Appendix 4

Record of Feedback Workshop

Appendix 4.1

Meeting Note Feedback for Koto Panjang Hydroelectric Power Project in West Sumatra

Appendix 4.1 Meeting Note Feed-Back Workshop for Koto Panjang Hydroelectric Power Project in West Sumatra

Place: BAPPEDA Office of West Sumatra Province

Time: 10.00 (a.m.) up to -15.00 (p.m.)

Moderator: Vice Regent of 50 Kota Regency (Wakil Bupati 50 Kota)

1. Introduction

- BAPPEDA of West Sumatra (Ir. Afriadi Laudin, M.Si)
- The staff from BAPPEDA of West Sumatra said that the head of BAPPEDA of West Sumatra could not attend the meeting because of appointment with the governor on official business.
- The meeting aimed to explain the result of SAPS Team dealing with Koto Panjang Hydroelectric Power Project.

1. H. Amri Darwis (Vice Regent of 50 Koto Regency)

He said that Koto Panjang problems were our problems that had to overcome together with all of us attending the meeting today. He asked the participants to give suggestions or additional input.

2. Mr. Minato (SAPS Team – JBIC)

- He hoped that the meeting would be one of the additional input or suggestions in solving Koto Panjang problems.
- Previously, he had meetings in Tanjung Balik and Tanjung Pauh village in March. He will be back to Indonesia in June-July 2002 to finalize the solution of the current problems. Hopefully all parties concerned with the Project would accept it.
- He hoped suggestions or input from the government staff and wali nagari (head of village) and all party involved in the Project would be the basis of solution.
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2. The Presentation of Study Result of Koto Panjang (preceding data)

- The presentation of the result of survey was made by Dr. Bambang Panudju from Bita Bina Semesta Inc as follows:

- The presentation should be done by UNAND (University of Andalas Padang). Unfortunately it did not attend the meeting.
- The study was the continued study that had done before. The study was conducted by NIPPON KOEI in cooperation with BITA BINA SEMESTA, UNIVERSITY OF ANDALAS PADANG. The study was conducted in a very tight schedule.
- The method of the study was holding PRA meeting asking for the villagers to participate. Average attendance was about 50 villagers per meeting. In addition, using questioner, survey for all of the household in Tanjung Balik and Tanjung Pauh was carried out. The questioner was elaborated by SAPS Study Team in English and translated into Indonesian language by BBS.
- There after the presentation made by BBS contained general points of view of PAFs on compensation, rubber plantation, water supply, MCK (the place of Bath Room, Washing Place, and Toilet), electricity, income, and NGO's involved.
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3. Discussions

1. Vice Head of Regentcy of 50 Kota, West Sumatera

- The government duty was to fulfill the promise.
- The government never wanted to make the people suffering.
- He hoped that the BAPPENAS could give some information about the budget to local government.
- The local people would be involved in the programs to solve the Koto Panjang Project's problems.
- The local government has had action program and it is still in need of additional input.

2. BAPPENAS (Mr. Syahrial)

He asked whether the questioners answered or written down by all household or not. Mr. Bambang answered that the questioner was answered or written down by the all household.

He said that in the previous BAPPENAS meeting attended by Vice Head of Regency of 50 Kota if the BAPPENAS had ever asked to make proposals for action plan to each department of the local government. Also at the meeting if West Sumatra's BAPPEDA office asked the local people to give suggestions or

additional input for the action plan in order to finalize it as Integrated Action Plan.

He also said that the commitment of central government to cope with the problems never stopped but there was budget problem.

Central government had asked to form a Task Force, but until now the ministers have not agreed formulation of the Task Force yet.

He hoped additional inputs from SAPS Team for the Action Plan is duly made.

The central government through each government department had ever asked to allocate the budget to solve the Koto Panjang problems.

3. SAPS TEAM (Mr. Minato)

The SAPS Team would ask to invite head of Villages (Wali Nagari) to clarify and finalize Action Plan in June-July period.

4. Wali Nagari of Tanjung Pauh (Mr. Dalpen Aperta)

- He asked or suggested that we had to find out the solution for the present problems.
- He hoped that NGO, JBIC, Local Government, and Local People would have to cooperate in formulating the Action Plan in June – July period.
- He also hoped that the local NGO of "Taratak" would have to get involved in formulating the Action Plan because they had known the problem since 1990.

5. Wali Nagari of Tanjung Balik (Mr.Petumas)

He suggested that the Action Plan had to be examined carefully before it was implemented.

6. NGO Bina Swadaya

The staff of Bina Swadaya informed that there were 12 persons of Bina Swadaya working in Riau Province and they also would visit to West Sumatra. They would be in Tanjung Balit and Tanjung Pauh till 14 April 2002.

Bina Swadaya would make action plan with local people based on the result of their study.

The method used was PRA (discussion with local people) and no questioner is used.

7. SAPS Team (Mr. Minato)

He said that NGOs from Japan are not involved in formulating Action Plan at the moment.

8. Vice Head of Regency

- He said that local government and the University of Andalas in Padang has made the Action Plan.
- The Action Plan would have to be completed by involving the local people.
- He also suggested to select the organizer for implementation of the action plan and do not want to wait until June – July 2002 when SAPS Study Team returns.

9. Wali Nagari of Tanjung Balik

He would accept whoever to be the organizer but the most important thing was the local people had to be involved.

10. NIPPON KOEI (Mr. Gejo / Team Leader)

He explained the schedule of study as follows:

- From March to April, 2002 impact survey is carried out.
- In the middle of April up to at the middle June, the team would finish the interim report.
- At the middle of June up to at the end of July, the team would come back to the project area in order to complete the Action Plan.
- In August, the team would make draft final report and then all parties should agree the Action Plan.
- In September, the team would hold final workshop to discuss how to implement the Action Plan.
- There are three parties in making action plan: government, SAPS Team, and PAFs assisted by NGO.

11. Wali Nagari of Tanjung Pauh

He said that the villagers of Tanjung Pauh seemed to have rejected to allow the NGO Bina Swadaya in doing survey.

12. Wali Nagari of Tanjung Balik

He said that there was no problem Bina Swadaya to survey in his village.

13. Vice Head of Regency

He requested to Wali Nagari Tanjung Pauh to discuss this problem with his villagers and he should inform him (vice head of regency) at least one week after the meeting.

14. JBIC (Mr. Nakagawa)

He asked about progress in forming TASK FORCE of BAPPENAS.

15. BAPPENAS (Mr. Syarial)

Task Force was established by BAPPENAS. With a decree its primary duty was coordination and monitoring including budget allocation. Regency of each province would be the appropriate agency in implementing the action plan as well as the center of information. He hoped that the people who would work for this department master the information on Koto Panjang Project. This Task Force would be lead by the Director of Budget with members from all party involved. The decree of Task Force officially would be signed in March this year.

16. Directorate General of Agriculture (Mr. Agus)

He asked about to clarify the minimum standard of soil in pH.

He had found some plantations road was broken, so if there was integrated program the road had to be serviced.

Based on budget for past four years the government had planted 1,508 ha, but there were 250 ha of area the plantation did not functioned well.

Rearrangement of plantation area's borders should be clearly established among the farmers and they would have to be responsible for each plantation plot.

He also clarified that there was a program to replant intercropping plants in the rubber plantation with extent 270 ha in 2002. But the area of the plantation was full of weeds so that it needed much budget.

17. Directorate General of Fishery

Developing the potentiality of fishery is needed in the reservoir of Kotapanjang Project. For example providing credit for floating cage is considered. Directorate General of Fishery have prepared training for the program. The floating cage is 7m x 7m and 3-5 m in depth. One floating cage could hold 300 kg of seedlings, which would lead to 1.2 tons of harvest. If four cages were provided per family, it would be 4,8 tons of harvest a year. The investment of each cage would be approximately 40-50 millions including feeding and seedlings. The program would encourage NGOs for implementation and monitoring.

18. PLN

There was no free charge for connecting electricity to each resettled families.

It was better to continue the Action Plan elaborated by all parties concerned with the problem.

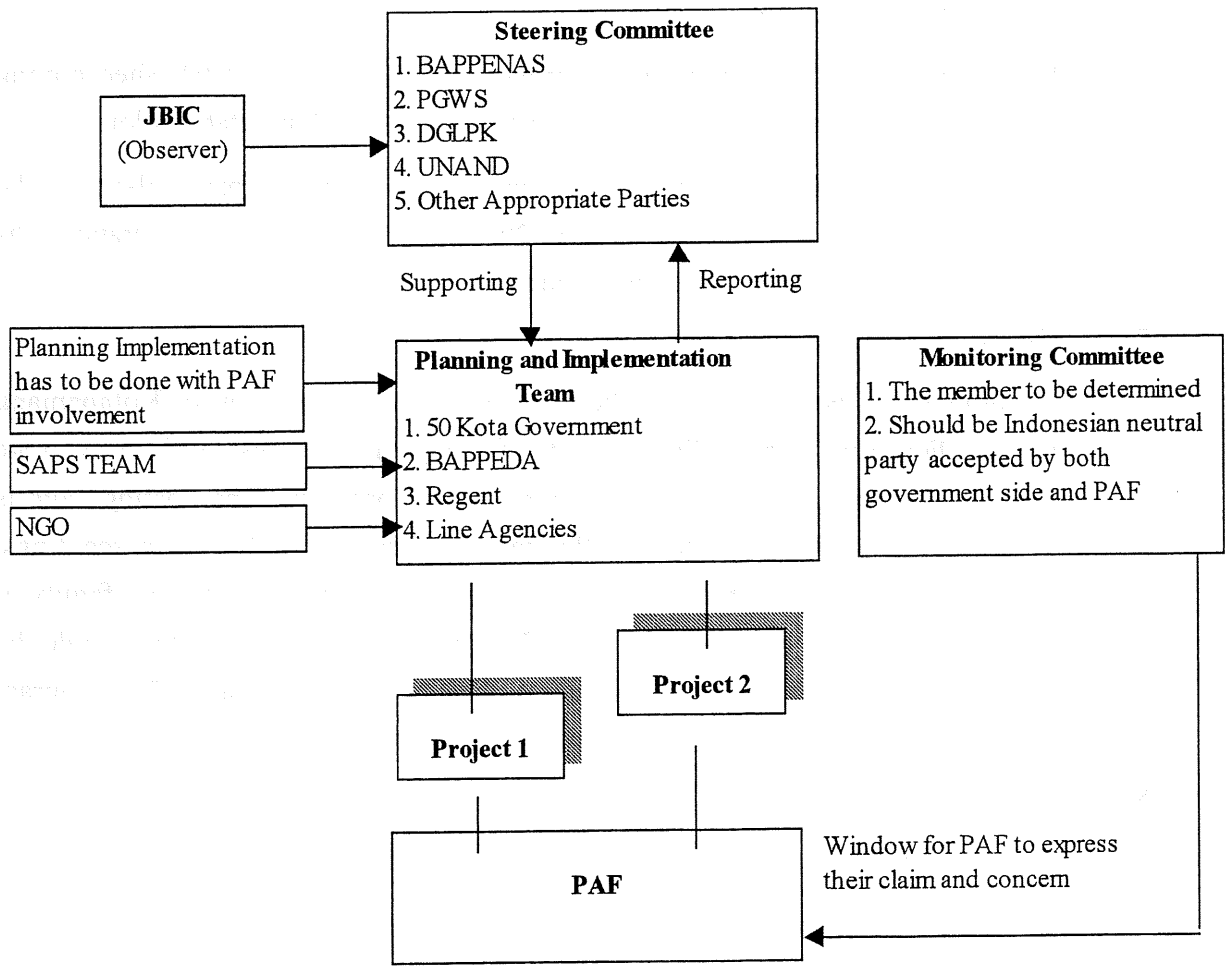
19. Local Government Office of Fishery and Ocean of West Sumatra

There had been program that enhance fishery in the reservoir of Kotapanjang Project.

The Local Government Office of Fishery and Ocean had ever tried hatchery in the reservoir but net was eaten or destroyed by large fish such as Ikan Buntal. The fishery office suggested that the provincial government should play a role of fishery as organizer and BAPPEDA as a main responsible organization for the program. The technical responsibility would be on the related technical institutions of fishery.

4. Conclusion

1. All meeting participants had agreed to modify and complete the Regency Government's Action Plan.
2. The organization of solving the Koto Panjang Project's problems as explained in the previous meeting was as follows:



1. Elaborating a functional Action Plan was the responsibility of local government. The details of the program for implementation of Action Plan had to be reported in the middle of July to Local Government. But, the exactly time would be confirmed by SAPS Study Team.
2. In formulating Action Plan, local people will have to get involved.
3. In the mean time the Action Plan was elaborate, each government department program should make progress.

LIST OF PARTICIPANTS

DAFTAR ABSEN

Rapat : Presentasi hasil survey study SAPs Pembangunan Proyek PLTA Koto Panjang Kab. 50 Kota .

Hari/Tanggal :

No	Nama	Instansi	Tanda Tangan
1			
2	Danang W. Lat-	Bappeda SB	[signature]
3	Yurizal	Dinas Trkim	[signature]
4	IRFAN MUNIR	BPM. Prop	[signature]
5	Agus A	Dit. Jen BP. Bun Jakarta	[signature]
6.	Yazarwin Yusuf	DIPERTABUN SUMBAR	[signature]
7	Willybrordus. T. PM.	Dit. RLKT. DEPHUT.	[signature]
8.	Eko Gatnut W.	BRLKT A/K	[signature]
9	ISMAN TANDRI, ST	BPN Sumbar	[signature]
10.	ZULFIKAR. Sy.	BPAN. Tg. Pauh.	[signature]
11	ADLY FAUZI, BA	Camat Pangkalan	[signature]
12.	Dalpen Aperta	W. Nagari T. Pauh	[signature]
13.	Petrimus.	W.N. Tanjung Balit	[signature]
14	Agung Prasetio	Bina Swadaya - Jakarta	[signature]
15.	Syahrial Laetan	Bappenas	[signature]
16	SUTISNA HERMAWAN	PLN PST	[signature]
17	YUSUP SUGILAR	SETDIT PERIKANAN	[signature]
18.	Tirial M	Kebersih & Peril...	[signature]
19	Agus A. Budhiman	Directorate General of Aquaculture - Dkt	[signature]
20	Tetsunari Gf	JBEC SAPS Team	T. [signature]
21	Ano Sumarno	BBS	[signature]

No	Nama	Instansi	Tanda Tangan
23	YUSRI NOER	Dtsnah Sumtr	
24.	[illegible]	[illegible]	
25	Afrizal Lauddin	Bappeda Tk	
26.	BAMBANG PANUDJU	BBS	
27	S. Hinato	SAPS Tesaur	
28	h. amri [illegible]	Pemda 50 Kota	
29	SHIGEO NAKAGAWA	JBIC Jakarta	
30	ISRIN AGOES	DINAS TARKIM	
31	Hefdi	Bappeda Sumbar	

Appendix 4.2

Feedback Workshop for Impact Survey JBIC-SAPS Survey Team: PLTA Koto Panjang

Apppendix 4.2 Feedback Workshop for Impact Survey JBIC-SAPS Survey Team: PLTA Koto Panjang

Place: Provincial Bappeda Meeting Room 3rd Floor, Jl. Gajah Mada 200

Date: Thursday, 28 March 2002

Time: 09.00 West Indonesia – finished

Moderator: Ir. Sakti Hutabarat, Magr Econ.

Notulen: Ms. Nessy

Peserta :

1. Head of Natural Resources Section of Bappeda (Representative)
2. Bappenas
3. Directorate General of Plantation
4. Food crops service
5. Plantation service

Head of Village/Representative of Village

7. Surveyor/ UNRI Team
8. Team JBIC – SAPS
9. NGO
10. PT. Bita Bina Semesta

1. Introduction

The Head of Natural Resource Section explained that the Head of Bappeda could not attend the meeting due to ill health. Hence, chairing of the meeting has been delegated to the Head of Natural Resources.

1. The objective of the study is to identify the impacts arising from the Kotopanjang HEPP development.
2. In order to preserve the Kotopanjang project's image, it is requested that the actual field conditions be given.

Currently, 3 groups of activities are being implemented:

- JBIC Team in collaboration with PT. Bita Bina Semesta and UNRI.

- Bina Swadaya NGO
- Government

1. The meeting is expected to provide inputs for the sustainability of the post Kotopanjang HEPP development. Clarification from JBIC (Mr. Minato)

Objective:

- To evaluate the Kotopanjang HEPP, which to date has operated for 8 years.
- For ± 2 years surveys have been undertaken around Kotopanjang, hence the next step is :
  - Action plan ~ for the future .
  - Resolving the site problems.
- At the sane time PT.Bita Bina Semesta and the University of Riau have conducted impact survey and data tabulation.
- In addition, PRA Meetings and household statistical questionnaires were conducted in order to obtain better results.
  - Questionnaire : carried out by students
  - Hence inputs from the students that performed the survey are also expected.
  - Participation of the Village Heads/ Village Representatives is also expected.

2. Presentation

Presentation by Ir. Sakti Hutabarat, Magr. Econ. ~ of UNRI

a) Description on the study boundary of the Kotopanjang HEPP project

Description of the locations of the villages' prior and after resettlement as well as the social economic impacts arising from the resettlement.

b) Benefits of the Kotopanjang HEPP project

- High electricity demand
- The price of fuel that is relatively expensive, hence non-fossil fuel generated electricity is needed.
- Increase of regional economic activities.

c) Efforts that could be carried out to ameliorate conditions of the communities

affected by the project:

- It is expected that the level of welfare is higher or at least the same as before the relocation.
- ± 4152 households in Riau were relocated
- Compensation Scheme
- Land : 4000 m^2
- Plantation area : 2 Ha
- Housing: 7X 7 m (for those with inundated houses)

d) Conclusion from the PRA meeting conducted at each village are:

- Disappointing water facilities
- Non-functioning MCK facilities
- Some of the rubber plantation areas were not inundated.

e) Objective of the study

To collect data and facts on the social-economic issues confronting the community.

f. Methodology

- Implementing PRA Meetings at 14 villages and 2 additional villages as comparative study, this being at Karya Bakti and Gunung. Malelo
- Distribution of questionnaires by UNRI students (consisting of 50 enumerators)
- Issues that were investigated
- Land Compensation
- MCK
- Rubber plantation
- Electricity
- Housing
- Transportation
- Income

3. Impression of Each Representative

a) Junior Expert : (Gulat)

State of the community from relocated villages: decline in work mentality.

b) Enumerator from UNRI (Abdul Halim)

Currently many of the community have lost their main livelihoods.

Suggestion: Provide capital + community character building in order to increase welfare.

c) Enumerator from UNRI (Nasukha)

Observation of Batu Bersurat :

Decline in the welfare of the entire community. This is attributed to scarcity of livelihood. Before the project, diversification of land could still be done.

The only current source of the people's income is from catching fish at the lake.

It seems that governmental aid does not correspond to the needs of the community.

The Government provided fish instead of the rods.

Suggestion : The government should provide plant seedlings, land and planting.

Aid that was provided is consumptive in character.

Aid should be directly given to the community on individual basis/HH ~ requires transparency.

It is hoped that the Government gives special attention to education (school)

Feedback from the local community .

d) Enumerator of UNRI (Sudisman)

Village that was observed : Tanjung Village

The community moved of their own accord.

It is hoped that the government will fulfill their promises.

e) Enumerator from UNRI (Zamrizal)

Village that was observed : Gunung Bungsu Village

The plasma provided by the Government was of very bad quality .

Problem: The boundary between Gunung Bungsu and the central village should be re-defined.

f) Junior Expert (Ahmad Rivai)

Impression from PRA Meeting

- The community appears to be very disappointed.
- Example : Beforehand many types of livelihoods were available. Currently only a few is accessible.
- Road facility (positive impact) from the Kotopanjang HEPP development.
- Water facility

PIR Villlage ~ community economy is better than Plasma.

g) Conclusion of the moderator against the impressions presented (by Ir. Sakti Hutabarat) :

Four (4) elements should be recommended :

- More attention should be given against Natural Resources ~ affects soil fertility.
- Planning ~ for marketing of farm products.
- Market oriented, future programs should give heed to market accessibility
- Organizational structure at the village level should be ameliorated.

4. Remarks - Session I

1. Representative from Bappenas (Bapak Syahrial.Luthan)

90 % of the project area of the Kotopanjang HEPP development is located in Riau and 10 % is located in West Sumatra. However, more problems are found in West Sumatra than in Riau. In general, conditions in Riau is relatively better. However, the water condition is currently insufficient ~ a solution must be found.

Statements advanced by various representatives who queried on:

- Furnishing of assistance.

  Example : Plantation

- Mechanism for the realization of aid

- Should it be PIR/Plasma pattern.

How did the surveyors perceive remarks made by the community when they were distributing the questionnaires, as emotional people tend to give only negative statements.

2. Head of Team from UNRI (Ir. Sakti Hutabarat)

Perception against the respondents answers: Should not be 100 % trusted.

Because: The community has often been visited by surveyors beforehand, hence the local community's opinion could be biased/structured from the past events.

3. Kampar Regent represented by Bappeda Level II of Kampar

- Has not seen the action plan from the meeting that took place during the last fasting month at Bappenas. The meeting was to prepare integrated coordination between the central and regional agencies to manage the impacts of the Kotopanjang HEPP project.
- Should a "Desa Binaan" or Cultivated Village be carried out, which in turn could be implemented by the Research team of UNRI ?

4. Food Crops Agency of Kampar Regency (Bpk Zamrih)

- What is the parameter used to assess the prosperity level of the community prior to and after implementation of the Kotopanjang HEPP Project.
- Present condition : Aptness of the community to accept and implement the Kotopanjang HEPP Project (in modules) is still insufficient/lacking. *With respect to the Kotopanjang HEPP Program, this is already available.*

Suggestion : Small groups should be given capital + instruction.

5. Plantation Agency of Kampar

- Failure of rubber plantation has occurred twice already at the Kotopanjang HEPP area, notably the Batu Bersurat Village success level is ± 50%.
- Condition : the plantation area is located far from the settlement area. Hence, what is the solution to this matter ?

- Utilization of the Kotopanjang HEPP Area for tourism should be considered, as this could ameliorate community welfare (diversification of livelihood).

6. Plantation Agency of Riau (Bpk Faizal)

Person-in-charge of the plantation transition period

Impression: that 3446 households do not want to move from the location area (PIR Pattern). 2 Ha/Household has been planted with rubber (covering 6824 Ha) ? → 11 Villages.

Yearly budget spent by the Regional Government for :

2000 : 11,2 B
2001 : 9,6 B } 31 Billion allocated funds for plantation.
2002 : 8,9 B

7. The rubber trees are now ± 2 years old.

It is expected that the trees will begin to produce in ± 4 years time.

For marketing : no problems.

8. Head of Village of Muara Mahat Baru, District of Tapung (Abas)

Project teams consist of 2, i.e. :

a. JBIC (Official) from Japan

b. From Japan in association with an NGO from West Sumatra, this being Taratak → Ade, LTH of West Sumatra

9. Head of Muara Pongkai Village (Hadi Nalawi)

Promises from the Governor's administration (Saleh Jasit)

- Free electricity
- Clean water
- MCK

However in reality, none of the above was realized

10. Head of Binamang Village (Ahmad Dahlan)

Notably for Binamang Village, the economic condition of the community is very

precarious. 90 % of the community lives from fishing.

11. Head of Gunung Bungsu Village (Zamhil)

- It is hoped that with current conditions being as it is, the associated agency will participate.
- The error of the HEPP Team, village boundary must be followed up.

12. Head of Pulau Gadang Village (Sofyan)

- The rubber trees were planted by contractors. Hence, only the roadsides were planted with trees. The remaining were dumped in the swamplands.
- Problems with provision of clean water.
- It is hoped that the government will provide capital notably for the development of "patin" fish cultivation.
- The people's housing should be reviewed prior to developing agro-tourism in the Kotopang HEPP area. It is hoped that Mr Gejo does not just give recommendations to the government.

13. Head of Koto Mesjid Village (Abdul Kadis)

- To procure information on actual conditions, the village leaders should be approached, as they are the ones that really know the conditions prevailing in the village.
- To the plantation Agency : please provide aid for maintenance.
- Please give attention to providing working opportunities for the youths of the village.

14. Head of Ranah Sungkai Village (Damiri)

- Please follow up the issues notably those related to the economy.
- Please give attention to providing working opportunities for the local youths.

15. Head of Lubuk Agung Village

We are not satisfied with the presence of the students, as what we wish for is the presence of the Officials so that we can address them directly with our complaints.

16. Head of Pongkai Baru Village (Syahruzin)

Problem currently confronting our Village : scarcity of food (scarcity of livelihoods.

- Land compensation that is still not settled : 175 households.
- The rubber plantations are only 2 years old. It is hoped that the living allowance ("jadup") be extended until the trees start to produce.
- Village boundary should be established.

17. Head of Tanjung Alai Village (Syarif)

It is hoped that future solutions be given for:

- Please pay the people's land compensation
- Working opportunities
- Living allowance (" jadup") that was promised by the government should be realized.

18. Head of Mura Takus Village (Amir D.)

Livelihood: income ranging from Rp 30.000,- to Rp 50.000,-/week is not sufficient to support the families, hence aid is solicited for:

- Cages
- Net
- Fish

19. Head of Kota Tuo Village

It is hoped that training facilities be provided for the community affected by the Kotopanjang HEPP project.

20. Head of Tanjung Village (Gusandri)

- 45 Households: obtained compensation but did not receive compensation for houses and other facilities.
- It is hoped that promises to provide facilities will be realized.
- Please establish the boundary between Gunung Bungsu and Tanjung Villages.

21. Head of Pongkai Istiqomah Village (Darlis M.)

- Plot 0013 → has not been compensated
- Please accelerate the aid that is going to be given.

22. Head of Batu Bersurat Village (Hamiz)

- What is the best way to improve the economy of the communities affected by the Kotopanjang HEPP project.
- Please do not use us anymore as the object of surveys.

23. Head (Camat) of XIII Koto Kampar District

With respect to the Socio-economic aspects of Kotopanjang HEPP :

Measures that should be taken :

- Near future
- Provision of living allowance: need 28 ton/month of rice @ Rp 1.000/kg
- Provision of capital for ventures
- Almost 80% of the project affected families live below the poverty line.
  - PPK (Proyek Pengembangan Kecamatan or District Development Project) through submission of proposals. The community catches fish at the Lake, and is not considered as independent fishermen, hence do not need permits to catch fish.
  - Sustainability of the rubber plantations must be considered.
  - Roadways must be developed along the lake sides to assist sustainability of the people's lives.
  - Many children have dropped out of school. Scholarships are needed.
  - Compensation
  - Livelihoods : previously ± 60 peopled were trained at PU but are now not used.

5. Remarks - Session II

1. Riau Mandiri - NGO (Amsil)

- Is it possible that we obtain the reports/ narratives of the PRA Meetings ?
- It is hoped that a Special team could be established that really cares about the impacts arising from the Kotopanjang HEPP project such as the Forum Korban Pembela Dampak Koto Panjang. (Front for the Defense of the Victims Impacted by Kotopanjang).

- When preparing the programs, the village heads should be included in project development.
- Establishment of village boundary should be followed up.

2. Bina Swadaya - NGO (Khadir)
   - Problems have arisen because of actions. Hence to overcome this matter the attention (participation) of the relevant agencies is required.
   - The community should be involved in the planning. Implementation of community activities is hoped to the subject of development and construction of the impacts from Kotopanjang.
3. PLN (State Electricity Company)
   - With the realization of the Kotopanjang HEPP Project, PLN feels very fortunate.
   - Free electricity is not a policy of the company, hence the mechanism for this must be reviewed in the BUMN. However, when electricity is back to normal, it should be reconsidered. Likewise for agro-tourism in the Kotopanjang HEPP Area.
4. PEMDA (Regional Government)
   - The communities affected by the Kotopanjang HEPP project require consensus on policies.
   - APBD has allocated funds for improving the economy/ capital for community food farming ventures.
5. BAPPEDA

   A special team will be appointed to resolve the issues arising from the Kotoppanjang HEPP project.
6. Riau Mandiri NGO

   This meeting must have an output.
7. PEMDA (Regional Government) of Kampar

   The Japanese Team should not raise issues that make it appear that PEMDA at Kampar Level II is doing nothing.
8. PLN (State Electricity Company)

   It is hoped that gambir trees are not planted in the Kotopanjang Dam/Lake area, as this will cause sedimentation of the lake.

9. JBIC Team from, Japan (Mr. Nakagawa)

After realization of this project, Indonesia was affected by an economic crisis. Hence, the Japanese government could not do much of anything. Mr. Nakagawa extended his gratitude to the Village Heads for providing inputs related to the development of subsequent programs. He is very impressed with the dialogue. It is hoped that the Government and Bina Swadaya NGO can carry out similar things.

The Team will return to Japan next month. However, next July the team will return with action plans for the development of this region. Mr Nakagawa stated that various other teams will also do the same things, thus he asks that the communities be patient as the good cooperation of all is needed.

SAPS Team → will return in July.

4. Closing

1. BAPPENAS

- The Steering Committee will follow up the meeting and will have assistance from the Kotopanjang Clearing House (Information Center). Hence, no misleading information.
- More emphasis will be focused on economic activities.
- Action plan has been prepared but still requires reediting.
- A tested action plan is expected.
- It is expected that the action plan will involve all stakeholders (community).

7. Conclusions

The Kotopanjang HEPP Project affects the lives of the people, notably with respect to socio-economic aspects.

Dominating issues are:

a. Level of community welfare

b. Decline of community mentality at the new location, the community appears resigned to their situation.

c. Governmental pledges have not been fulfilled such as :

- Free electricity

- MCK
- Clean water
- Plantation
- Transportation (road facilities).

- Concrete action plan is required to restore the trust of the project affected families.

- Improving the economy of the project affected families must be given serious attention, i.e.:

- Potentiality of local natural resources, which is associated to the fertility level of each project affected village.
- Matured planning on marketing of farm products that could be developed at project affected villages.
- Market orientation for the products produced by the villages.
- Restructuring of village organizations

LIST OF PARTICIPANTS

DAFTAR HADIR
WORKSHOP JBIC-SAPS PLTA KOTO PANJANG
Tanggal 28 MARET 2002

NO	NAMA	INSTANSI	TANDA TANGAN
1.	T. Goji	JBIC SAPS Team	
2.	S. Minato	—〃—	
3.	NAKAGAWA	JBIC Jakarta	
4.	Mucchtar	JBIC - SAPS	
5.	BAMBANG PANGUDI	BBS / JBIC	
6.	A. Rachman	BBS	
7.	T. ZOHAR USMAN	PUSPEDAL I	
8.	SYAFRUDDIN NASUTION	LEMLIT. UNRI	
9.	Titania Nugroho	LP - UNRI	
10.	Meldon, Glees	Brikes	
11.	KARDI. A	KOMPRASUC	
12.	M. EVAN ST	BAPEDAL Prop. Riau	
13.	Heri Zach	BAPPEDA Prop.	
14.	GWR. RICHEE W	Balitbang	
15.	R. Faizal	Disbun Riau	
16.	Agung P	Bina Swadaya Jakut	

17.	Andi Rohman K	Bina Swadaya	
18.	BME Manurung	UNRI	
19.	AHMAD RIFAT	UNRI	
20.	S. Simangunsong	Distan Prop	
21.	Herlina Siregar	Distan Prop	
22.	C. Sibarani	BAPPEDA - Inhil	
23.	Irdan	Bid III - Bappeda Riau	
24.	WARNIATI	Dinas Pertanian & Kelautan Prop Riau	
25.	Tony Ht barat	PLN Sektor P. Baru	
26.	MUH. ADI UTOMO	STE P2D / DIT. PM BAPPENAS	
27.	Fifin Arfiana	UKSDA	
28.	ANTONO. S	PLN SEKTOR PKU.	
29.	Nukman	UKSDA Riau	
30.	SAPTO NUGROHO	BAPPEDA PROV RIAU	
31.	Syafrinaldi	Bappeda Kab. K.	
32.	Hasanuddin	Bappeda Kabupaten	
33.	[illegible]	BWD - V	
34.	P. Suranto	WWF	

35.	ABDUL KADIR	Pem. MASJARAKAT	
36.	Abbas Ab	Kep Des Tj Ali	
37.	BAKARUDIN	Pem Masyarak	
38.	JAMHIR	PEM. MASY.	
39.	MHD. YATIM.	TOKOH MASYARAKAT	
40.	BAKARUDIN	KEP DESA	
41.	AMIR. A	Kep. DESA.	
42.	Mali B	Kepem Des.	
43.			
44.			
45.			
46.			
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49.			
50.			
51.			
52.			

53.	ZULHER	Bappeda Kpr.	
54.	Nefli Zal	— " —	
55.	Syamsuri Zal, Hs	— " —	
56.	M. Syukur	Dishut Kampar	
57.	Syafrizal	Dishut Kampar	
58.	ABD. JALIL S	Dishut Kampar	
59.	ILYAS	Dishut Kampar	
60.	Zaiful Yusri.	BPN. Kpr.	
61.	Patriarun	DLS Pekanbaru	
62.	[illegible]	P. Rayeu	
63.	H. ZAMRIKAS	PERTAMINA	
64.	Yasmimar, SH.	Kantor Camat Tk	
65.	Sri Mulyati I	Bappeda Kpr Hulu	
66.	Heryanto	— "	
67.	Walder. M.	— " —	
68.	Dahniar	— " —	
69.	Peri A.	— " —	
70.	Supriadi	— "	

71.	Sari-4 Lestari	Bappeda Prop.	
72.	Syahrial Loetan	Bappenas	
73.	SUTISNA HERMATWAN	PLN PUSAT	
74.	Agus H.	Dit. Jen. Perhubungan	
75.	RAMSES HARINJA	PLN-PUSAT	
76.			
77.			
78.			
79.			
80.			
81.			
82.			
83.			
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86.			
87.			
88.			

107.	H. NAHRAWI	Kepala Desa Pangkalan	
108.	Zulbardi	Ninik Mamak Pangkalan	
109.	ABBAS. G.	KADES. Tapung	
110.	MARGONO	LKMD.	
111.	Ahmad Rivai	Ninik mamak pangkalan sibenuang.	
112.	Syaiful Zein.	Kades Pangkalan	
113.	JARLIS. U	Polisi Hutan	
114.	H. Syamsuar	LKMD Pangkalan Lesung	
115.	AHMAD DAHLANHURI.	KADES BINAMANG	
116.	RUSDI'EIN	Kades.	
117.	NURHAMIDI	KADES SB. SIBUAK.	
118.	NUR BITNUR	pemuka masyarakat	
119.	GUSSAMDRI	KADES - Tanjungsani	
120.	RUSLI	SEKDES	
121.	H. Hamdani	Camat	
122.	AWALUDIN	KADES. KOTO TUO	
123.	SYOFIAN DT. MAJO SATI	KADES. PL Gadang	
124.	DAMIRI	KADES. Air Sirah	

125.	FADHILAH REMEDY	MAHASISWA	[signature]
126.	YOSERIZAL	FISIPOL UNRI	[signature]
127.	Lumen Munzi	TAN UNRI	[signature]
128.	ABDUL HALIM	Mahasiswa	[signature]
129.	Zefy.	Riau Mandiri	[signature]
130.	Tomi	Riau Mandiri	[signature]
131.	Joniwidodo	mahasiswa	[signature]
132.	ZAMIRIZAL	FAPERTA UNRI	[signature]
133.	MASKA AZWIR.	Mahasiswa.	[signature]
134.	Hendri Darmawan	FAPERTA UNRI	[signature]
135.	ZULFAHMI	MAHASISWA	[signature]
136.	M. TOHA	MAHASISWA	[signature]
137.	ADI CAHYADI	MAHASISWA	[signature]
138.	JON HENDRI	MAHASISWA	[signature]
139.	RUDHIYAN NAFIS	MAHASISWA	[signature]
140.	Gus Saudri	KADES TANJUNG[illegible]	[signature]
141.	SUASMAN	Mahasiswa	[signature]
142.	PURWONO.	MAHASISWA.	[signature]

143.	ELVITRA MUTIARA PUTRI	Mahasiswa	
144.	YENDRI PURNAMA	MAHASISWA	
145.	Nasrikha	Mahasiswa	
146.	Eri Hartoni	Mahasiswa	
147.	Muijeni	Mahasiswa	
148.	A. NUR CHAIRUN. R	Mahasiswa	
149.	Dedy SURYANA	MAHASISWA	
150.	Lucianto Sapari	Mahasiswa	

Appendix 5

Record of Feedback Workshop

Appendix 5.1

Data Sheet for Water Supply System

Appendix 5.1 Water Supply System - Data Sheet Template

A General

Name of Village
District
Province
Dates surveyed by NGO
Dates visited by study team
Topographic map reference 1:50,000
Topographic map 1:10,000 available ☐ no ☐
GPS data (true north)
Reference point Elevation (m) Lat 00^0 Long 101^0

_____
_____
_____
_____
_____

Water use	1990	2000
Number of households	259	
Population (estimated 5 persons per house)	1295	
Demand per person (liters/day)	60	
Demand per household	300	
Total domestic water demand	77.7	

B Water supply facilities provided at time of resettlement and still in use

Ministry of transmigration
Engineering report for resettlement area, yes ☐ no ☐

Engineering study drawings & maps yes ☐ no ☐

number of shallow wells with bucket _____
number of wells per family _____

Used for drinking and cooking yes ☐ no ☐
Used for washing and bathing yes ☐ no ☐
Does the well run dry ? yes ☐ no ☐

Water quality for shallow wells
- bad taste wet season ☐ dry season ☐
- color _____ wet season ☐ dry season ☐
- bad smell wet season ☐ dry season ☐
- other _____
- water quality is good wet season ☐ dry season ☐
- average depth of water in well wet season _____ dry season _____

Does each household have a storage cistern yes ☐ no ☐
Does each house collect rainwater yes ☒ no ☐
Volume (liters) _____ Type: _____

C Additional water supply facilities provided under OECF loan SPL-V/VI 1993-94

Engineering study report & drawings yes ☐ no ☐

c1 ***Source:***

surface water ☐ name of stream stream _____

borehole ☐ borehole depth (to be confirmed) _____ m

Is water quality data for the BH available? yes ☐ no ☐

Location Elevation (m) Lat 00^0 Long 101^0

c2 ***Extraction method:***

pumped intake ☐ infiltration well next to stream ☐

gravity intake ☐ earth dam ☐ concrete weir ☐

For pumped extraction, what is the pump capacity? Q _____ m3/min

Head _____ m

Is the pump is operational? yes ☐ no ☐

broken ☐ the pump is missing ☐ not in use ☐

c3 ***Raw water pipeline (source to treatment)*** no transmission pipeline ☐

Location	Size	Materials	Length m

installation: Above ground surface ☐ below ground surface ☐

condition: Leaking ☐ not in use ☐

c4 ***Treatment facility:*** not in use ☐

Pre-treatment: chemical coagulation ☐ sedimentation tank ☐

Filtration: slow sand ☐ rapid sand ☐

Chemical used ? lime ☐ alum ☐

Treated water storage: in ground concrete reservoir ☐ capacity _____ m3

filter in use but storage by-passed ☐ not in use ☐

Location Elevation (m) Lat 00^0 Long 100^0

_____

c5 ***Distribution system***

booster pumps: Qty: 2 Q _____ m3/min

Head _____ m

Is the pump is operational? yes ☐ no ☐

broken ☐ the pump is missing ☐ not in use ☐

diesel generators Qty 2 generator rating _____ kW/kVA

engine rating _____ HP

Is the generator operational? yes ☐ no ☐

broken ☐ missing ☐ not in use ☐

_____

_____

c6 *Distribution piping map:* available ☐ no ☐

Location	Size	Materials	Length m
main feeder			
branches			
laterals			

installation: Above ground surface ☐ below ground surface ☐

condition: Leaking ☐ not in use ☐

How is the water delivered : individual house connection ☐

to public cistern/hydrant ☐

number of public hydrants _____ number of houses per public hydrants _____

	Elevation (m)	Lat 00^{0}N	Long 101^{0}E
highest point in the village	_____	_____	_____
lowest point in the village	_____	_____	_____
point farthest from treatment facility	_____	_____	_____

D <u>Catchment dams provided by GOI - PU</u> yes ☐ no ☐

Engineering study report yes ☐ no ☐

Engineering drawings yes ☐ no ☐

d1 *Source*

River or other surface water by gravity ☐

name of river or stream _____

Spring by gravity ☐

Structure earth dam ☐ concrete weir ☐

Notes on conditions of check dam and pond

_____

_____

_____

_____

Source Location Elevation (m) Lat 00^0 Long 101^0

_____

_____

_____

_____

For Spring : what is spring yield wet season _____ dry season _____

spring yield not measured ☐

is the spring protected ? yes ☐ no ☐

what kind of protection permanent ☐ temporary ☐

describe : _____

For pond behind check dam

Surface area of pond _____ m2 Depth of pond _____ m

Estimated storage capacity _____ m3

Is there any water catchment scheme to protect the water source

yes ☐ no ☐

Is the source also used for other purposes

for irrigation yes ☐ no ☐

for watering animal yes ☐ no ☐

Does the source run dry ? yes ☐ no ☐

When does the source run dry _____

How many days without rain before the source runs dry ? _____ weeks

How long does the source run dry ? _____ weeks

d2 ***Raw water pipeline (from source to filter)***

Location	Size	Materials	Length m

installation: Above ground surface ☐ below ground surface ☐

condition: Appears good ☐ Leaking ☐ not in use ☐

d3 ***Slow sand filter*** with storage tank ☐ number of units in use 2

Location Elevation (m) Lat 00^{0} Long 101^{0}

_____

_____

_____

Dimensions of storage tank: Capacity

Wall materials : ferro cement ☐ brick ☐ stone ☐

Roof materials : galvanized corrugated sheet metal ☐ no roof ☐

Operating condition :

_____

_____

_____

Is the water flowing into reservoir clean ? yes ☐ no ☐

Is the reservoir structure in good condition yes ☐ no ☐

Reservoir is connected to piped distribution system yes ☐ no ☐

Appendix 5.2 Water Supply System - Data Sheet for Pulau Gadang

A General

Name of Village		Pulau Gadang
District		Kampar
Province		Riau
Dates surveyed by NGO		8 - 14 April '02
Dates visited by study team		22 April '02
Topographic map reference 1:50,000		1816 - 14
Topographic map 1:10,000	available ☐	no ☒
Land System	: MPT (55) close to TWH (42)	
Land Form	: (55) asymetric & unoriented point of sediment.	
	(42) Undulating plain on mixed sediment.	
Lithology	: (55) sandstone, shale, conglomerate, siltstone.	
	(42) shale, conglomerate, mudstone, sandstone, siltstone.	

GPS data (true north)

Reference point	Elevation (m)	Lat 00^0	Long 101^0
PG S1 ph - stream	86	20.12	50.23
PG 1	124	20.15	49.93
PG 2	112	20.34	49.61
PG 3	101	20.78	49.00

Water use

	1990	2000
Number of households	592	
Population (estimated 5 persons per house)	2960	
Demand per person (liters/day)	60	
Demand per household (liters/day)	300	
Total domestic water demand (m3/day)	177.6	

B Water supply facilities provided at time of resettlement and still in use

Ministry of transmigration

Engineering report for resettlement area,	yes	☐	no	☒
Engineering study drawings & maps	yes	☐	no	☒
number of shallow wells with bucket				83
number of families per well				4
Used for drinking and cooking	yes	☒	no	☐
Used for washing and bathing	yes	☒	no	☐
Does the well run dry ?	yes	☒	no	☐

Water quality for shallow wells

bad taste	wet season	☐	dry season	☐
color	wet season	☐	dry season	☐
bad smell	wet season	☐	dry season	☐
other				
water quality potable	wet season	☒	dry season	☒
average depth of water in well	wet season 4 m		dry season	
Does each household have a storage cistern	yes	☐	no	☒
Does each house collect rainwater	yes	☒	no	☐

Volume (liters) 200 liters Type: plastic rain barrel with open top

C Additional water supply facilities provided under OECF loan SPL-V/VI 1993-94

Engineering study report & drawings yes ☐ no ☒

One WTP serving Pulau Gadang & Koto Mesjid

c1 ***Source:***

surface water ☒ name of stream stream Silam river

borehole ☐ borehole depth (to be confirmed) _____ m

Is water quality data for the BH available? yes ☐ no ☐

Location		Elevation (m)	Lat 00⁰	Long 100⁰
PG S1	STM intake	86	20.12	50.23

c2 ***Extraction method:***

pumped intake ☒ infiltration well next to stream ☒

gravity intake ☐ earth dam ☐ concrete weir ☐

For pumped extraction, what is the pump capacity? Q _____ m3/min

Head _____ m

Is the pump is operational? yes ☐ no ☒

broken ☐ the pump is missing ☐ not in use ☒

c3 ***Raw water pipeline (source to treatment)*** no transmission pipeline ☐

Location	Size	Materials	Length m

installation: Above ground surface ☐ below ground surface ☐

condition: Leaking ☐ not in use ☒

c4 ***Treatment facility:*** not in use ☒

Pre-treatment: chemical coagulation ☐ sedimentation tank ☐

Filtration: slow sand ☐ rapid sand ☐

Chemical used ? lime ☐ alum ☐

Treated water storage: in ground concrete reservoir ☐ capacity _____ m3

filter in use but storage by-passed ☐ not in use ☐

Location	Elevation (m)	Lat 00⁰	Long 100⁰
PG S1	86	20.12	50.23

c5 ***Distribution system***

booster pumps: Qty: Q _____ m3/min

Head _____ m

Is the pump is operational? yes ☐ no ☒

broken ☐ the pump is missing ☐ not in use ☒

diesel generators Qty generator rating _____ kW/kVA

engine rating _____ HP

Is the generator operational? yes ☐ no ☒

broken ☐ missing ☐ not in use ☒

c6 *Distribution piping map:* available ☐ no ☒

Location	Size	Materials	Length m
main feeder			
branches			
laterals			

installation: Above ground surface ☐ below ground surface ☐

condition: Leaking ☐ not in use ☒

How is the water delivered : individual house connection ☐

to public cistern/hydrant ☒

number of public hydrants _____ number of houses per public hydrants _____

		Elevation (m)	Lat 00^{0}N	Long 101^{0}E
highest point in the village	PG 1	124	20.15	49.93
lowest point in the village	PG 3	101	20.78	49.00
point farthest from treatment facility				

D **Catchment dams provided by GOI - PU** yes ☐ no ☒

Appendix 5.1 Water Supply System - Data Sheet for Koto Mesjid

A General

Name of Village			Koto Mesjid	
District			Kampar	
Province			Riau	
Dates surveyed by NGO			8 - 14 April '02	
Dates visited by study team			22 March '02	
Topographic map reference 1:50,000			0816 - 14	
Topographic map 1:10,000		available ☐		no ☒
Land System	: MPT (55) close to TWH (42)			
Land Form	: (55) asymetric & unoriented point of sediment.			
	(42) Undulating plain on mixed sediment.			
Lithology	: (55) sandstone, shale, conglomerate, siltstone.			
	(42) shale, conglomerate, mudstone, sandstone, siltstone.			

GPS data (true north)

Reference point		Elevation (m)	Lat 00^0	Long 100^0
KM S1	bridge	85	20.10	51.00
KM 1	village center	93	19.85	50.69

Water use

	1990	2000
Number of households	259	
Population (estimated 5 persons per house)	1295	
Demand per person (liters/day)	60	
Demand per household (liters/day)	300	
Total domestic water demand (m3/day)	77.7	

B Water supply facilities provided at time of resettlement and still in use

Ministry of transmigration				
Engineering report for resettlement area,		yes ☐		no ☒
Engineering study drawings & maps		yes ☐		no ☒
number of shallow wells with bucket				65
number of wells per family				4
Used for drinking and cooking		yes ☒		no ☐
Used for washing and bathing		yes ☒		no ☐
Does the well run dry ?		yes ☒		no ☐
Water quality for shallow wells				
	bad taste	wet season ☐		dry season ☐
	color _____	wet season ☐		dry season ☐
	bad smell	wet season ☐		dry season ☐
	other _____			
	water is potable	wet season ☒		dry season ☒
	average depth of water in well	wet season _____		dry season _____
Does each household have a storage cistern		yes ☐		no ☒
Does each house collect rainwater		yes ☒		no ☐

Volume (liters) 200 liters Type: plastic rain barrel with open top

C Additional water supply facilities provided under OECF loan SPL-V/VI 1993-94

Engineering study report & drawings yes ☐ no ☒

One WTP facility serves Pulau Gadang & Koto Mesjid.

c1 *Source:*

surface water ☒ name of stream stream Silam river (one facility with P.G.)

borehole ☐ borehole depth (to be confirmed) _____ m

Is water quality data for the BH available? yes ☐ no ☐

Location	Elevation (m)	Lat 00°	Long 101°
PG S1	86	20.12	50.23

c2 *Extraction method:*

pumped intake ☒ infiltration well next to stream ☒

gravity intake ☐ earth dam ☐ concrete weir ☐

For pumped extraction, what is the pump capacity? Q _____ m3/min

Head _____ m

Is the pump is operational? yes ☐ no ☒

broken ☐ the pump is missing ☐ not in use ☒

c3 *Raw water pipeline (source to treatment)* no transmission pipeline ☐

Location	Size	Materials	Length m

installation: Above ground surface ☐ below ground surface ☐

condition: Leaking ☐ not in use ☒

c4 *Treatment facility:* not in use ☒

Pre-treatment: chemical coagulation ☐ sedimentation tank ☐

Filtration: slow sand ☐ rapid sand ☐

Chemical used ? lime ☐ alum ☐

Treated water storage: in ground concrete reservoir ☐ capacity _____ m3

filter in use but storage by-passed ☐ not in use ☐

Location	Elevation (m)	Lat 00°	Long 100°
PG S1	86	20.12	50.23

c5 *Distribution system*

booster pumps: Qty: Q 9.5 m3/hr

GRUNDFOS Model No. B 42670010 Type CRB-100 Vertical Multistage Centrfugal Pump H 84.9

Is the pump is operational? yes ☐ no ☒

broken ☐ the pump is missing ☐ not in use ☒

diesel generators Qty generator rating _____ kW/kVA

YANMAR Model TS 300 & TS 230 engine rating _____ HP

Is the generator operational? yes ☐ no ☒

broken ☐ missing ☐ not in use ☒

Could not enter the pump house

c6 ***Distribution piping map:*** available ☐ no ☒

Location	Size	Materials	Length m
main feeder			
branches			
laterals			

installation: Above ground surface ☐ below ground surface ☐

condition: Leaking ☐ not in use ☒

How is the water delivered : individual house connection ☐

to public cistern/hydrant ☒

number of public hydrants _____ number of houses per public hydrants _____

	Elevation (m)	Lat 00^{0}N	Long 101^{0}E
highest point in the village	93	19.85	50.69
lowest point in the village			
point farthest from treatment facility	85	20.10	51.00

D **Catchment dams provided by GOI - PU** yes ☐ no ☒

Appendix 5.1 Water Supply System - Data Sheet for Ranah Sungkai

A General

Name of Village		Ranah Sungkai
District		Kampar
Province		Riau
Dates surveyed by NGO		26 - 31 Mar-02
Dates visited by study team		27-mar-02
Topographic map reference 1:50,000		00816-14
Topographic map 1:10,000	available [X]	no [ ]
Land System	: TWH (42)	
Land Form	: undulating plain on mixed sediment.	
Lithology	: shale, conglomerate, mudstone, sandstone, siltstone.	

GPS data (true north)

Reference point		Elevation (m)	Lat 00^0	Long 100^0
RS 5	Block 2	107	23.15	46.61
RS 6	Village leadder's house	121	23.29	46.35
RS 7	Block 3	129	22.78	46.41

Water use

	1990	2000
Number of households	337	
Population (estimated 5 persons per house)	1685	
Demand per person (liters/day)	60	
Demand per household (liter/day)	300	
Total domestic water demand (m^3/day)	101.1	

B Water supply facilities provided at time of resettlement and still in use

Ministry of transmigration

Engineering report for resettlement area,	yes	[X]	no	[ ]
Engineering study drawings & maps	yes	[X]	no	[ ]
number of shallow wells with bucket				
number of family per wells				2
Used for drinking and cooking	yes	[X]	no	[ ]
Used for washing and bathing	yes	[X]	no	[ ]
Does the well run dry ?	yes	[X]	no	[ ]

Water quality for shallow wells

bad taste		wet season	[ ]	dry season	[ ]
color	slightly cloudy-white	wet season	[X]	dry season	[ ]
bad smell		wet season	[ ]	dry season	[ ]
other					
water is potabled		wet season	[X]	dry season	[X]
average depth of water in well		wet season	7 m	dry season	

Does each household have a storage cistern	yes	[ ]	no	[X]
Does each house collect rainwater	yes	[X]	no	[ ]

Volume (liters) =~ 200 liter Type: plastic rain barrel with open top

C Additional water supply facilities provided under OECF loan SPL-V/VI 1993-94

Engineering study report & drawings yes ☐ no ☒

c1 *Source:*

surface water ☒ name of stream stream Kinari river

borehole ☐ borehole depth (to be confirmed) _____ m

Is water quality data for the BH available? yes ☐ no ☐

Location Elevation (m) Lat 00^0 Long 101^0

c2 *Extraction method:*

pumped intake ☒ infiltration well next to stream ☐

gravity intake ☐ earth dam ☒ concrete weir ☐

For pumped extraction, what is the pump capacity? Q _____ m3/min

Head _____ m

Is the pump is operational? yes ☐ no ☒

broken ☐ the pump is missing ☐ not in use ☐

c3 *Raw water pipeline (source to treatment)* no transmission pipeline ☐

Location	Size	Materials	Length m

installation: Above ground surface ☐ below ground surface ☐

condition: Leaking ☐ not in use ☐

c4 *Treatment facility:* not in use ☐

Pre-treatment: chemical coagulation ☒ sedimentation tank ☐

Filtration: slow sand ☒ rapid sand ☐

Chemical used ? lime ☒ alum ☐

Treated water storage: in ground concrete reservoir ☒ capacity _____ m3

filter in use but storage by-passed ☐ not in use ☒

Location	Elevation (m)	Lat 00^0	Long 100^0
RS WTP	100	23.32	46.61

c5 *Distribution system*

booster pumps: Qty: 1 Q 9.5 m^3/hr

GRUNDFOS Model No. B 42670010 Type CRB-100 Vertical Multistage Centrfugal Pump Head 84.9 m

Is the pump is operational? yes ☐ no ☒

broken ☐ the pump is missing ☐ not in use ☒

diesel generators Qty 2 generator rating _____ kW/kVA

YANMAR Model TS 300 & TS 230 engine rating _____ HP

Is the generator operational? yes ☐ no ☒

YANMAR Model TS 300 & TS 230

broken ☐ missing ☐ not in use ☒

c6 *Distribution piping map:* available ☐ no ☒

Location	Size	Materials	Length m
main feeder			
branches			
laterals			

installation: Above ground surface ☐ below ground surface ☒

condition: exposed broken pipes ☒ not in use ☐

How is the water delivered : individual house connection ☐

to public cistern/hydrant ☒

number of public hydrants _____ number of houses per public hydrants _____

	Elevation (m)	Lat 00^{0}N	Long 100^{0}E
highest point in the village	129 Block 3	22.78	46.41
lowest point in the village	92	23.74	46.50
point farthest from treatment facility			

D **Catchment dams provided by GOI - PU** yes ☐ no ☒

Engineering study report yes ☐ no ☐

Engineering drawings yes ☐ no ☐

E ***Potential For Alternate Sources***

River or other surface water by gravity ☒

name of river or stream Tebat Hantu & Pinang Mancung

Spring by gravity ☐

Structure earth dam ☐ concrete weir ☐

Notes on conditions of check dam and pond

Waterfall cascading into pool at rock outcrop.

Good condition to build a concrete dam.

Check dam impact on downstream users.

Source Location	Elevation (m)	Lat 00^{0}	Long 100^{0}
RS3	69	23.69	46.53

(start of path to proposed montain stream source)

For Spring : what is spring yield wet season _____ dry season _____

spring yield not measured ☐

is the spring protected ? yes ☐ no ☐

what kind of protection permanent ☐ temporary ☐

describe : _____

For pond behind check dam

Surface area of pond _____ m2 Depth of pond _____ m

Estimated storage capacity 20 m3

Is there any water catchment scheme to protect the water source

yes ☐ no ☒

Is the source also used for other purposes

for irrigation yes ☒ no ☐

for watering animal yes ☐ no ☒

Does the source run dry ? yes ☐ no ☒

When does the source run dry _____

How many days without rain before the source runs dry ? _____ weeks

How long does the source run dry ? _____ weeks

Appendix 5.1 Water Supply System - Data Sheet for Lubuk Agung

A General

Name of Village		Lubuk Agung
District		Kampar
Province		Riau
Dates surveyed by NGO		26 - 31 Mar.'02
Dates visited by study team		27 March '02
Topographic map reference 1:50,000		0816 - 14
Topographic map 1:10,000	available [X]	no [ ]
Land System	: TWH (42)	
Land Form	: undulating plain on mixed sediment.	
Lithology	: shale, conglomerate, mudstone, sandstone, siltstone.	

GPS data (true north)

Reference point		Elevation (m)	Lat 00^0	Long 100^0
LA1	main road	102	22.70	46.46
LA 2	Dam	107	22.46	46.70
LA 3	Stream	100	22.48	46.96
LA 4	Storage tank	132	22.34	46.91

Water use

	1990	2000
Number of households	220	
Population (estimated 5 persons per house)	1100	
Demand per person (liters/day)	60	
Demand per household (liter/day)	300	
Total domestic water demand (m3/day)	66	

B Water supply facilities provided at time of resettlement and still in use

Ministry of transmigration

Engineering report for resettlement area,	yes	[X]	no	[ ]
Engineering study drawings & maps	yes	[X]	no	[ ]
number of shallow wells with bucket				
number of family per well				4
Used for drinking and cooking	yes	[X]	no	[ ]
Used for washing and bathing	yes	[X]	no	[ ]
Does the well run dry ?	yes	[X]	no	[ ]

Water quality for shallow wells

bad taste	wet season	[ ]	dry season	[ ]
color	wet season	[ ]	dry season	[ ]
bad smell	wet season	[ ]	dry season	[ ]
other				
water quality is good	wet season	[ ]	dry season	[ ]
average depth of water in well	wet season		dry season	
Does each household have a storage cistern	yes	[ ]	no	[X]
Does each house collect rainwater	yes	[X]	no	[ ]

Volume (liters) 200 liters Type: plastic rain barrel with open top

C Additional water supply facilities provided under OECF loan SPL-V/VI 1993-94

Engineering study report & drawings — yes ☐ — no ☒

c1 *Source:*

surface water ☒ — name of stream: Kapecong river

borehole ☐ — borehole depth (to be confirmed) _____ m

Is water quality data for the BH available? — yes ☐ — no ☐

Location	Elevation (m)	Lat 00^0	Long 100^0
LA 3	100	22.48	46.96

c2 *Extraction method:*

pumped intake ☒ — infiltration well next to stream ☐

gravity intake ☐ — earth dam ☐ — concrete weir ☒

For pumped extraction, what is the pump capacity? — Q _____ m3/min

Head _____ m

Is the pump is operational? — yes ☐ — no ☒

broken ☐ — the pump is missing ☒ — not in use ☒

c3 *Raw water pipeline (source to treatment)* — no transmission pipeline ☐

Location	Size	Materials	Length m

installation: Above ground surface ☐ — below ground surface ☐

condition: Leaking ☐ — not in use ☒

c4 *Treatment facility:* — not in use ☒

Pre-treatment: chemical coagulation ☐ — sedimentation tank ☐

Filtration: slow sand ☐ — rapid sand ☐

Chemical used ? lime ☐ — alum ☐

Treated water storage: in ground concrete reservoir ☒ — capacity _____ m3

filter in use but storage by-passed ☐ — not in use ☒

Location	Elevation (m)	Lat 00^0	Long 100^0
LA4	132	22.34	46.91

c5 *Distribution system*

booster pumps: Qty: 2 — Q 9.5 m3/hr

GRUNDFOS Model No. B 42670010 Type CRB-100 Vertical Multistage Centrfugal Pump — Head 84.9 m

Is the pump is operational? — yes ☐ — no ☒

broken ☐ — the pump is missing ☐ — not in use ☒

diesel generators Qty 2 — generator rating _____ kW/kVA

YANMAR model TS 300 — engine rating _____ HP

Is the generator operational? — yes ☐ — no ☒

broken ☐ — missing ☐ — not in use ☒

c6 ***Distribution piping map:*** available ☐ no ☒

Location	Size	Materials	Length m
main feeder			
branches			
laterals			

installation: Above ground surface ☐ below ground surface ☐

condition: Leaking ☐ not in use ☒

How is the water delivered : individual house connection ☐

to public cistern/hydrant ☒

number of public hydrants _____ number of houses per public hydrants _____

	Elevation (m)	Lat 00^{0}N	Long 100^{0}E
highest point in the village	132 Storage tank	22.34	46.91
lowest point in the village	102 LA1	22.70	46.46
point farthest from treatment facility	100	22.48	46.96

D <u>Catchment dams provided by GOI - PU</u> yes ☒ no ☐

Engineering study report yes ☐ no ☒

Engineering drawings yes ☐ no ☒

d1 ***Source***

River or other surface water by gravity ☒

name of river or stream Bukit Meranti river

Spring by gravity ☐

Structure earth dam ☐ concrete weir ☒

Notes on conditions of check dam and pond
Checked dam was built in 1999/2000, unused because surface run-off has eroded the foundations. Leakage occurred.
Distribution pipe from dam by grafity has broken.

Source Location	Elevation (m)	Lat 00^0	Long 100^0
LA 2	107	22.46	46.70

For Spring : what is spring yield wet season _____ dry season _____

spring yield not measured ☐

is the spring protected ? yes ☐ no ☐

what kind of protection permanent ☐ temporary ☐

describe : _____

For pond behind check dam

Surface area of pond _____ m2 Depth of pond _____ m

Estimated storage capacity _____ m3

Is there any water catchment scheme to protect the water source

yes ☐ no ☒

Is the source also used for other purposes

for irrigation yes ☐ no ☒

for watering animal yes ☐ no ☒

Does the source run dry ? yes ☐ no ☒

When does the source run dry _____

How many days without rain before the source runs dry ? _____ weeks

How long does the source run dry ? _____ weeks

d2 ***Raw water pipeline (from source to filter)***

Location	Size	Materials	Length m

installation: Above ground surface ☐ below ground surface ☐

condition: Appears good ☐ Leaking ☐ not in use ☒

d3 ***Slow sand filter*** with storage tank ☒ number of units in use 1

Location	Elevation (m)	Lat 00^0	Long 100^0
LA 5	122	20.96	47.73

Dimensions of storage tank: Capacity

Wall materials : ferro cement ☐ brick ☒ stone ☐

Roof materials : galvanized corrugated sheet metal ☐ no roof ☐

Operating condition :

not in used

Is the water flowing into reservoir clean ? yes ☐ no ☐

Is the reservoir structure in good condition yes ☐ no ☐

Reservoir is connected to piped distribution system yes ☐ no ☐

Appendix 5.1 Water Supply System - Data Sheet for Batu Bersurat

A General

Name of Village		Batu Bersurat
District		Kampar
Province		Riau
Dates surveyed by NGO		26 - 31 March '02
Dates visited by study team		28 Mach '02
Topographic map reference 1:50,000		1816 - 13
Topographic map 1:10,000	available [X]	no [ ]
Land System	: BGA (63)	
Land Form	: long point of hill with steep slope on metamorphic rock	
Lithology	: quartzite, schist, phyllite, shale, sandstone.	

GPS data (true north)

Reference point		Elevation (m)	Lat 00^{0}	Long 100^{0}
BB 1	entrance to S T	175	18.72	44.25
BB 2	Existing storage tank	169	18.74	44.06
BB 5	new check dam	125	19.09	45.39

Water use

	1990	2000
Number of households	522	
Population (estimated 5 persons per house)	2610	
Demand per person (liters/day)	60	
Demand per household 9liters/day)	300	
Total domestic water demand (m^3/day)	156.6	

B Water supply facilities provided at time of resettlement and still in use

Ministry of transmigration Engineering report for resettlement area,		yes [ ]	no	[X]
Engineering study drawings & maps		yes [ ]	no	[X]
number of shallow wells with bucket				261
number of families per wells				2
Used for drinking and cooking		yes [X]	no	[ ]
Used for washing and bathing		yes [X]	no	[ ]
Does the well run dry ?		yes [X]	no	[ ]
Water quality for shallow wells				
	bad taste	wet season [ ]	dry season	[ ]
	color slightly cloudy	wet season [X]	dry season	[ ]
	bad smell	wet season [ ]	dry season	[ ]
	other			
	water is potable	wet season [X]	dry season	[X]
	average depth of water in well	wet season 3 m	dry season	
Does each household have a storage cistern		yes [ ]	no	[X]
Does each house collect rainwater		yes [X]	no	[ ]

Volume (liters) 200 liters Type: plastic rain barrel with open top

C Additional water supply facilities provided under OECF loan SPL-V/VI 1993-94

Engineering study report & drawings — yes ☐ — no ☒

c1 *Source:* Same system supplies Binamang

surface water ☒ — name of stream: Reservoir of PLTA

borehole ☐ — borehole depth (to be confirmed) _____ m

Is water quality data for the BH available? — yes ☐ — no ☐

Location	Elevation (m)	Lat 00°	Long 101°
BB 3 intake well	106	18.29	44.06

c2 *Extraction method:*

pumped intake ☒ — intake well ☐

gravity intake ☐ — earth dam ☐ — concrete weir ☐

For pumped extraction, what is the pump capacity? Q _____ m3/min

Head _____ m

Is the pump is operational? — yes ☐ — no ☒

broken ☐ — the pump is missing ☒ — not in use ☐

c3 *Raw water pipeline (source to treatment)* — no transmission pipeline ☐

Location	Size	Materials	Length m
	4"	GIP	

installation: Above ground surface ☒ — below ground surface ☒

condition: sections of the pipe have been removed ☒ — not in use ☒

c4 *Treatment facility:* — not provided ☒

Pre-treatment: chemical coagulation ☐ — sedimentation tank ☐

Filtration: slow sand ☐ — rapid sand ☐

Chemical used ? lime ☐ — alum ☐

Raw water storage: above ground concrete reservoir ☒ — capacity 100 m3

filter in use but storage by-passed ☐ — not in use ☒

Location	Elevation (m)	Lat 00°	Long 100°
BB 2	169	18.74	44.19

c5 *Distribution system* : by gravity - no pumping

The water from the storage thank also supplies Binamang

c6 *Distribution piping map:* — available ☐ — no ☒

Location	Size	Materials	Length m
main feeder			
branches			
laterals			

installation: Above ground surface ☐ — below ground surface ☐

condition: Leaking ☐ — not in use ☒

How is the water delivered : — individual house connection ☐

to public cistern/hydrant ☒

number of public hydrants 18 — number of houses per public hydrants 30

Elevation (m) — Lat 00°N — Long 100°E

highest point in the village	175	18.72	44.25
lowest point in the village	106	18.29	44.06
point farthest from treatment facility			

D **Catchment dams provided by GOI - PU** yes [X] no [ ]

Engineering study report yes [ ] no [X]

Engineering drawings yes [ ] no [X]

d1 ***Source***

River or other surface water [X]

name of river or stream Ngalau river

Spring by gravity [ ]

Structure earth dam [ ] concrete weir [X]

Notes on conditions of check dam and pond :
Checked dam was built in 2001 still in good condition, small leakage occure.
Some children used pond for bathing/swimming and the water may be poluted by soap or other material.
The water must be pumped up to a communal storage tank.

Source Location		Elevation (m)	Lat 00^0	Long 100^0
BB 5	check dam	125	19.09	45.39
BB 6	Pump	131		

For Spring : what is spring yield wet season _____ dry season _____

spring yield not measured [ ]

is the spring protected ? yes [ ] no [ ]

what kind of protection permanent [ ] temporary [ ]

describe : _____

For pond behind check dam

Surface area of pond 50 m2 Depth of pond 1.0 m

Estimated storage capacity 20 m3

Is there any water catchment scheme to protect the water source

yes [ ] no [X]

Is the source also used for other purposes

for irrigation yes [ ] no [X]

for watering animal yes [ ] no [X]

Does the source run dry ? yes [ ] no [X]

When does the source run dry _____

How many days without rain before the source runs dry ? _____ weeks

How long does the source run dry ? _____ weeks

d2 ***Raw water pipeline (from source to filter)***

Location	Size	Materials	Length m
	1"	PVC	

installation: Above ground surface [X] below ground surface [ ]

condition: Appears good [ ] Leaking [ ] not in use [ ]

d3 ***Raw Water Storage Tank*** with filter [X] number of units in use 1

Location	Elevation (m)	Lat 00^0	Long 100^0
BB 7	129	19.11	45.35

Dimensions of storage tank: 2.5 x 2.5 x 2.0 Capacity 12.5 m3

Wall materials : ferro cement [ ] brick [X] stone [ ]

Roof materials : galvanized corrugated sheet metal [ ] no roof [X]

Operating condition :

Water tank still in use, small leakage occured. It didn't work since two weeks ago because electricity connection has broken.

Is the water flowing into reservoir clean ? yes [ ] no [X]

Is the reservoir structure in good condition yes [X] no [ ]

Reservoir is connected to piped distribution system yes [ ] no [X]

Appendix 5.1 Water Supply System - Data Sheet for Binamang

A General

Name of Village		Binamang
District		Kampar
Province		Riau
Dates surveyed by NGO		1 - 7 April '02
Dates visited by study team		28 April '02
Topographic map reference 1:50,000		0816 - 13
Topographic map 1:10,000	available ☐	no ☐
Land System	: BGA (63) close to MPT (55).	
Land Form	: (63) long point of hill with steep slope on metamorphic rock	
	(55) asymetric & unoriented point of sediment	
Lithology	: (63) quartzite, schist, phyllite, shale, sandstone.	
	(55) sandstone, shale, conglomerate, siltstone.	

GPS data (true north)

Reference point		Elevation (m)	Lat 00^0	Long 100^0
BM 1	old checkdam	140	19.05	43.80
BM 2	MCK	132	19.19	43.67
BM 4	new check dam	151	19.12	43.62
BM 5	high point	181	18.93	43.83

Water use

	1990	2000
Number of households	178	
Population (estimated 5 persons per house)	890	
Demand per person (liters/day)	60	
Demand per household (liter/day)	300	
Total domestic water demand (m^3/day)	53.4	

B Water supply facilities provided at time of resettlement and still in use

Ministry of transmigration

Engineering report for resettlement area,	yes ☐	no ☒
Engineering study drawings & maps	yes ☐	no ☒
number of shallow wells with bucket		89
number of wells per family		2
Used for drinking and cooking	yes ☒	no ☐
Used for washing and bathing	yes ☒	no ☐
Does the well run dry ?	yes ☒	no ☐

Water quality for shallow wells

bad taste		wet season ☐	dry season ☐
color	slighly cloudy	wet season ☒	dry season ☐
bad smell		wet season ☐	dry season ☐
other			
water quality potable		wet season ☒	dry season ☒
average depth of water in well		wet season 3 m	dry season

Does each household have a storage cistern	yes ☐	no ☒
Does each house collect rainwater	yes ☒	no ☐

Volume (liters) 200 liters Type: plastic barrel with open top

C **Additional water supply facilities provided under OECF loan SPL-V/VI 1993-94**

Engineering study report & drawings yes ☐ no ☒

c1 *Source:* Same system supplies Batu Bersurat

surface water ☒ name of stream stream reservoir of PLTA

borehole ☐ borehole depth (to be confirmed) _____ m

Is water quality data for the BH available? yes ☐ no ☐

Location		Elevation (m)	Lat 00^0	Long 101^0
BB 3	intake well	106	18.29	44.06

c2 *Extraction method:*

pumped intake ☒ intake well ☐

gravity intake ☐ earth dam ☐ concrete weir ☐

For pumped extraction, what is the pump capacity? Q _____ m3/min

Head _____ m

Is the pump is operational? yes ☐ no ☒

broken ☐ the pump is missing ☒ not in use ☐

c3 *Raw water pipeline (source to treatment)* no transmission pipeline ☐

Location	Size	Materials	Length m
	4"	GIP	

installation: Above ground surface ☒ below ground surface ☒

condition: sections of pipe have been removed ☒ not in use ☒

c4 *Treatment facility:* not provided ☒ not in use ☐

Pre-treatment: chemical coagulation ☐ sedimentation tank ☐

Filtration: slow sand ☐ rapid sand ☐

Chemical used ? lime ☐ alum ☐

Raw Water storage: above ground concrete reservoir ☒ capacity 100 m3

filter in use but storage by-passed ☐ not in use ☒

Location	Elevation (m)	Lat 00^0	Long 100^0
BB 2	169	18.74	44.19

c5 *Distribution system* : by gravity - no pumping

The water from the storage tank also serves Batu Bersurat

c6 *Distribution piping map:* available ☐ no ☒

Location	Size	Materials	Length m
main feeder			
branches			
laterals			

installation: Above ground surface ☐ below ground surface ☐

condition: Leaking ☐ not in use ☒

How is the water delivered : individual house connection ☐

to public cistern/hydrant ☒

number of public hydrants 6 number of houses per public hydrants 30

		Elevation (m)	Lat 00^{0}N	Long 100^{0}E
highest point in the village	BM 5	181	18.93	43.83
lowest point in the village	MCK	132	19.19	43.67
point farthest from treatment facility				

D Catchment dams yes [X] no [ ]

Engineering study report yes [ ] no [X]

Engineering drawings yes [ ] no [X]

d1 ***Source in use***

River or other surface water by gravity [X]

name of river or stream Makam river and another stream

Spring by gravity [ ]

Structure earth dam [ ] concrete weir [X]

Notes on conditions of check dam and pond

1) Check dam was built in 2001 by PU still in good condition,but pipe installation has not completed yet. Height of dam was 3 m approximately.
The water may be contaminated by up stream users, (washing, toilets & garbage)
2) Small check dam built by PPK - still in used
3) Small check dam with MCK

Source Location		Elevation (m)	Lat 00^0	Long 100^0
BM 4	new check dam	151	19.12	43.62
BM1	old check dam by PPK	140	19.05	43.80
BM2	MCK with small check dam	132	19.19	43.67

d2 ***Other Potential Sources :***

stream by gravity : (same stream that is used for PPK dam)

location : at higher elevation.

Is there any water catchment scheme to protect the water sources yes [ ] no [X]

Is the source also used for other purposes

for irrigation yes [ ] no [X]

for watering animal yes [ ] no [X]

Does the source run dry ? yes [ ] no [X]

When does the source run dry

How many days without rain before the source runs dry ? weeks

How long does the source run dry ? weeks

d2 ***Raw water pipeline (from source to filter)***

Location	Size	Materials	Length m
PU dam	4" dia	PVC	
MCK dam	4"	PVC	
PPK dam	4"	PVC	

installation: Above ground surface [ ] below ground surface [ ]
has not completed yet [X]

condition: Appears good [X] Leaking [ ] not in use [ ]

d3 ***Raw Water Storage Tank***

Storage & filter units have not been provided.
Water was transmitted to a public MCK where there is no storage.

Appendix 5.1 Water Supply System - Data Sheet for Pongkai Baru

A General

Name of Village			Pongkai Baru		
District			Kampar		
Province			Riau		
Dates surveyed by NGO			19 - 25 Mar-02		
Dates visited by study team			21-mar-02		
Topographic map reference 1:50,000			0816 - 13		
Topographic map 1:10,000		available	[X]	no	[ ]
Land System	: SAR (41)				
Land Form	: undulating tuffaceous sedimentary plains				
Lithology	: mudstone, siltstone, sandstone, tuffite, fine graned tefra.				

GPS data (true north)

Reference point	Elevation (m)	Lat 00^0	Long 100^0
PB 0	135	21.71	36.15

Water use	1990	2000
Number of households	200	
Population (estimated 5 persons per house)	1000	
Demand per person (liters/day)	60	
Demand per household (liter/day)	300	
Total domestic water demand (m3/day)	60	

B Water supply facilities provided at time of resettlement and still in use

Ministry of transmigration Engineering report for resettlement area,		yes	[ ]	no	[X]
Engineering study drawings & maps		yes	[X]	no	[ ]
number of shallow wells with bucket					100
number of housing units per well					2
Used for drinking and cooking		yes	[X]	no	[ ]
Used for washing and bathing		yes	[X]	no	[ ]
Does the well run dry ?		yes	[X]	no	[ ]
Water quality for shallow wells					
	bad taste	wet season	[ ]	dry season	[ ]
	color	wet season	[ ]	dry season	[ ]
	bad smell	wet season	[ ]	dry season	[ ]
	other				
	water is potable	wet season	[X]	dry season	[X]
	average depth of water in well	wet season	4 m	dry season	
Does each household have a storage cistern		yes	[ ]	no	[X]
Does each house collect rainwater		yes	[X]	no	[ ]

Volume (liters) 200 liters Type: plastic rain barrel with open top

C Additional water supply facilities provided under OECF loan SPL-V/VI 1993-94

Engineering study report & drawings — yes ☐ — no ☒

c1 *Source:*

surface water ☒ — name of stream stream: Kinawai river

Does the source run dry ? — yes ☒ — no ☐

borehole ☐ — borehole depth: _____ m

Is water quality data for the BH available? — yes ☐ — no ☐

Location	Elevation (m)	Lat 00⁰	Long 101⁰
PB 1	134	21.78	35.99

c2 *Extraction method:*

pumped intake ☒ — infiltration well next to stream ☒

gravity intake ☐ — earth dam ☐ — concrete weir ☐

For pumped extraction, what is the pump capacity? Q _____ m3/min

Head _____ m

Is the pump is operational? — yes ☐ — no ☒

broken ☐ — the pump is missing ☒ — not in use ☐

c3 *Raw water pipeline (source to treatment)* — no transmission pipeline ☐

Location	Size	Materials	Length m

installation: Above ground surface ☐ — below ground surface ☒

condition: Leaking ☐ — not in use ☒

c4 *Treatment facility:* not in use ☒

Pre-treatment: chemical coagulation ☐ — sedimentation tank ☐

Filtration: slow sand ☒ — rapid sand ☐

Chemical used ? lime ☐ — alum ☐

Treated water storage: in ground concrete reservoir ☒ — capacity _____ m3

by-passed (directly to distribution system) ☐ — not in use ☒

Location	Elevation (m)	Lat 00⁰	Long 100⁰
PB 2	142	21.89	36.04

c5 *Distribution system*

booster pumps: Qty: 2 units — Q 9.5 m3/hr

GRUNDFOS Model No. B 42670010 Type CRB-100 Vertical Multistage Centrfugal Pump — Head 33.0 m

Is the pump is operational? — yes ☐ — no ☒

broken ☐ — the pump is missing ☐ — not in use ☒

diesel generators Qty 2 units generator rating _____ kW/kVA

YANMAR Model TS 300 engine rating _____ HP

Is the generator operational? yes ☐ no ☒

broken ☒ missing ☐ not in use ☐

c6 ***Distribution piping map:*** available ☐ no ☒

Location	Size	Materials	Length m
main feeder			
branches			
laterals			

installation: Above ground surface ☐ below ground surface ☒

condition: Leaking ☐ not in use ☐

How is the water delivered : individual house connection ☐

to public cistern/hydrant ☒

number of public hydrants 7 number of houses per public hydrants 30

	Elevation (m)	Lat 00^{0}N	Long 100^{0}E
highest point in the village	135	21.71	36.15
lowest point in the village	134	21.78	35.99
point farthest from treatment facility			

D Catchment Dams provided by GOI - PU yes ☐ no ☒

Notes : could not find PU check dam

E ***Potential Alternate Source***

River or other surface water by gravity ☐

name of river or stream to be verified

Spring by gravity (± 4 km distance from village, to be verified) ☒

Structure earth dam ☐ concrete weir ☐

Notes on conditions of check dam and pond:
The SAPS team, the NGO and the villagers could not locate the catchment dam.

Source Location Elevation (m) Lat 00^0 Long 100^0

For spring : what is spring yield wet season _____ dry season _____

spring yield not measured ☐

is the spring protected ? yes ☐ no ☐

what kind of protection permanent ☐ temporary ☐

describe : _____

Appendix 5.1 Water Supply System - Data Sheet for Mayang Pongkai

A General

Name of Village		Mayang Pongkai
District		Kampar
Province		Riau
Dates surveyed by NGO		8 - 14 April '02
Dates visited by study team		3 April '02
Topographic map reference 1:50,000		0816 - 22
Topographic map 1:10,000	available ☐	no ☒
Land System	: MBI (33)	
Land Form	: undulating to rolling tuffaceous sedimentary plains (V83)	
Lithology	: fine grained tefra, tuffite, mudstone, siltstone, sandstone, alluvium, recent riverine, old sands and gravels.	

GPS data (true north)

Reference point	Elevation (m)	Lat 00^0	Long 101^0
MP 1	54	12.46	19.12

Water use

	1990	2000
Number of households	259	
Population (estimated 5 persons per house)	1295	
Demand per person (liters/day)	60	
Demand per household (liters/day)	300	
Total domestic water demand (m^3/day)	77.7	

B Water supply facilities provided at time of resettlement and still in use

Ministry of transmigration Engineering report for resettlement area,	yes ☐	no ☒
Engineering study drawings & maps	yes ☐	no ☒
number of shallow wells with bucket		130
number of housing unit per wells		2
Used for drinking and cooking	yes ☒	no ☐
Used for washing and bathing	yes ☒	no ☐
Does the well run dry ?	yes ☒	no ☐

Water quality for shallow wells

bad taste	wet season ☐	dry season ☐
color	wet season ☐	dry season ☐
bad smell	wet season ☐	dry season ☐
other		
water is potable	wet season ☒	dry season ☒
average depth of water in well	wet season 7 m	dry season 1 m

Does each household have a storage cistern	yes ☐	no ☒
Does each house collect rainwater	yes ☒	no ☐

Volume (liters) 200 liters Type: plastic barrel with open top

Notes : Villagers have increased the depth of existing wells to 9 m in some location to reach the water table during dry season.

Houses are widely separated : shared wells are not convinient. Villagers would prefer individual wells for each house.

C **Catchment dams provided by GOI - PU** yes ☐ no ☒

Engineering study report yes ☐ no ☐

Engineering drawings yes ☐ no ☐

D ***Source used by the villagers***

River or other surface water ☒

name of river or stream Win river

Spring by gravity ☐

Structure earth dam ☐ concrete weir ☐

Notes on conditions of river :
The water is coloured, should not be used for drinking water.
It is used mainly during dry season.

Source Location	Elevation (m)	Lat 00^0	Long 101^0
MP 2	45	11.81	18.62

Capacity of stream : wet season _____ dry season _____

stream flow not measured ☒

E ***Cost Data provided by the Villagers.***

e1 Labour cost for 1 meter depth of digging : Rp. 200,000.00 (including concrete ring material

size of concrete ring :
inner diameter : 1.0 m
thickness : 0.1 m
length : 1.0 m

e2 Electric Pump : Rp. 300,000.00 - 600,000.00 (varies)
for example, UCHIDA pump : Rp. 450,000.00

e3 Water Tank : Rp. 500,000.00
(Poly Tank, capacity : 1000 liters)

Appendix 5.1 Water Supply System - Data Sheet for Tanjung Alai

A General

Name of Village		Tanjung Alai
District		Kampar
Province		Riau
Dates surveyed by NGO		26 - 31 March '02
Dates visited by study team		28 March '02
Topographic map reference 1:50,000		0816 - 14
Topographic map 1:10,000	available ☐	no ☒
Land System	: TWH (42)	
Land Form	: undulating plain on mixed sediment.	
Lithology	: shale, conglomerate, mudstone, sandstone, siltstone.	

GPS data (true north)

Reference point		Elevation (m)	Lat 00^{0}	Long 100^{0}
TA 1	village centre	158	19.28	48.03
TA 2	bridge	133	19.4	48.03
TA 4	abandoned houses	173	19.65	47.98
TA 10	abandoned intake	114	19.62	48.45

Water use

	1990	2000
Number of households	313	
Population (estimated 5 persons per house)	1565	
Demand per person (liters/day)	60	
Demand per household (liters/day)	300	
Total domestic water demand (m^3/day)	93.9	

B Water supply facilities provided at time of resettlement and still in use

Ministry of transmigration

Engineering report for resettlement area,	yes	☐	no	☒
Engineering study drawings & maps	yes	☐	no	☒
number of shallow wells with bucket				157
number of families per well				2
Used for drinking and cooking	yes	☒	no	☐
Used for washing and bathing	yes	☒	no	☐
Does the well run dry ?	yes	☒	no	☐

Water quality for shallow wells

bad taste		wet season	☐	dry season	☐
color	brown	wet season	☒	dry season	☐
bad smell		wet season	☐	dry season	☐
other					
water is potable		wet season	☐	dry season	☐
average depth of water in well		wet season	3 m	dry season	

Does each household have a storage cistern	yes	☐	no	☒
Does each house collect rainwater	yes	☒	no	☐

Volume (liters) 200 liters Type: plastic barrel with open top

C Additional water supply facilities provided under OECF loan SPL-V/VI 1993-94

Engineering study report & drawings — yes ☐ — no ☒

c1 *Source:*

surface water ☒ — name of stream stream: Silam river & Bomban river

borehole ☐ — borehole depth (to be confirmed) _____ m

Is water quality data for the BH available? — yes ☐ — no ☐

Location	Elevation (m)	Lat 00⁰	Long 101⁰
TA 10 (old check dam at Silam river)	114	19.62	48.45

c2 *Extraction method:*

pumped intake ☒ — infiltration well next to stream ☐

gravity intake ☐ — earth dam ☐ — concrete weir ☒

For pumped extraction, what is the pump capacity? — Q _____ m3/min

Head _____ m

Is the pump is operational? — yes ☐ — no ☒

broken ☐ — the pump is missing ☒ — not in use ☐

c3 *Raw water pipeline (source to treatment)* — no transmission pipeline ☐

Location	Size	Materials	Length m

installation: Above ground surface ☐ — below ground surface ☒

condition: Leaking ☐ — not in use ☒

c4 *Treatment facility:* — not in use ☒

Pre-treatment: chemical coagulation ☒ — sedimentation tank ☒

Filtration: slow sand ☐ — rapid sand ☐

Chemical used ? lime ☒ — alum ☐

Treated water storage: in ground concrete reservoir ☒ — capacity _____ m3

filter in use but storage by-passed ☐ — not in use ☒

Location		Elevation (m)	Lat 00⁰	Long 100⁰
TA 3	WTP	139	19.47	48.04
TA 11	Pump House	184	19.23	47.53
TA 6	storage reservoir	134	19.38	47.87

c5 *Distribution system*

booster pumps: Qty: 2 units — Q 9.5 m3/hr

GUNDFOS model B42670010 Type CRB-100 — Head 84.9 m

Vertical Multistage Centrifugal Pump

Is the pump is operational? — yes ☐ — no ☒

broken ☐ — the pump is missing ☐ — not in use ☒

diesel generators Qty — generator rating _____ kW/kVA

YANMAR Model TS 30 & TS 230 — engine rating _____ HP

Is the generator operational? — yes ☐ — no ☒

broken ☐ — missing ☒ — not in use ☐

c6 *Distribution piping map:* available ☐ no ☒

Location	Size	Materials	Length m
main feeder			
branches			
laterals			

installation: Above ground surface ☐ below ground surface ☐

condition: Leaking ☐ not in use ☒

How is the water delivered : individual house connection ☐

to public cistern/hydrant ☒

number of public hydrants 11 number of houses per public hydrants 30

	Elevation (m)	Lat 00^{0}N	Long 101^{0}E
highest point in the village	173	19.65	47.98
lowest point in the village	133	19.4	48.03
point farthest from treatment facility	173 (mosque)	19.05	47.94

D Catchment dams provided by GOI - PU yes ☒ no ☐

Engineering study report yes ☐ no ☒

Engineering drawings yes ☐ no ☒

d1 ***Source***

River or other surface water by gravity ☒

name of river or stream Duku river (near sauce of spring)

Spring by gravity ☐

Structure earth dam ☐ concrete weir ☒

Notes on conditions of check dam and pond
Check dam still in good condition, built in 2001.
Water in the pond is full of algae and vegetation
is contributing to same turbidity.

Source Location	Elevation (m)	Lat 00^0	Long 101^0
TA S1	179	18.5	47.81

For Spring : what is spring yield wet season ____ dry season ____

spring yield not measured ☒

is the spring protected ? yes ☐ no ☒

what kind of protection permanent ☐ temporary ☐

describe : ____

For pond behind check dam

Surface area of pond 64 m2 Depth of pond 1.25 m

Estimated storage capacity 30 m3

Is there any water catchment scheme to protect the water source

yes ☐ no ☒

Is the source also used for other purposes

for irrigation yes ☐ no ☒

for watering animal yes ☐ no ☒

Does the source run dry ? yes ☐ no ☒

When does the source run dry _____

How many days without rain before the source runs dry ? _____ weeks

How long does the source run dry ? _____ weeks

d2 ***Raw water pipeline (from source to filter)***

Location	Size	Materials	Length m
	4" dia	PVC	

installation: Above ground surface ☒ below ground surface ☐

has not been completed yet ☒

condition: Appears good ☒ Leaking ☐ not in use ☐

d3 ***Raw water storage tank*** with filter ☒ number of units in use 1

Location	Elevation (m)	Lat 00^0	Long 100^0
TA 9	173	19.05	47.94
TA 12 (end of outlet from new check dam, below storage reservoir)	163	19.07	47.97

Dimensions of storage tank: 4m x 4m x 2m. Capacity : 32 m3

Wall materials : ferro cement ☐ brick ☒ stone ☐

Roof materials : galvanized corrugated sheet metal ☐ no roof ☒

Operating condition :

Storage reservoir has not been used yet, because outlet pipe from check dam is not connected to the reservoir. The end of outlet pipe is 10 m lower than storage reservoir, and there is aparently not enough pressure to flow into the reservoir.

Is the water flowing from the dam clean ? yes ☒ no ☐

Is the reservoir structure in good condition yes ☒ no ☐

Reservoir is connected to piped distribution system yes ☐ no ☒

5.1 Water Supply System - Data Sheet for Muara Takus

A General

Name of Village		Muara Takus
District		Kampar
Province		Riau
Dates surveyed by NGO		19 - 25 Mar-02
Dates visited by study team		21-mar-02
Topographic map reference 1:50,000		0816 - 13
Topographic map 1:10,000	available [X]	no [ ]
Land System	: MPT (55)	
Land Form	: asymetric & unoriented point of sediment.	
Lithology	: sandstone, shale, conglomerate, siltstone.	

GPS data (true north)

Reference point		Elevation (m)	Lat 00^0	Long 100^0
MT 0	village center	113	19.59	38.91
MT 4	mosque	114	19.73	38.77
MT 2	public hydrant	121	19.43	39.03

Water use

	1990	2000
Number of households	244	
Population (estimated 5 persons per house)	1220	
Demand per person (liters/day)	60	
Demand per household (liter/day)	300	
Total domestic water demand (m3/day)	73.2	

B Water supply facilities provided at time of resettlement and still in use

Ministry of transmigration				
Engineering report for resettlement area,	yes	[X]	no	[ ]
Engineering study drawings & maps	yes	[X]	no	[ ]
number of shallow wells with bucket				122
number of housing units per well				2
Used for drinking and cooking	yes	[X]	no	[ ]
Used for washing and bathing	yes	[X]	no	[ ]
Does the well run dry ?	yes	[X]	no	[ ]
Water quality for shallow wells				
bad taste	wet season	[ ]	dry season	[ ]
color _____	wet season	[X]	dry season	[ ]
bad smell	wet season	[ ]	dry season	[ ]
other _____				
water quality is potable	wet season	[X]	dry season	[X]
average depth of water in well	wet season	3 m	dry season	_____
Does each household have a storage cistern	yes	[ ]	no	[X]
Does each house collect rainwater	yes	[X]	no	[ ]

Volume (liters) 200 liter Type: plastic rain barrel with open top

C Additional water supply facilities provided under OECF loan SPL-V/VI 1993-94

Engineering study report & drawings — yes ☐ — no ☒

c1 ***Source:***

surface water ☐

borehole ☒ — borehole depth 175 m

Is water quality data for the BH available? — yes ☐ — no ☐

Location		Elevation (m)	Lat 00^0	Long 101^0
MT 1	borehole	119	19.41	39.04

c2 ***Extraction method:***

pumped intake ☒ — infiltration well next to stream ☐

gravity intake ☐ — earth dam ☐ — concrete weir ☐

For pumped extraction, what is the pump capacity? — Q _____ m3/min

Head _____ m

Is the pump is operational? — yes ☐ — no ☒

broken ☐ — the pump is missing ☐ — not in use ☒

c3 ***Raw water pipeline (source to treatment)*** — no transmission pipeline ☐

Location	Size	Materials	Length m

installation: Above ground surface ☐ — below ground surface ☐

condition: Leaking ☐ — not in use ☒

c4 ***Treatment facility:*** — not in use ☒

Pre-treatment: chemical coagulation ☐ — sedimentation tank ☐

Filtration: slow sand ☒ — rapid sand ☐

Chemical used ? lime ☐ — alum ☐

Treated water storage: in ground concrete reservoir ☒ — capacity _____ m3

filter in use but storage by-passed ☒ — not in use ☐

Location	Elevation (m)	Lat 00^0	Long 101^0
MT 1	119	19.41	39.04

c5 ***Distribution system***

booster pumps: Qty: — Q _____ m3/min

Pump house overgrown with vegetation. Could not visit. — Head _____ m

Is the pump is operational? — yes ☐ — no ☒

broken ☐ — the pump is missing ☐ — not in use ☒

diesel generators Qty — generator rating _____ kW/kVA

engine rating _____ HP

Is the generator operational? yes ☐ no ☒

broken ☐ missing ☐ not in use ☒

available ☐ no ☒

c6 ***Distribution piping map:***

Location	Size	Materials	Length m
main feeder	75 mm	PVC	
branches	50 mm	PVC	
laterals			

installation: Above ground surface ☐ below ground surface ☒

condition: Leaking ☐ not in use ☐

How is the water delivered : individual house connection ☐

to public cistern/hydrant ☒

number of public hydrants 8 number of houses per public hydrants 30

	Elevation (m)	Lat 00^{0}N	Long 100^{0}E
highest point in the village	123	19.34	38.87
lowest point in the village	113	19.59	38.91
point farthest from treatment facility	114	19.73	38.77

D Catchment dams provided by GOI yes ☒ no ☐

Engineering study report & drawings yes ☐ no ☒

Engineering drawings yes ☐ no ☒

d1 ***Source***

River or other surface water by gravity ☐

name of river or stream _____

Spring by gravity ☐

Structure earth dam ☒ concrete weir ☐

Notes on conditions of check dam and pond:
there is a pond located at just up stream of check dam with max. capacity 80 m3 approximately.
check dam still in use but the water looks very dirty, so the villagers didn't use for drinking, only for washing.

Source Location	Elevation (m)	Lat 00^{0}	Long 100^{0}
MT S1	135	19.07	38.96

For spring : what is spring yield wet season _____ dry season _____

spring yield not measured ☒

is the spring protected ? yes ☐ no ☒

what kind of protection permanent ☐ temporary ☐

describe : the spring water is collected in a surface pond behind the check dam

For pond (behind check dam)

Surface area of pond 200 m2 Depth of pond 1.0 m

Estimated storage capacity 80 m3

Is there any water catchment scheme to protect the water source

yes ☐ no ☒

Is the source also used for other purposes

for irrigation yes ☐ no ☒

for watering animal yes ☐ no ☒

Does the source run dry ? yes ☐ no ☒

d2 ***Raw water pipeline (from source to filter)***

Location	Size	Materials	Length m

installation: Above ground surface ☒ below ground surface ☒

condition: Appears good ☒ Leaking ☐ not in use ☐

d3 ***Slow sand filter*** with storage tank ☐

Dimensions: Capacity

Wall materials : ferro cement ☐ brick ☒ stone ☐

Roof materials : galvanized corrugated sheet metal ☒ no roof ☐

Operating condition :

Is the water flowing into reservoir clean ? yes ☐ no ☐

Reservoir is connected to piped distribution system yes ☐ no ☐

Appendix 5.1 Water Supply System - Data Sheet for Koto Tuo

A General

Name of Village		Koto Tuo
District		Kampar
Province		Riau
Dates surveyed by NGO		19 - 25 Mar-02
Dates visited by study team		20-mar-02
Topographic map reference 1:50,000		00816-13
Topographic map 1:10,000	available [X]	no [ ]
Land System	: MPT (55)	
Land Form	: asymetric & unoriented point of sediment	
Lithology	: sandstone, shale, conglomerate, siltstone.	

GPS data (true north)

Reference point	Elevation (m)	Lat 00^0	Long 100^0
KT A	131	18.16	40.54
KT B00	121	18.03	41.00
KT CST 0	162	17.47	41.78

Water use

	1990	2000
Number of households	599	
Population (estimated 5 persons per house)	2995	
Demand per person (liters/day)	60	
Demand per household (liter/day)	300	
Total domestic water demand (m3/day)	179.7	

B Water supply facilities provided at time of resettlement and still in use

Ministry of transmigration Engineering report for resettlement area,	yes	[X]	no	[ ]
Engineering study drawings & maps	yes	[X]	no	[ ]
number of shallow wells with bucket				300
number of wells per family				2
Used for drinking and cooking	yes	[X]	no	[ ]
Used for washing and bathing	yes	[X]	no	[ ]
Does the well run dry ?	yes	[X]	no	[ ]

Water quality for shallow wells

bad taste	wet season	[X]	dry season	[ ]
color _____	wet season	[X]	dry season	[ ]
bad smell	wet season	[ ]	dry season	[ ]
other _____				
water is potable	wet season	[X]	dry season	[X]
average depth of water in well	wet season 3.5 m		dry season _____	
Does each household have a storage cistern	yes	[ ]	no	[X]
Does each house collect rainwater	yes	[X]	no	[ ]

Volume (liters) <1m3 Type: plastic rain barrel with open top

C Additional water supply facilities provided under OECF loan SPL-V/VI 1993-94

Engineering study report & drawings — yes ☐ — no ☒

c1 ***Source:***

surface water ☐ — name of stream stream _____

borehole ☒ — borehole depth 175 m

Is water quality data for the BH available? — yes ☐ — no ☒

Location	Elevation (m)	Lat 00^0	Long 100^0
KT BH1	134	18.19	40.55
KT BH2	143	17.39	41.63

c2 ***Extraction method:***

pumped intake ☒ — infiltration well next to stream ☐

gravity intake ☐ — earth dam ☐ — concrete weir ☐

For pumped extraction, what is the pump capacity? — Q _____ m3/min

Head _____ m

Is the pump is operational? — yes ☐ — no ☒

broken ☐ — the pump is missing ☒ — not in use ☐

c3 ***Raw water pipeline (source to treatment)*** — no transmission pipeline ☒

Location	Size	Materials	Length m

installation: Above ground surface ☐ — below ground surface ☐

condition: Leaking ☐ — not in use ☐

c4 ***Treatment facility:*** (2 provided 1 at each borehole) — not in use ☒

Pre-treatment: chemical coagulation ☐ — sedimentation tank ☐

Filtration: slow sand ☒ — rapid sand ☐

Chemical used ? lime ☐ — alum ☐

Treated water storage: in ground concrete reservoir ☒ — capacity _____ m3

by-passed (directly to distribution system) ☐ — not in use ☒

c5 ***Distribution system***

booster pumps: Qty: 2 — Q 9.5 m3/hr

GRUNDFOS Model No. B 42670010 Type CRB-100 Vertical Multistage Centrfugal Pump — Head 84.9 m

Is the pump is operational? — yes ☐ — no ☒

broken ☐ — the pump is missing ☐ — not in use ☒

diesel generators Qty 2 — generator rating _____ kW/kVA

YANMAR Model TS 300 & TS 230 — engine rating _____ HP

Is the generator operational? — yes ☐ — no ☒

broken ☐ — missing ☐ — not in use ☐

c6 *Distribution piping map:* available ☐ no ☒

Location	Size	Materials	Length m
main feeder			
branches			
laterals			

installation: Above ground surface ☐ below ground surface ☒

condition: Leaking ☐ not in use ☐

How is the water delivered : individual house connection ☐

to public cistern/hydrant ☐

number of public hydrants 20 number of houses per public hydrants 30

	Elevation (m)	Lat 00^{0}N	Long 100^{0}E
highest point in the village	162 block C	17.47	41.78
lowest point in the village	121 block B	18.03	41.00
point farthest from treatment facility			

D Catchment dams provided by GOI - PU yes ☒ no ☐

Engineering study report & drawings yes ☐ no ☒

Engineering drawings yes ☐ no ☒

d1 *Source*

River or other surface water by gravity ☐

name of river or stream 2 locations : 1 near block A & 1 near block C)

Spring by gravity ☒

Structure earth dam ☐ concrete weir ☒

Notes on conditions of check dam and pond:
previous check dams have failed because surface run-off has eroded the foundations
The new dam structure will likely sufer the same fate

Source Location		Elevation (m)	Lat 00^{0}	Long 100^{0}
KT S1	block A	145	18.05	40.53
KT S2	block B	133	17.83	40.89
KT S3		166	16.82	41.18
KT S4		164	16.81	41.21

For spring : what is spring yield wet season _____ dry season _____

spring yield not measured ☒

is the spring protected ? yes ☐ no ☒

what kind of protection permanent ☐ temporary ☐

describe : the spring water is collected in a surface pond behind the check dam

For pond (behind check dam)
Surface area of pond _____ m2 Depth of pond _____ m

Estimated storage capacity _____ m3

Is there any water catchment scheme to protect the water source

yes ☐ no ☒

Is the source also used for other purposes

for irrigation yes ☐ no ☒

for watering animal yes ☐ no ☒

Does the source run dry ? yes ☐ no ☒

When does the source run dry _____

How many days without rain before the source runs dry ? _____ weeks

How long does the source run dry ? _____ weeks

d2 ***Raw water pipeline (from source to filter)***

Location	Size	Materials	Length m
from S1 to Block A	75 mm	GIP	
from S1 to Block C	75 mm	GIP	
from S3 to Block C	75 mm	GIP	

installation: Above ground surface ☒ below ground surface ☐

condition: Appears good ☒ Leaking ☐ not in use ☐

d3 ***Slow sand filter*** with storage tank ☒

Location	Elevation (m)	Lat 00^{0}	Long 100^{0}
KT C ST0	162	17.47	41.78
KT ST2	142	18.00	41.46

Dimensions: Capacity

Wall materials : ferro cement ☐ brick ☒ stone ☐

Roof materials : galvanized corrugated sheet metal ☐ no roof ☐

Operating condition :

Filter/Storage unit KTC STO in block C is empty because there is not enough pressure in the inlet pipe. The head differential between the dam and the filter is too small.

Is the water flowing into reservoir clean ? yes ☒ no ☐

Reservoir is connected to piped distribution system yes ☐ no ☒

E Potential Sources

River or other surface water by gravity ☒

name of river or stream _____

Source Location		Elevation (m)	Lat 00^{0}	Long 100^{0}
KT S3	block C	166	16.82	41.18
KT S4	block C	164	16.81	41.21

Spring by gravity ☒

Structure earth dam ☐ concrete weir ☒

Appendix 5.1 Water Supply System - Data Sheet for Muara Mahat Baru

A General

Name of Village		Muara Mahat Baru
District		Kampar
Province		Riau
Dates surveyed by NGO		8 - 14 April '02
Dates visited by study team		22 March '02
Topographic map reference 1:50,000		0816 - 23
Topographic map 1:10,000	available ☐	no ☒
Land System	: MBI (33)	
Land Form	: undulating to rolling tuffaceous sedimentary plains (V83)	
Lithology	: fine grained tefra, tuffite, mudstone, siltstone, sandstone, alluvium, recent riverine, old sands and gravels.	

GPS data (true north)

Reference point	Elevation (m)	Lat 00^0	Long 101^0
MMB BH1	84	29.39	5.31

Water use

	1990	2000
Number of households	447	
Population (estimated 5 persons per house)	2235	
Demand per person (liters/day)	60	
Demand per household (liter/day)	300	
Total domestic water demand (m^3/day)	134.1	

B Water supply facilities provided at time of resettlement and still in use

Ministry of transmigration Engineering report for resettlement area,	yes	☐	no	☒
Engineering study drawings & maps	yes	☐	no	☒
number of shallow wells with bucket				224
number of housing units per well				2
Used for drinking and cooking	yes	☒	no	☐
Used for washing and bathing	yes	☒	no	☐
Does the well run dry ?	yes	☐	no	☒

Water quality for shallow wells

bad taste	wet season	☐	dry season	☐
color _____	wet season	☐	dry season	☐
bad smell	wet season	☐	dry season	☐
other _____				
water is potable	wet season	☒	dry season	☒
average depth of water in well	wet season ____		dry season ____	

Does each household have a storage cistern	yes	☐	no	☒
Does each house collect rainwater	yes	☒	no	☐

Volume (liters) 200 liter Type: plastic barrel with open top

C Additional water supply facilities provided under OECF loan SPL-V/VI 1993-94

Engineering study report & drawings — yes ☐ — no ☒

c1 ***Source:***

surface water ☐ — name of stream _____

borehole ☒ — borehole depth (to be confirmed) 125 m

Is water quality data for the BH available? — yes ☐ — no ☒

Location	Elevation (m)	Lat 00^0	Long 101^0
MMB BH1	84	29.39	5.31

c2 ***Extraction method:***

pumped intake ☒ — infiltration well next to stream ☐

gravity intake ☐ — earth dam ☐ — concrete weir ☐

For pumped extraction, what is the pump capacity? — Q _____ m3/min

Head _____ m

Is the pump is operational? — yes ☐ — no ☒

broken ☐ — the pump is missing ☐ — not in use ☒

c3 ***Raw water pipeline (source to treatment)*** — no transmission pipeline ☐

Location	Size	Materials	Length m

installation: Above ground surface ☐ — below ground surface ☐

condition: Leaking ☐ — not in use ☒

c4 ***Treatment facility:*** — not in use ☒

Pre-treatment: chemical coagulation ☐ — sedimentation tank ☐

Filtration: slow sand ☒ — rapid sand ☐

Chemical used ? lime ☐ — alum ☐

Treated water storage: in ground concrete reservoir ☒ — capacity _____ m3

filter in use but storage by-passed ☐ — not in use ☐

Location	Elevation (m)	Lat 00^0	Long 101^0
MMB BH1	84	29.39	5.31

c5 ***Distribution system***

booster pumps: Qty: — Q _____ m3/min

Head _____ m

Is the pump is operational? — yes ☐ — no ☒

broken ☐ — the pump is missing ☐ — not in use ☒

diesel generators Qty — generator rating _____ kW/kVA

engine rating _____ HP

Is the generator operational? — yes ☐ — no ☒

broken ☐ — missing ☒ — not in use ☐

c6 ***Distribution piping map:*** available ☐ no ☒

Location	Size	Materials	Length m
main feeder			
branches			
laterals			

installation: Above ground surface ☐ below ground surface ☒

condition: Leaking ☐ not in use ☒

How is the water delivered : individual house connection ☐

to public cistern/hydrant ☒

number of public hydrants 15 number of houses per public hydrants 30

	Elevation (m)	Lat 00^0N	Long 101^0E
highest point in the village			
lowest point in the village			
point farthest from treatment facility			

D **<u>Catchment dams provided by GOI - PU</u>** yes ☐ no ☒

Engineering study report yes ☐ no ☐

Engineering drawings yes ☐ no ☐

E ***Potential Sources*** yes ☐ no ☒

River or other surface water by gravity ☐

name of river or stream _____

Appendix 5.1 Water Supply System - Data Sheet for Gunung Bungsu

A General

Name of Village		Gunung Bungsu	
District		Kampar	
Province		Riau	
Dates surveyed by NGO		19 - 25 Mar-02	
Dates visited by study team		21-mar-02	
Topographic map reference 1:50,000		0816 - 13	
Topographic map 1:10,000	available	[X]	no [ ]
Land System	: MPT (55)		
Land Form	: asymetric & unoriented point of sediment		
Lithology	: sandstone, shale, conglomerate, siltstone.		

GPS data (true north)

Reference point		Elevation (m)	Lat 00^0	Long 100^0
GB 1	flat area	127	19.13	38.07
GB 3	village centre	130	19.16	37.89

Water use

	1990	2000
Number of households	241	
Population (estimated 5 persons per house)	1205	
Demand per person (liters/day)	60	
Demand per household (liter/day)	300	
Total domestic water demand (m3/day)	72.3	

B Water supply facilities provided at time of resettlement and still in use

Ministry of transmigration Engineering report for resettlement area,	yes	[ ]	no	[ ]
Engineering study drawings & maps	yes	[X]	no	[ ]
number of shallow wells with bucket				121
number of housing units per well				2
Used for drinking and cooking	yes	[X]	no	[ ]
Used for washing and bathing	yes	[X]	no	[ ]
Does the well run dry ?	yes	[X]	no	[ ]
Water quality for shallow wells				
bad taste	wet season	[ ]	dry season	[ ]
color _____	wet season	[ ]	dry season	[ ]
bad smell	wet season	[ ]	dry season	[ ]
other _____				
water is potable	wet season	[X]	dry season	[ ]
average depth of water in well	wet season	7 m	dry season	_____
Does each household have a storage cistern	yes	[ ]	no	[X]
Does each house collect rainwater	yes	[ ]	no	[X]

Volume (liters) _____ Type: _____

Notes : wells located on hillside are 9 m deep and one day after 2 weeks without rain.

C Additional water supply facilities provided under OECF loan SPL-V/VI 1993-94

Engineering study report & drawings — yes ☐ no ☒

c1 *Source:*

surface water ☒ name of stream: Kampar river

borehole ☐ borehole depth: _____ m

Is water quality data for the BH available? yes ☐ no ☐

Location	Elevation (m)	Lat 00⁰	Long 100⁰
GB 4	116	19.09	38.40

c2 *Extraction method:*

pumped intake ☒ direct suction ☒ infiltration well next to stream ☐

gravity intake ☐ earth dam ☐ concrete weir ☐

For pumped extraction, what is the pump capacity? Q _____ m3/min

Head _____ m

Is the pump is operational? yes ☐ no ☒

broken ☐ the pump is missing ☒ not in use ☐

c3 *Raw water pipeline (source to treatment)* no transmission pipeline ☐

Location	Size	Materials	Length m

installation: Above ground surface ☐ below ground surface ☒

condition: Leaking ☐ not in use ☒

c4 *Treatment facility:* not in use ☒

Pre-treatment: chemical coagulation ☒ sedimentation tank ☐

Filtration: slow sand ☒ rapid sand ☐

Chemical used ? lime ☒ alum ☐

Treated water storage: in ground concrete reservoir ☒ capacity _____ m3

by-passed (directly to distribution system) ☐ not in use ☒

Location	Elevation (m)	Lat 00⁰	Long 100⁰
GB 5	129	19.21	37.99

c5 *Distribution system*

booster pumps: Qty: 2 units Q 9.5 m3/hr

GRUNDFOS Model No. B 42670010 Type CRB-100 Vertical Multistage Centrfugal Pump — Head 33.0 m

Is the pump operational? yes ☐ no ☒

broken ☐ the pump is missing ☐ not in use ☒

diesel generators Qty 2 units generator rating _____ kW/kVA

YANMAR Model TS 300 engine rating _____ HP

Is the generator operational? yes ☐ no ☒

broken ☐ missing ☐ not in use ☒

c6 ***Distribution piping map:*** available ☐ no ☒

Location	Size	Materials	Length m
main feeder			
branches			
laterals			

installation: Above ground surface ☐ below ground surface ☐

condition: Leaking ☐ not in use ☒

How is the water delivered : individual house connection ☐

to public cistern/hydrant ☒

number of public hydrants 8 number of houses per public hydrants 30

	Elevation (m)	Lat 00^0N	Long 100^0E
highest point in the village	140	19.34	37.83
lowest point in the village	126	19.42	37.86
point farthest from treatment facility	130	19.16	37.89

D Catchment dams provide by GOI yes ☐ no ☒

Engineering study report & drawings yes ☐ no ☐

Engineering drawings yes ☐ no ☐

E *Potential Alternate Source*

Spring water developed and used by villagers ☒

Spring Location	Elevation (m)	Lat 00^0	Long 100^0
GB S1	126	19.42	37.86

For spring : what is spring yield wet season Good dry season Good

spring yield not measured ☒

is the spring protected ? yes ☐ no ☒

what kind of protection permanent ☐ temporary ☐

describe : spring water is ponded in a deep dug pit

Appendix 5.1 Water Supply System - Data Sheet for Tanjung Pauh

A General

Name of Village		Tanjung Pauh & Tanjung Balit
District		Lima Puluh Kota
Province		West Sumatra
Dates surveyed by NGO		8 - 14 April '02
Dates visited by study team		2 - April '02
Topographic map reference 1:50,000		0816 - 11 & 0816 - 12
Topographic map 1:10,000	available ☐	no ☐
Land System	: LWW (34)	
Land Form	: undulating to rolling mixed sedimentary plains (P02)	
Lithology	: shale, sandstone, alluvium, recent riverine.	

GPS data (true north)

Reference point	Elevation (m)	Lat 00^0	Long 100^0
TP1	181	11.95	46.04
TP2	189	12.07	45.69
TP3	182	12.04	45.75
TP4	187	11.97	45.86
TP5	181	11.93	45.94
TP6	155	11.80	46.19
TP7	169	11.62	46.50
TB1	178	11.71	46.32
TB2	215	11.96	45.62

Water use

	1990	2000
Number of households	313	
Population (estimated 5 persons per house)	1565	
Demand per person (liters/day)	60	
Demand per household	300	
Total domestic water demand	93.9	

B Water supply facilities provided at time of resettlement and still in use

Ministry of transmigration
Engineering report for resettlement area, yes ☐ no ☐

Engineering study drawings & maps yes ☐ no ☐

number of shallow wells with bucket _____
number of wells per family _____

Used for drinking and cooking yes ☐ no ☒

Used for washing and bathing yes ☐ no ☒

Does the well run dry ? yes ☒ no ☐

Water quality for shallow wells

bad taste		wet season	☒	dry season ☐
color	_____	wet season	☒	dry season ☐
bad smell		wet season	☒	dry season ☐
other	_____			
water is not potable				☒
average depth of water in well		wet season	7 m	dry season _____

Notes : There are many MCK facilities but all of those did not used anymore, because water quality was very bad.

Does each household have a storage cistern yes ☐ no ☒

Does each house collect rainwater yes ☐ no ☒

Volume (liters) _____ Type: _____

C Additional water supply facilities provided under OECF loan SPL-V/VI 1993-94

Engineering study report & drawings yes ☐ no ☒

c1 ***Source:***

surface water ☒ name of stream stream Panca river

borehole ☐ borehole depth (to be confirmed) _____ m

Is water quality data for the BH available? yes ☐ no ☐

Location Elevation (m) Lat 00^0 Long 100^0

no measurement

c2 ***Extraction method:***

pumped intake ☒ infiltration well next to stream ☒

gravity intake ☐ earth dam ☐ concrete weir ☐

For pumped extraction, what is the pump capacity? Q _____ m3/min

Head _____ m

Is the pump is operational? yes ☐ no ☒

broken ☐ the pump is missing ☐ not in use ☒

c3 ***Raw water pipeline (source to treatment)*** no transmission pipeline ☐

Location	Size	Materials	Length m

installation: Above ground surface ☐ below ground surface ☐

condition: Leaking ☐ not in use ☒

c4 ***Treatment facility:*** not in use ☒

Pre-treatment: chemical coagulation ☐ sedimentation tank ☒

Filtration: slow sand ☒ rapid sand ☐

Chemical used ? lime ☐ alum ☐

Treated water storage: in ground concrete reservoir ☒ capacity _____ m3

filter in use but storage by-passed ☐ not in use ☐

Location	Elevation (m)	Lat 00^0	Long 100^0
TB3 (WTP)	183	11.54	46.65
TP ST1 (storage on hilltop)	200	11.99	46.74

c5 ***Distribution system***

booster pumps: Qty: 2 Q _____ m3/min

Head _____ m

Is the pump is operational? yes ☐ no ☒

broken ☐ the pump is missing ☐ not in use ☒

diesel generators Qty 1 generator rating _____ kW/kVA

engine rating _____ HP

Is the generator operational? yes ☐ no ☒

broken ☐ missing ☐ not in use ☒

c6 ***Distribution piping map:*** available ☐ no ☒

Location	Size	Materials	Length m
main feeder	4" dia	GIP	
branches			
laterals			

installation: Above ground surface ☐ below ground surface ☒

condition: Leaking ☐ not in use ☒

How is the water delivered : individual house connection ☐

to public cistern/hydrant ☒

number of public hydrants _____ number of houses per public hydrants _____

	Elevation (m)	Lat 00^{0}N	Long 100^{0}E
highest point in the village	215	11.96	45.62
lowest point in the village	155	11.8	46.19
point farthest from treatment facility	189	12.07	45.69

D Catchment dams yes ☒ no ☐

Engineering study report yes ☐ no ☒

Engineering drawings yes ☐ no ☒

d1 ***Source,*** show 2 (two) sources : 1 provided by PU,

1 provided by villagers with loan from Japan NGO

River or other surface water by gravity ☒

name of river or stream Bukit Lakuak river (planned for T.Pauh & T.Balit)

Structure earth dam ☐ concrete weir ☒

Notes on conditions of check dam and pond :
The villagers informed to SAPS team survey that dam structure built in bukit lakuak river was broken, so, no water flowing into the village.
It is planned by PU 50 Kota district to be repaired within this year (2002)

Name of stream Kelok Balacu river

Structure natural stone pond ☒ concrete weir ☐

Notes on conditions of check dam and pond

Source Location		Elevation (m)	Lat 00^0	Long 101^0
no measurement for PU dam				
TP S2	(Kelok Balacu river)	231	12.24	47.18

Other potential source by gravity

TP S1	(other potential spring)	192	12.16	47.05

For Spring : what is spring yield wet season _____ dry season _____

spring yield not measured [X]

is the spring protected ? yes [ ] no [X]

what kind of protection permanent [ ] temporary [ ]

describe : _____

For pond behind check dam

Surface area of pond 3 m2 Depth of pond 0.5 m

Estimated storage capacity 1.5 m3

Is there any water catchment scheme to protect the water source

yes [ ] no [X]

Is the source also used for other purposes

for irrigation yes [ ] no [X]

for watering animal yes [ ] no [X]

Does the source run dry ? yes [ ] no [X]

When does the source run dry _____

How many days without rain before the source runs dry ? _____ weeks

How long does the source run dry ? _____ weeks

d2 ***Raw water pipeline (from source to filter)***

Location	Size	Materials	Length m
main feeder from	4" dia	PVC	
Kelok Balacu river			

installation: Above ground surface [X] below ground surface [ ]

condition: Appears good [ ] Leaking [ ] not in use [X]

d3 ***Slow sand filter*** with storage tank [ ] has not been built yet [X]

(by PU)

Location Elevation (m) Lat 00^0 Long 101^0

Note : small storage (no filter) built by T. Pauh villagers located at high location near the national road

Dimensions of storage tank: 2m x 2m x 1.5 m Capacity 6 m^3

Wall materials : ferro cement [X] brick [ ] stone [ ]

Roof materials : galvanized corrugated sheet metal [ ] no roof [ ]

Operating condition :

Water storage tank built by PU could not be located (12 m^3)

- is too small and a significant amount is lost

- the pipeline is exposed and can be damaged easily.

Is the water flowing into reservoir clean ? yes [X] no [ ]

Is the reservoir structure in good condition yes [X] no [ ]

Reservoir is connected to piped distribution system (which is built by villagers) yes [X] no [ ]

E Potential Sources

River or other surface water by gravity [X]

Name of stream Parmato river

Location : 3 - 5 km distance from the village to the North

Notes on conditions of source/river :
Based on village leader information Parmato river is bigger than Kelok Balacu river, and assumed it would be meet water demand in the village.
Location of source to be verified.

Appendix 5.1 Water Supply System - Data Sheet for Tanjung Balit

A General

Name of Village: Tanjung Balit
District: Lima Puluh Kota
Province: West Sumatra
Dates surveyed by NGO: 8 - 14 April '02
Dates visited by study team: 2 - April '02
Topographic map reference 1:50,000: 0816 - 11 & 0816 - 12
Topographic map 1:10,000: available ☐ no ☐
GPS data (true north)
Reference point: Elevation (m) Lat 00^0 Long 101^0
TP 11

Water use	1990	2000
Number of households	421	
Population (estimated 5 persons per house)	2105	
Demand per person (liters/day)	60	
Demand per household	300	
Total domestic water demand	126.3	

B Water supply facilities provided at time of resettlement and still in use

Ministry of transmigration
Engineering report for resettlement area, yes ☐ no ☐

Engineering study drawings & maps yes ☐ no ☐

number of shallow wells with bucket _____
number of wells per family _____

Used for drinking and cooking yes [X] no ☐
Used for washing and bathing yes [X] no ☐
Does the well run dry ? yes [X] no ☐

Water quality for shallow wells

bad taste	wet season	[X]	dry season	☐
color _____	wet season	[X]	dry season	☐
bad smell	wet season	[X]	dry season	☐
other _____				
water quality is good	wet season	☐	dry season	☐
average depth of water in well	wet season	3 m	dry season	_____

Does each household have a storage cistern yes ☐ no [X]
Does each house collect rainwater yes ☐ no [X]
Volume (liters) _____ Type: _____

C Additional water supply facilities provided under OECF loan SPL-V/VI 1993-94

Engineering study report & drawings yes ☐ no ☒

c1 *Source:*

surface water ☒ name of stream stream Panca river

borehole ☐ borehole depth (to be confirmed) _____ m

Is water quality data for the BH available? yes ☐ no ☐

Location Elevation (m) Lat 00^{0} Long 101^{0}

no measurement

c2 *Extraction method:*

pumped intake ☒ infiltration well next to stream ☐

gravity intake ☐ earth dam ☐ concrete weir ☐

For pumped extraction, what is the pump capacity? Q _____ m3/min

Head _____ m

Is the pump is operational? yes ☐ no ☒

broken ☐ the pump is missing ☐ not in use ☒

c3 *Raw water pipeline (source to treatment)* no transmission pipeline ☐

Location	Size	Materials	Length m

installation: Above ground surface ☐ below ground surface ☐

condition: Leaking ☐ not in use ☐

c4 *Treatment facility:* not in use ☒

Pre-treatment: chemical coagulation ☐ sedimentation tank ☒

Filtration: slow sand ☒ rapid sand ☐

Chemical used ? lime ☐ alum ☐

Treated water storage: in ground concrete reservoir ☒ capacity _____ m3

filter in use but storage by-passed ☐ not in use ☐

Location Elevation (m) Lat 00^{0} Long 100^{0}

_____

c5 *Distribution system*

booster pumps: Qty: 2 Q _____ m3/min

Head _____ m

Is the pump is operational? yes ☐ no ☒

broken ☐ the pump is missing ☐ not in use ☒

diesel generators Qty 1 generator rating _____ kW/kVA

engine rating _____ HP

Is the generator operational? yes ☐ no ☒

broken ☐ missing ☐ not in use ☒

_____

_____

c6 ***Distribution piping map:*** available ☐ no ☒

Location	Size	Materials	Length m
main feeder			
branches			
laterals			

installation: Above ground surface ☐ below ground surface ☐

condition: Leaking ☐ not in use ☒

How is the water delivered : individual house connection ☐

to public cistern/hydrant ☒

number of public hydrants _____ number of houses per public hydrants _____

	Elevation (m)	Lat 00^{0}N	Long 101^{0}E
highest point in the village	_____	_____	_____
lowest point in the village	_____	_____	_____
point farthest from treatment facility	_____	_____	_____

D **<u>Catchment dams provided by GOI - PU</u>** yes ☒ no ☐

Engineering study report yes ☐ no ☐

Engineering drawings yes ☐ no ☐

d1 ***Source***

River or other surface water by gravity ☒

name of river or stream Bukit Lakuak river

Spring by gravity ☐

Structure earth dam ☐ concrete weir ☒

Notes on conditions of check dam and pond

The villagers informed to SAPS team survey that dam structure was broken, so, there is no water flowing into the village. It is planned by PU 50 Kota district to be repaired within this year (2002).

Source Location Elevation (m) Lat 00^0 Long 101^0

no measurement

For Spring : what is spring yield wet season _____ dry season _____

spring yield not measured ☐

is the spring protected ? yes ☐ no ☐

what kind of protection permanent ☐ temporary ☐

describe : _____

For pond behind check dam
Surface area of pond _____ m2 Depth of pond _____ m

Estimated storage capacity _____ m3

Is there any water catchment scheme to protect the water source
yes ☐ no ☐

Is the source also used for other purposes
for irrigation yes ☐ no ☒
for watering animal yes ☐ no ☒
Does the source run dry ? yes ☐ no ☒

When does the source run dry _____

How many days without rain before the source runs dry ? _____ weeks

How long does the source run dry ? _____ weeks

d2 ***Raw water pipeline (from source to filter)***

Location	Size	Materials	Length m
main feeder	4" dia	PVC	

installation: Above ground surface ☐ below ground surface ☐
condition: Appears good ☐ Leaking ☐ not in use ☒

d3 ***Slow sand filter*** with storage tank ☐ number of units in use

Location Elevation (m) Lat 00^0 Long 101^0

Dimensions of storage tank: Capacity

Wall materials : ferro cement ☐ brick ☐ stone ☐
Roof materials : galvanized corrugated sheet metal ☐ no roof ☐

Operating condition :
Water storage tank has not been built yet.
There are many MCK facilities provided by PU but all of those did not used anymore,
because water quality was very bad.

Is the water flowing into reservoir clean ? yes ☒ no ☐
Is the reservoir structure in good condition yes ☐ no ☐
Reservoir is connected to piped distribution system yes ☒ no ☐

Appendix 5.2

Description of Water Supply in Each Village

Appendix 5.2 Description of Water Supply in Each Village

The following sheets were created to record information gathered during the team's field surveys for future reference. Much of the information required to complete the data sheets is still missing and the team intends to fill in the gaps as the information becomes available.

a) Koto Mesjid and Pulau Gadang

Existing wells are hand dug and range in depth from 3 to 4m (to be confirmed by survey). Wells run dry after a prolonged period of drought and villagers in Pulau Gadang report that water quality is a problem. In these two villages 1 well is provided for 4 houses whereas the other villages received 1 well for 2 households.

The villages are located next to each other, and follow the axis of the Silam River. The houses are located in groups on a series of small hills along the paved road. Low-lying areas created by the meandering Silam River separate the small hills.

Additional water supply facilities were provided after resettlement but are no longer operational: one infiltration well next to the Silam river, no filter treatment unit, raw water storage tank and booster pumps with distribution piping to communal hydrants. The treatment plant is located at the point that separates Koto Mesjid from Pulau Gadang.

Villagers in Koto Mesjid have implemented their own small-scale gravity scheme. Clean water is taken from a small stream at higher elevations in the mountain, about 2.5 km from the village and piped to an outlet in the village. PU has identified a budget in 2002 to improve this gravity scheme with check dam, new transmission pipe and filter/storage unit.

b) Ranah Sungkai

The village is divided into two large blocks, located on hilltops in relatively hilly terrain with only one small group of households in each block located in lower lying areas near the stream. Existing wells are hand dug and range in depth from 4 to 7 m in the hilly area and 3 to 4 m (to be confirmed by survey) in the flat area of the village. The wells serving houses on the hilltops are located at lower elevations on the slope more than 25m from the houses. The wells run dry after a prolonged period without rain and villagers complain about the distance and difficulty going up and down slopes to fetch water.

Additional water supply facilities were provided after resettlement but are no longer operational: diversion weir and direct suction pump at Kinari river, sedimentation tank, sand filter treatment, booster pumps and distribution piping to communal hydrants.

There are two potential sources of water from small streams located at higher elevations in the plantation: Pinang Mangu and Tebat Hantu. These sources appear to have a sufficient quantity of water but are not located high enough to feed the whole village by gravity. Nevertheless, the sources could be brought to public distribution points in the lower parts of the village to alleviate water supply problems during

periods of drought. The team has located a good site for a check dam on the Pinang Mangu just downstream of a small waterfall where there is a natural pool and a rocky outcrop.

c) Lubuk Agung

The village is arranged into one large block along the axis of the main road following the Kapecong River. Existing wells were dug to a depth of about 4 m but were abandoned because they frequently run dry. Most villagers are using water from the river. Surface water is relatively clear but there is considerable risk of contamination from runoff, pit latrines and garbage.

Additional water supply facilities were provided after resettlement but are no longer operational: an concrete weir across the river to form a pond, side intake well with direct suction pump to a small reservoir, no treatment, a piped distribution system supplied by booster pumps.

PU has constructed two small gravity schemes. An older check dam on the (????) river provides no water at all because the soil embankment on one side of the dam has been breached. A new check dam has recently been constructed on the Bukit Meranti Water from this check dam is piped to a small storage tank with filter. Water from the tank is flowing freely out a pipe onto the ground.

A number of improvements to the scheme may be possible however a more detailed field investigation and planning will be required:

- Pipe the water to communal taps at a few points in the village by gravity.
- Provide a large storage tank

d) Batu Bersurat

The village is arranged into two large blocks. Housing is located along the relatively flat area near the paved road and on land that slopes gradually up to the top the mountain. Existing wells are hand dug and range in depth from 4 to 5 m in the higher elevations and 3 to 4 m (to be confirmed by survey) in the flat area of the village. The wells run dry after a prolonged period without rain and villagers are using alternate surface water sources in Binamang and water from the reservoir.

Villagers tried to dig deeper wells by hand but encountered "natal" (hard soil or rock). One well near the mosque was dug deeper (7m) using machines and this well provides a good quantity of clean water in all seasons.

Additional water supply facilities were provided after resettlement but are no longer operational: an intake well with direct suction pump at the Kotopanjang reservoir over the hill to the south, a service reservoir on the mountain top, a gravity distribution piping system to communal hydrants in Batu Bersurat and Binamang.

PU has constructed a small catchment dam on the Ngalau River. The water from the pond behind the dam is pumped to a small storage tank near the small mosque. There is no treatment system despite claims by PU that the contract included a filter. The source is not protected and many people are using the pond for bathing. The small pump is

connected to the electrical supply at the Mosque. Although not yet connected, the plan is to distribute the water by gravity to various points in the village.

A number of improvements to the PU scheme may be possible however a more detailed field investigation and planning will be required:

- Increase the amount of storage
- Protect the source
- Provide a slow sand filter and a large storage tank.
- Provide a communal tap at the reservoir and at a few points in the village.

e) Binamang

The village is arranged into one large block. Housing is located up a steep slope. Existing wells are hand dug and range in depth from 4 to 7 m in the higher elevations (to be confirmed by survey). The wells run dry after a prolonged period without rain and villagers are using water from small streams. Surface water is relatively clear but there is considerable risk of contamination from runoff, pit latrines and garbage.

Additional water supply facilities were provided after resettlement but are no longer operational: an intake well with direct suction pump at the Kotopanjang reservoir over the hill to the south, a service reservoir on top of the mountain, a gravity distribution piping system to communal hydrants in Batu Bersurat and Binamang.

PU has constructed two small gravity schemes. An older check dam on the Makam River provides water to an MCK located by the main road. A new check dam has recently been constructed at a much higher on the Makam River. Water from this check dam will be piped to a storage tank with filter located near the MCK. It may be possible to provide additional storage units in other locations if the quantity of water is sufficient.

Another smaller stream also appears to have good potential for providing water by gravity. The team has located a good site for a check dam in a narrow section of the stream where the slopes are steep and rocky.

f) Pongkai Baru

Existing wells are hand dug and range in depth from 3 to 4 m (to be confirmed by survey). Wells run dry after a prolonged period of drought. Some villagers have reportedly dug deeper wells but water quality is poor.

The village is located on relatively flat ground at a high elevation and arranged in a single rectangular plan. Additional water supply facilities were provided after resettlement but are no longer operational: one stream side infiltration well with transmission pump, slow sand filter treatment, clear water storage tank and booster pumps with distribution piping to communal hydrants. The treatment plant is located on a prominent hilltop in the village. Villagers report that the stream has no flow during the dry season.

g) Mayang Pongkai

Existing wells are hand dug and range in depth from 2 to 3 m. The wells run dry and villagers report that water quality is a problem. The village is located on flat ground and the houses are widely distributed, with lot space between neighbors. The sharing of wells between households is inconvenient. Additional water supply facilities were never after resettlement. Villagers use water from the Win river during the dry season. Soil conditions are good for digging and some villagers have already dug individual deeper wells.

h) Pongkai Istiquoma

Facilities were never provided in this village. Villagers have dug their own wells and have requested that the government provide water supply facilities for every household. Oddly, none of the respondents to the statistical survey have reported a problem with the quality or quantity of the wells.

i) Tanjung Alai

The village is spread out over steeply sloping terrain. Houses are located at high elevations along the ridges and in the lower lying area near the Silam River. Existing wells are hand dug and range in depth from 4 to 7 m (to be confirmed by survey). The wells run dry after a prolonged period without rain and villagers and several households have moved to lower elevations closer to sources of surface water.

Additional water supply facilities were provided after resettlement but are no longer operational: a check dam with direct suction pump on Silam River, sedimentation tank, sand filter treatment, booster pumps and distribution piping to communal hydrants and two service reservoirs. Water quality on the Silam was very poor and a second intake was built on the Bomban River several kilometers away.

PU has constructed a small catchment dam on the Duku River. The water from the pond behind the dam flows by gravity the village Mosque. A storage reservoir with slow sand filter has been constructed but it is not connected to the transmission pipe. The transmission pipe has been terminated above ground in the ravine below the Mosque about 10 m lower. Apparently villager claim there is not enough head for water to reach the reservoir.

A number of improvements to the scheme may be possible however a more detailed field investigation and planning will be required:

- Connect the transmission line to the tank (if these is sufficient head)
- Provide a new storage tank at a lower elevation if there is no head
- Pump the water to a large storage tank at a higher elevation and supply the communal taps at a few points in the village by gravity.

j) Muara Takus

Existing wells are hand dug and range in depth from 3 to 4 m (to be confirmed by survey). Wells run dry after a prolonged period of drought and a few villagers report

that quality is a problem. Villagers tried to dig deeper wells but encountered "natal" (hard soil or rock).

The village is located flat ground in a low lying and arranged in a single rectangular plan. Additional water supply facilities were provided after resettlement but are no longer operational: one earth dam that captures water from a spring with slow sand filter treatment, booster pumps and distribution piping to communal hydrants. The source is still in use and provides a good quantity of water. The earth dam is in good condition. The booster station is no longer operational but the water, transmitted by gravity, is treated through the filter. The booster station is by-passed and water is supplied directly into the distribution piping. Three hydrants nearest to the treatment plant have water but there is insufficient head to supply the whole system.

A number of improvements to the scheme may be possible however a more detailed field investigation and planning will be required:

- Increase the amount of storage at the source
- Disconnect the existing distribution system
- Provide storage tanks with a public tap at strategic locations in each block.

k) Koto Tuo

Existing wells are hand dug and range in depth from 3 to 5 m (to be confirmed by survey). Wells in some blocks run dry after a prolonged period of drought. Villagers tried to dig deeper wells by hand but encountered "natal" (hard soil or rock).

The village is located divided into three large blocks each separated by a plantation area. Each block A and B are relatively flat and at lower elevations. Block C is hilly and at higher elevations. Additional water supply facilities were provided after resettlement but are no longer operational: two boreholes, each with slow sand filter treatment, booster pumps and distribution piping to communal hydrants. Villagers claim that water from the boreholes was also poor in quality. Some of the piping is used to distribute water from the gravity supply schemes implemented by PU.

PU has partially developed springs in the plantation above the village but there is potential to do more.

Spring S1 is located near block A and supplies block A and C. Water from the spring is collected by a check dam and is transmitted by gravity In block A the water is fed into the piped water supply system. Pressure is only sufficient to supply two public hydrants. These public hydrants provide only a small amount of storage and water is leaking continuously through the broken taps. In block C the water is passed through a slow sand filter and stored in a concrete structure recently built by PU. This tank is full of water but there is no faucet or connection to distribution the water to the users. The community is using water that comes out the overflow at the top of the tank as a shower for bathing.

Spring S2 is located south of block C and supplies a second storage/filter unit in a higher part of block C. Water is captured by a check dam and transmitted by gravity. Unfortunately the storage tank is empty. At least two previous attempts have been made by PU to build a check dam, each time at slightly higher elevations in the hopes

that the head would be enough to fill the tank. According to GPS readings taken by the team the available head is only about 2 m and not enough to overcome the losses in the rather long (2.3km) and small diameter (75mm) transmission line.

A third spring S3 is located near block B. Villagers presently use this spring as a point source but it is not protected or connected to any piping system. It shows good potential for supplying clean water by gravity to block B, which is located at a lower elevation.

A number of improvements to the scheme may be possible however a more detailed field investigation and planning are required to confirm the technical feasibility:

- Improve the quality and quantity of water captured by building seepage galleries and concrete spring boxes at the source.
- Increase the amount of storage at the source
- Do not feed water into the existing distribution system
- Provide storage tanks with a public tap at strategic locations in each block.

l) Muara Mahat Baru

Existing wells are hand dug and range in depth from 3 to 5 m. The wells do not run dry but villagers report that water quality is a problem and there is some conflict between neighbors who share wells.

The village is located on flat ground and arranged in large square plan. Additional water supply facilities were provided after resettlement but are no longer operational: one deep borehole, a slow sand filter for treatment, a clear water storage well, booster pump and distribution piping to public hydrants. Villagers claim that water from the borehole was poor in quality and quantity.

m) Gunung Bungsu

The village is located flat on relatively flat ground but a few households are located on a hillside. Existing wells are hand dug and range in depth from 9 to 12 m in the hilly area and 3 to 4 m in the flat area of the village. Only the wells located in the hillside area run dry after a prolonged period without rain.

Additional water supply facilities were provided after resettlement but are no longer operational: direct suction pump at Kampar river, sedimentation tank, sand filter treatment, booster pumps and distribution piping to communal hydrants.

There is one unprotected spring in the hilly part of the village. The spring fills a small pit that has been dug into the ground. This spring should be protected from contamination by building a covered infiltration well and installing a simple hand pump.

n) Tanjung Pauh & Tanjung Balit

The villages are side by side and spread out over an area of gently rolling terrain surrounded by high mountains. Existing wells are hand dug and range in depth from 3 – 4 m (to be confirmed by survey). The villagers do not use the wells because the water

quality is bad (high color and turbidity). Villagers buy water at 1000 Rp. Per 20-liter container from PDAM and use water from surface sources including a spring in the old village by the Mahat River.

Additional water supply facilities were provided in 1998 to serve both villages but are no longer operational: a raw water intake on Panca River pumped up to a, sedimentation tank, and sand filter treatment plant, booster pumps and distribution piping to communal hydrants and one service reservoirs with booster station. Operation stopped because villagers were unwilling or unable to assume operating responsibility.

In 2000 PU constructed a gravity scheme consisting of check dam on the Bukit Lakuak River approximately 8 km from the village, a gravity transmission pipeline and a storage tank in Tanjung Pauh. The dam has apparently failed and the scheme does not provide water. PU has a proposal to rehabilitate the dam and improve the gravity scheme.

The villagers in Tanjung Pauh have, with the assistance of a Japanese NGO, developed their own small-scale gravity scheme. A small check dam in the uppermost reaches of the Balacu River provides clean water by gravity to a small storage tank near the village. The transmission pipeline is PVC and runs on the surface over trees and rocks. The pipe is not old but already is damaged and leaking in a few places. Water from the storage tank is distributed to 2 points in each of 3 blocks where the water flows freely and is stored into one of the shallow wells. There is sufficient quantity of water and during our visit we could see water overflowing steadily out of the tank onto the ground. The water from this scheme is apparently not shared with the neighboring villagers in Tanjung Balit.

A number of improvements to the scheme may be possible however a more detailed field investigation and planning will be required:

- Protect the transmission line to the tank
- Provide a larger storage tank
- Provide distribution points in Tanjung Balit
- Provide taps at the distribution points to shut off the water when not in use

Appendix 5.3

Well Survey

Appendix 5.3 Well Survey

Surveyor(s) _____ Date _____

Village _____

1 How is the water taken from the well _____ ☐

a with handpump

b with electric pump

c with bucket or scoop

2 Water quality _____ ☐

a bad taste

b bad color

c bad smell

d all of the above a, b, c)

e water quality is good

3 Where do you wash clothing _____ ☐

a at home using potable water supply

b at home using rainwater catchment

c at public MCK

d surface water stream

4 if using MCK, how far do you travel _____ ☐

a <25m

b 25 - 50m

c 51 - 100m

d 101 - 200m

e >200m

5 If shared or public well, how far do you travel to get water? _____ ☐

a <25m

b 25 - 50m

c 51 - 100m

d 101 - 200m

e >200m

6 Is water boiled before drinking? _____ ☐

a yes

b no

c boiled for drinking but not for brushing teeth

7 Do you have a storage cistern at the house? _____ ☐

a yes

b no

c Volume (liters) _____ ☐☐☐☐

8 How many times a day do you collect water? _____ ☐

a 2 times per day or less

b 3 times per day

c 4 times per day

9 How much water is used (rough estimate liter/family/day) total _____ ☐☐

a cooking and drinking _____ ☐☐

b peronal washing/bathing _____ ☐☐

c washing clothes _____ ☐☐

d for toilet _____ ☐☐

10 what is the actual water level in the well measured from well's upper edge?
less the height of the edge from ground level _____ ☐

a <1m g 6-7m

b 1-2m h 7-8m

c 2-3m I 8-9m

d 3-4m j 9-10m

e 4-5m k 10-15m

f 5-6m L >15m

11 Age of well _____ ☐

a <2 years

b 2-5 years

c 5-10 years

d >10 years

12 Diameter of well _____ ☐

a <1m

b 1-1.5m

c 1.5-2m

d >2m

13 Well casing material _____ ☐

a concrete

b masonry

c no casing

14 Depth of well casing _____ ☐

a entirely

b partly

15 Depth of well _____ ☐

a <1m
b 1-2m
c 2-3m
d 3-4m
e 4-5m
f 5-6m
g 6-7m
h 7-8m
I 8-9m
j 9-10m
k 10-15m
L >15m

16 How far is the well from the nearest leaching pit or latrine? _____ ☐

a <5m

b 5-7m

c 7-10m

d >10m

additional observations/remarks

Appendix 6

Environment

Appendix 6.1

Figures for Physical Parameter

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Appendix 6.1 Figures for Physical Parameter

Figure 1 Concentrations of Color (in TCU) in water samples collected between 1994 – 2001

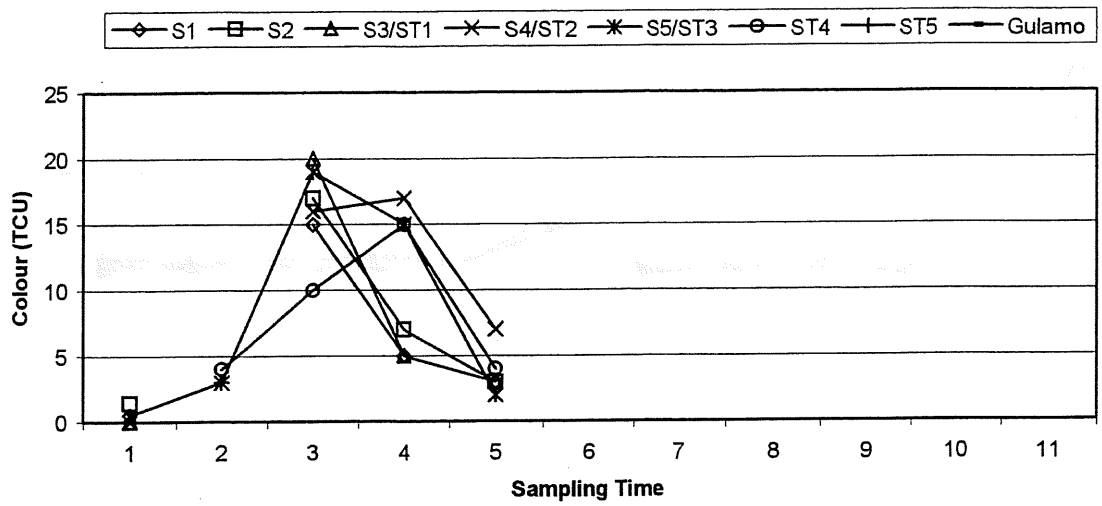


Figure 2 Temperature (degree C) in water samples collected between 1994 – 2001

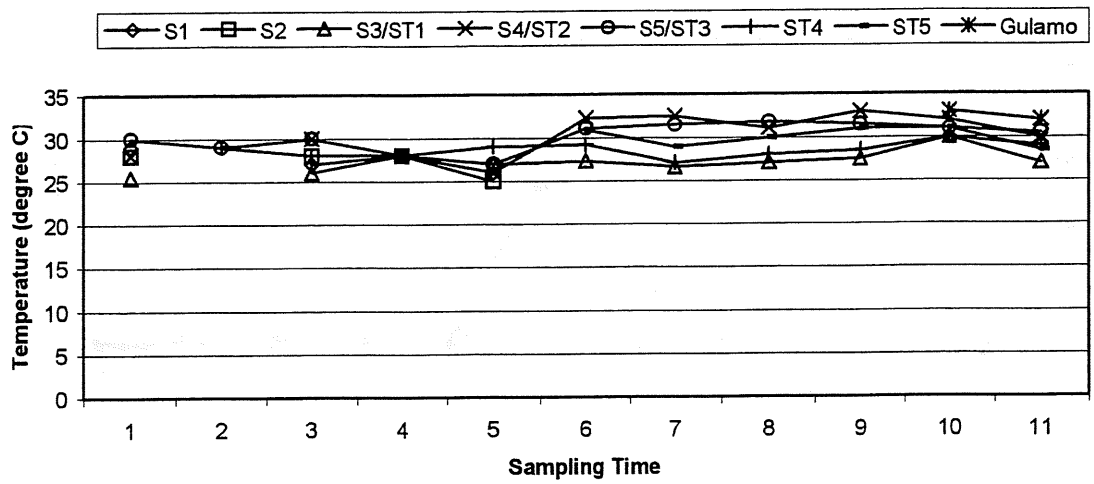


Figure 3 **Concentration of Turbidity (in NTU) in water samples collected between 1994 – 2001**

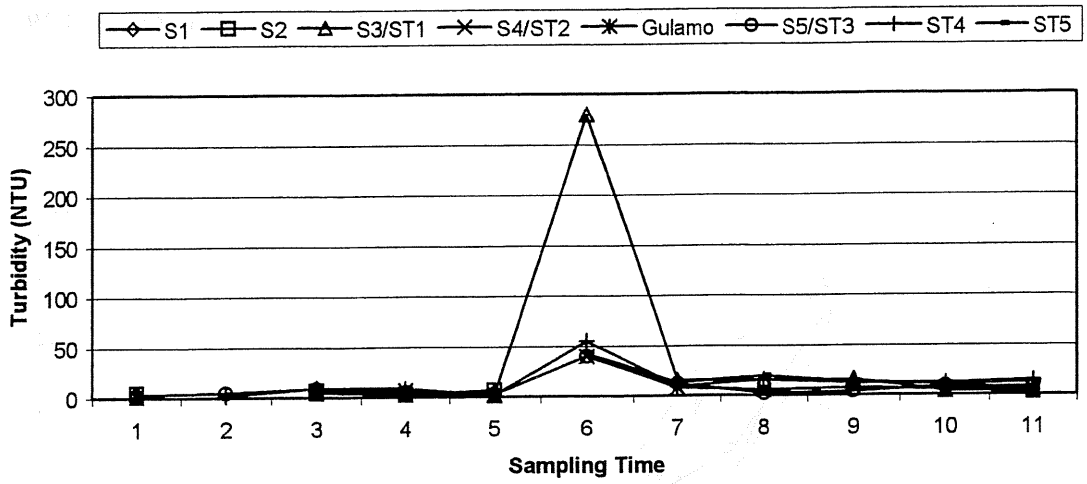


Figure 4 **Concentrations of Dissolved Solid (in mg/L) in water samples collected between 1994 – 2001**

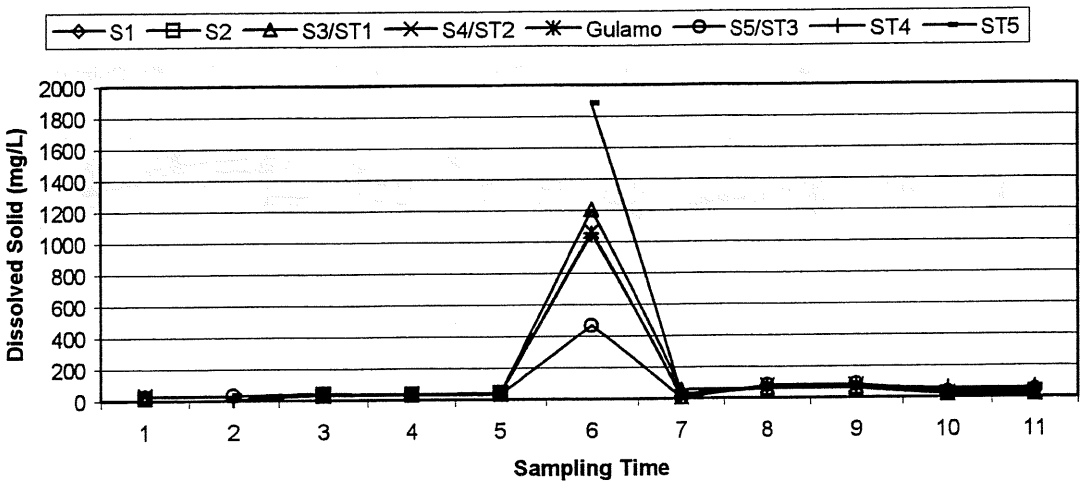
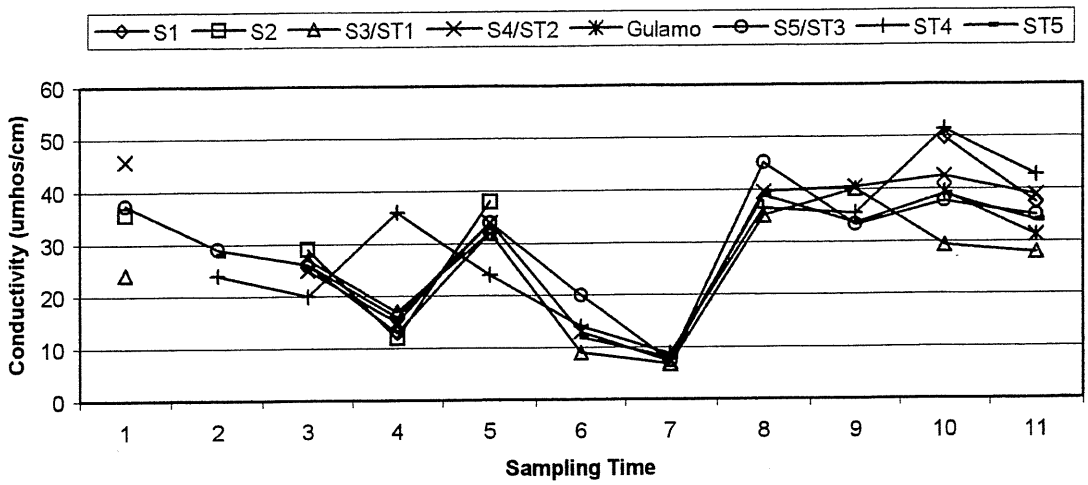
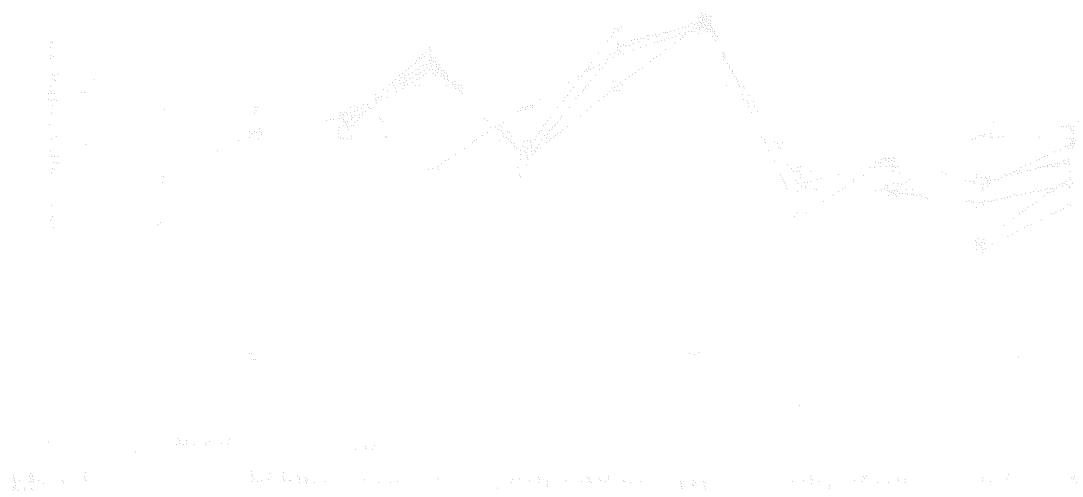


Figure 5 Concentrations of Conductivity (DHL) (μmhos/cm) in water samples collected between 1994 – 2001





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Appendix 6.2 Figures for Chemical Parameter

Figure 1 **pH in water samples collected between 1994 – 2001**

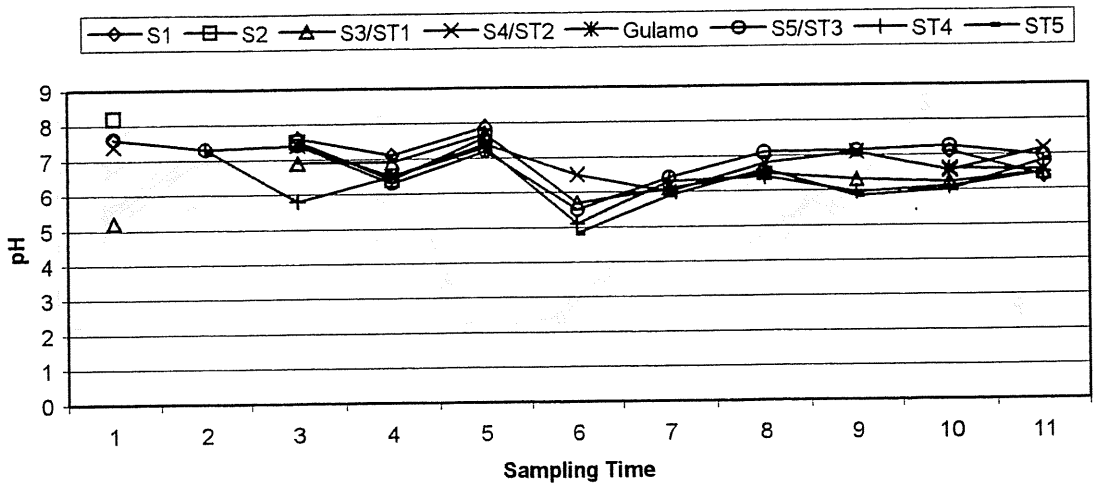


Figure 2 **Concentrations of Dissolved Oxygen (DO) (in mg/L) in water samples collected between 1994 – 2001**

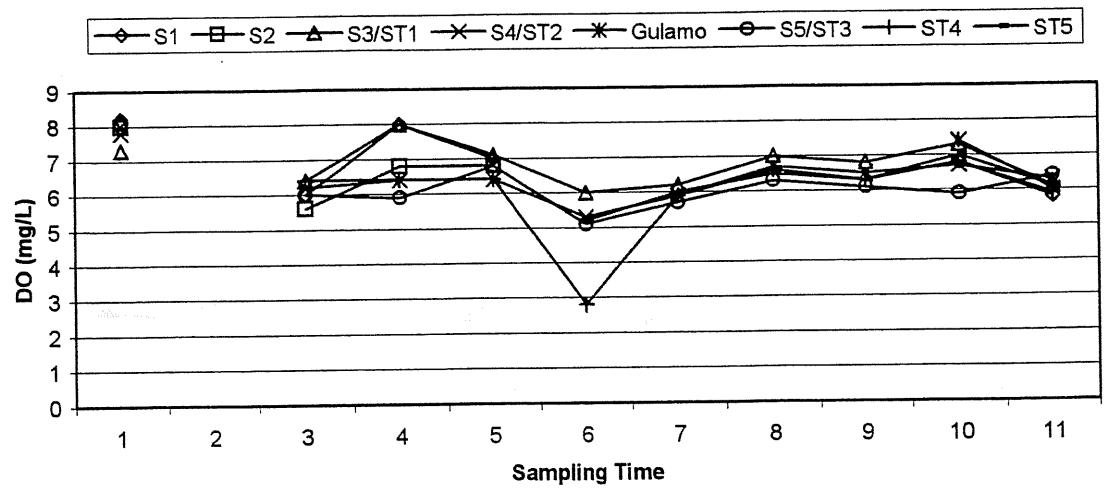


Figure 3 **Concentrations of Nitrate (NO_3) (in mg/L) in water samples collected between 1994 – 2001**

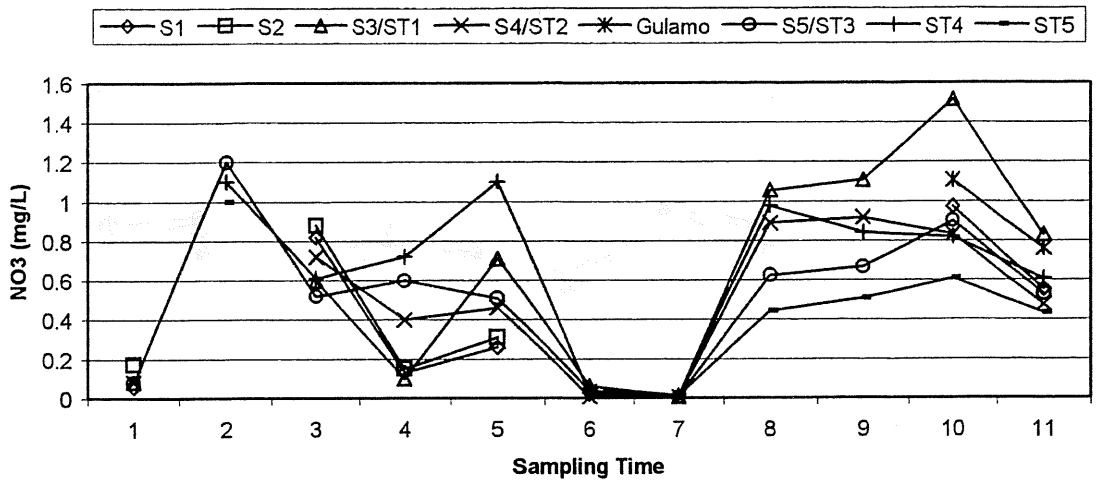
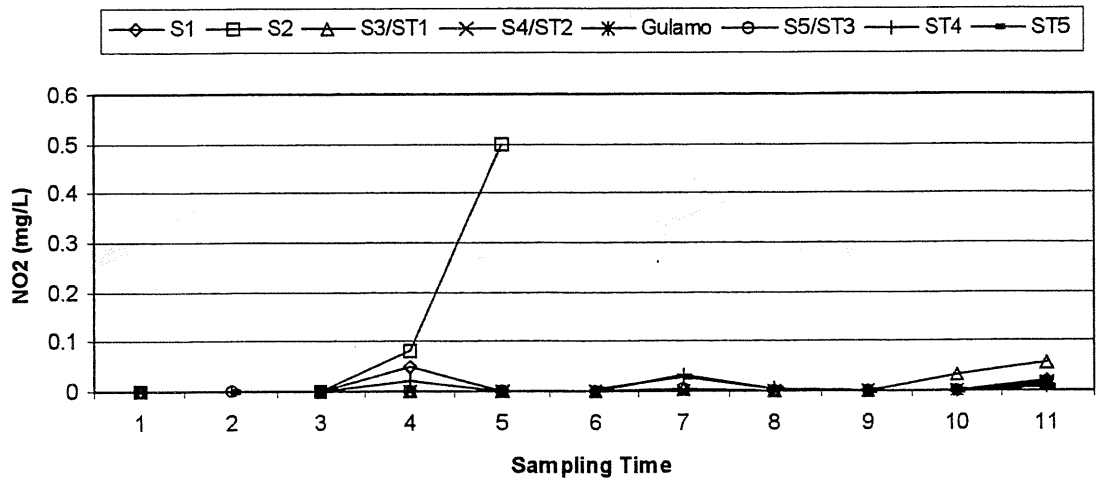


Figure 4 **Concentrations of Nitrite (NO_2) (in mg/L) in water samples collected between 1994 – 2001**



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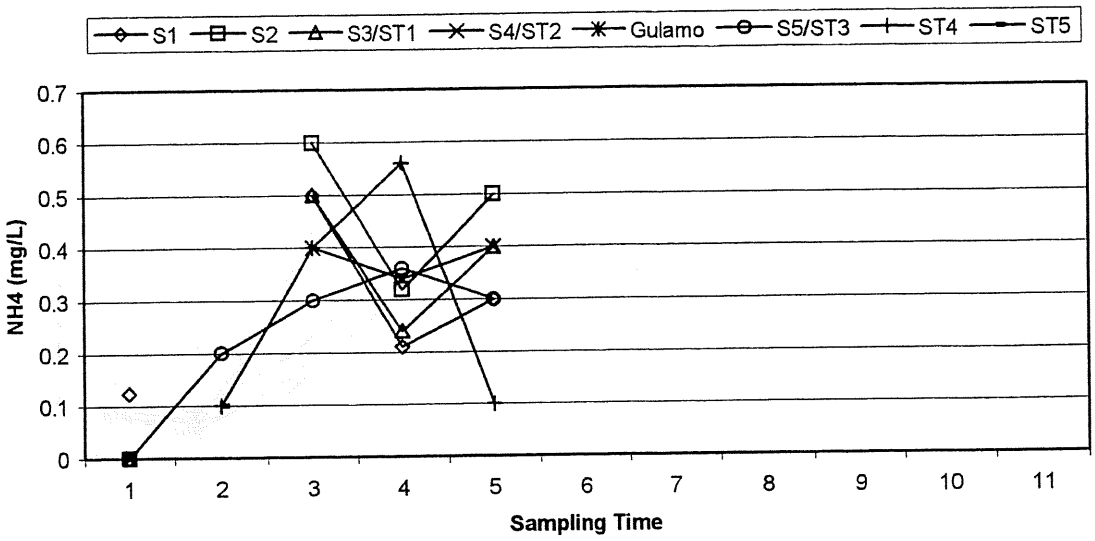

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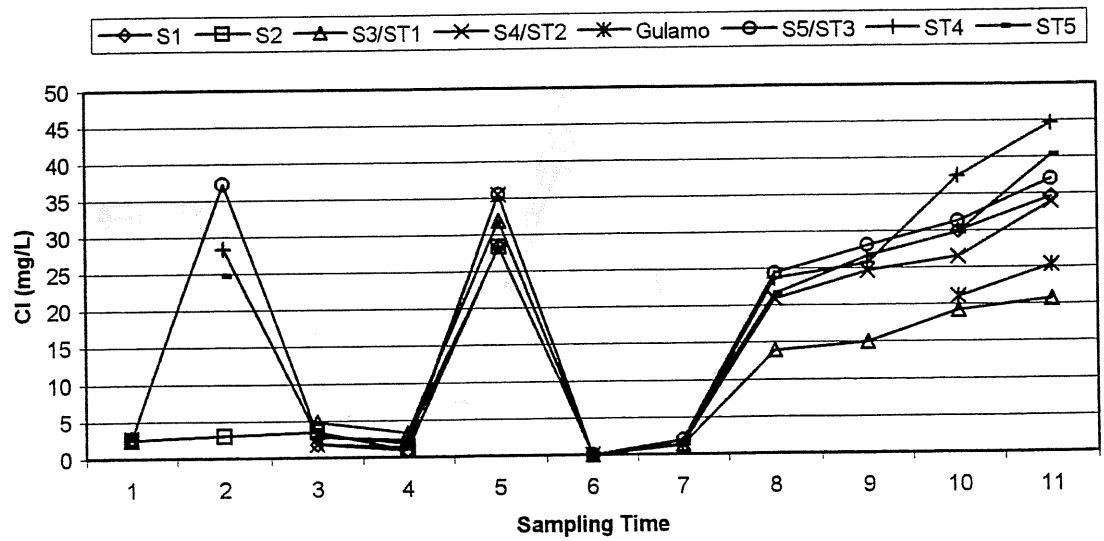
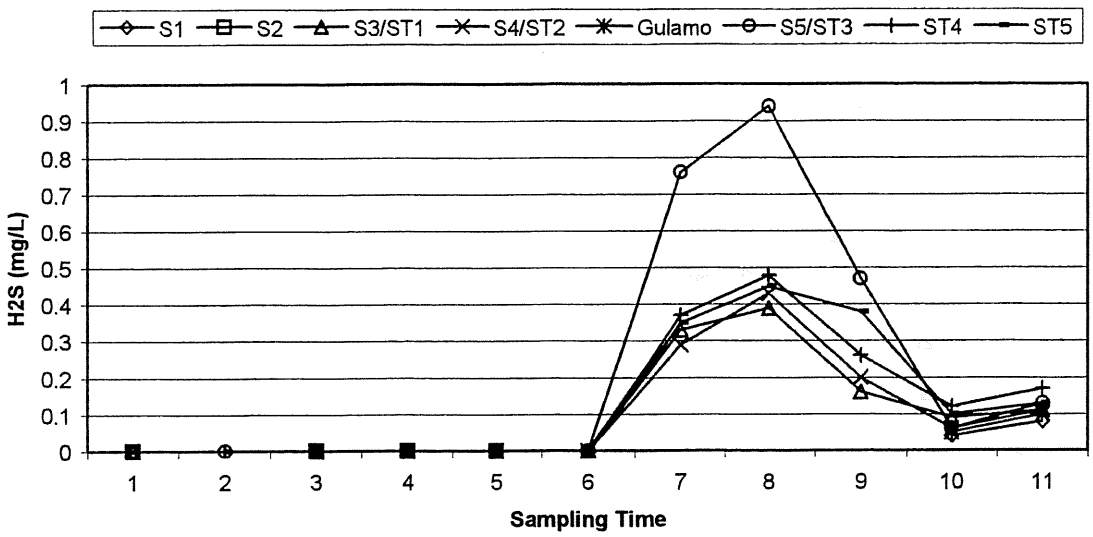


Figure 7 **Concentrations of Hydrogen Sulphate (H2S) (in mg/L) in water samples collected between 1994 – 2001**



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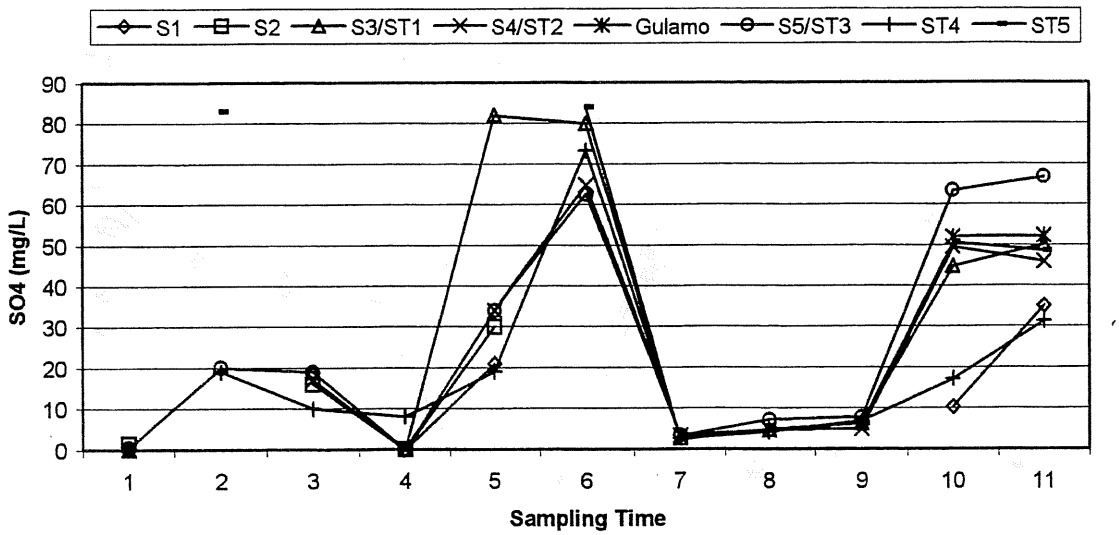

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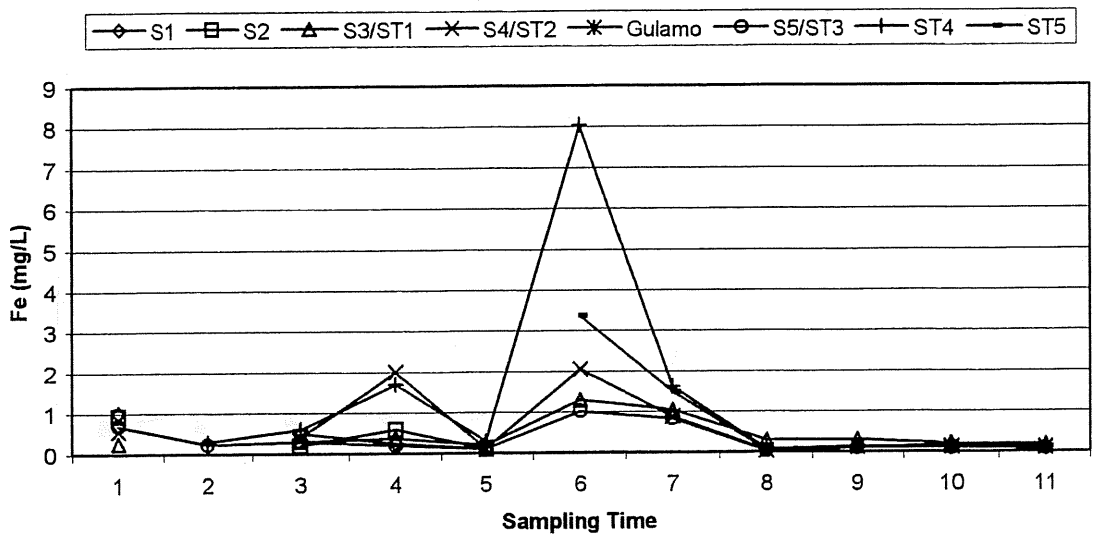


Figure 10 **Concentrations of Cadmium (Cd) (in mg/L) in water samples collected between 1994 – 2001**

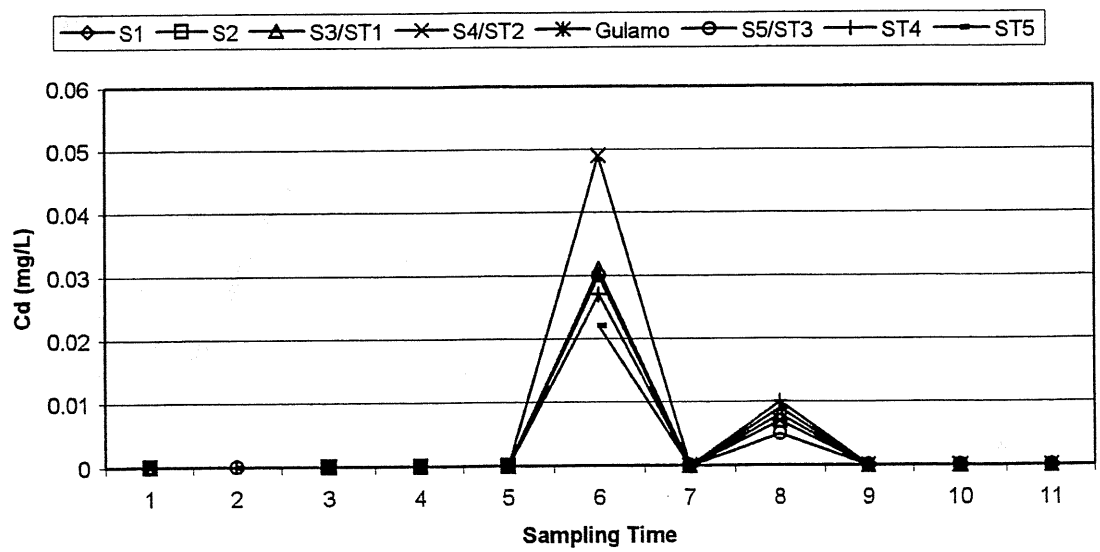


Figure 11 **Concentrations of Manganese (MN) (in mg/L) in water samples collected between 1994 – 2001**

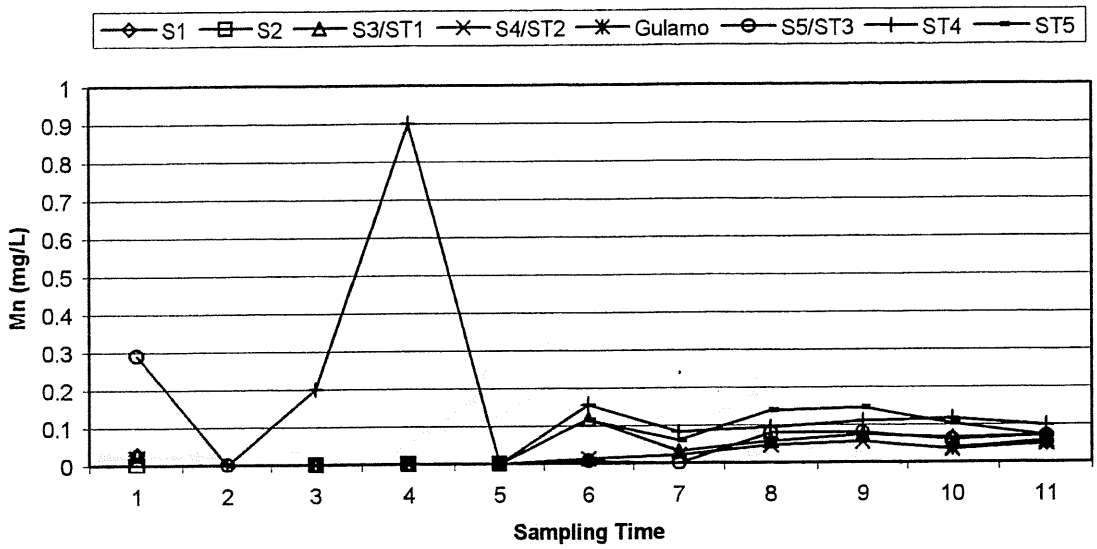


Figure 12 **Concentrations of Copper (Cu) (in mg/L) in water samples collected between 1994 – 2001**

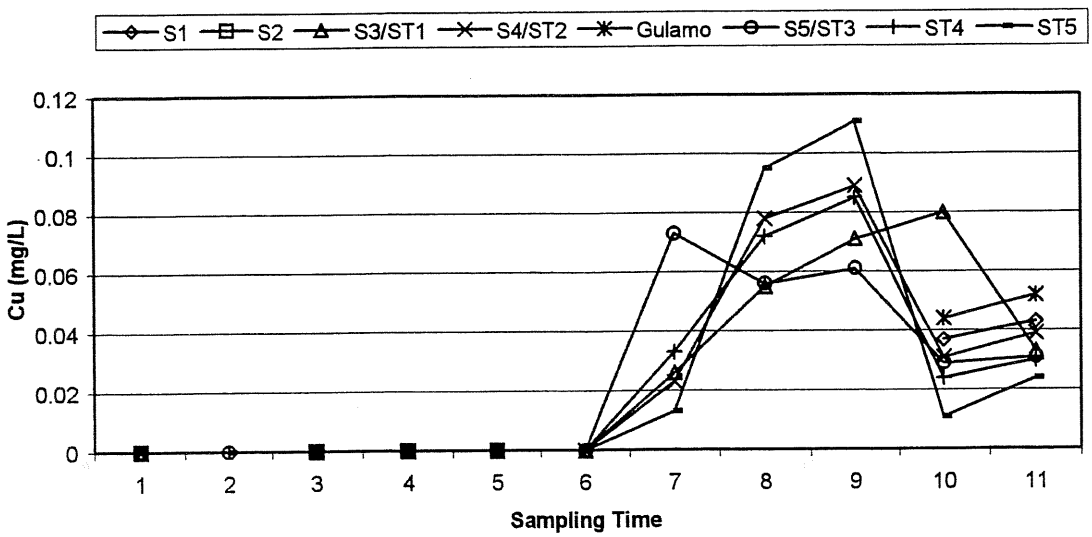
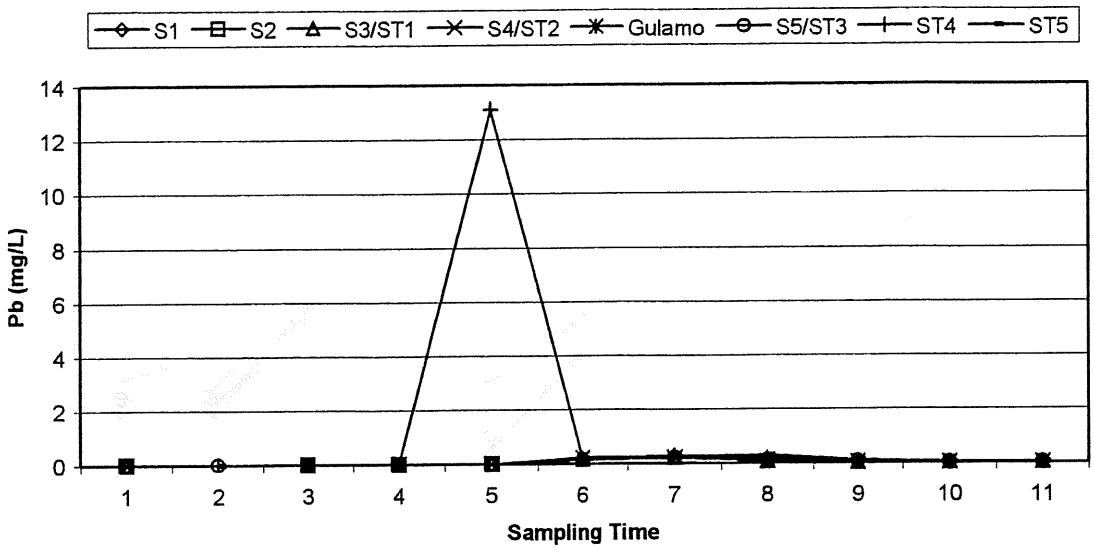


Figure 13 **Concentrations of Lead (Pb) (in mg/L) in water samples collected between 1994 – 2001**



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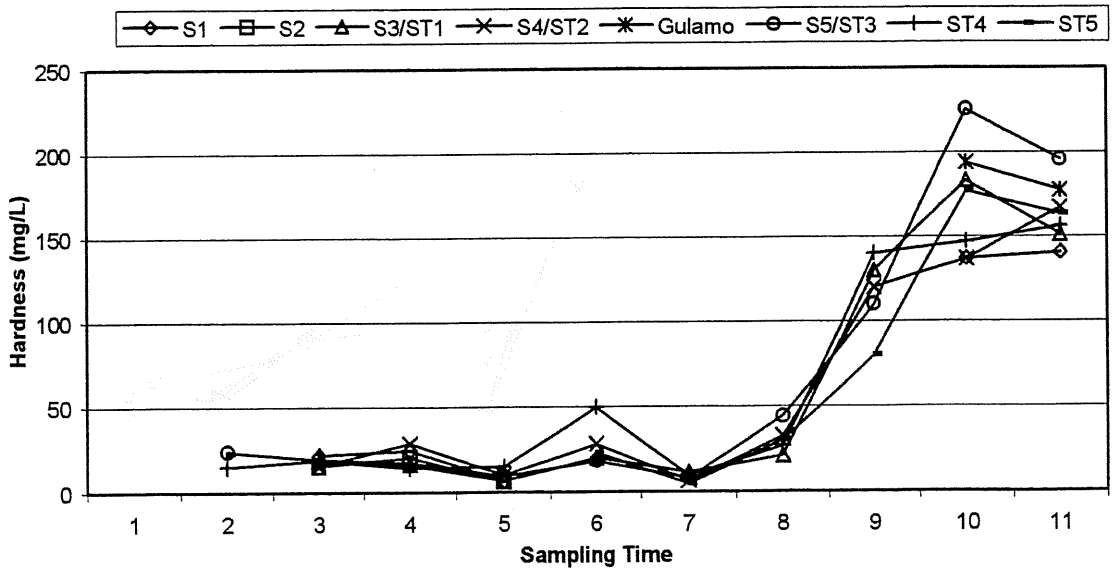

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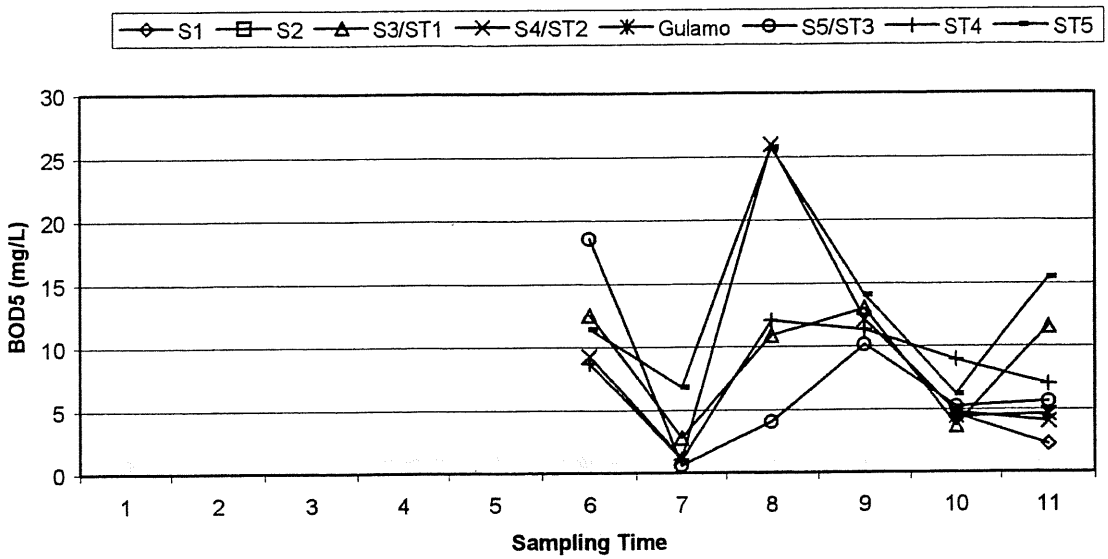

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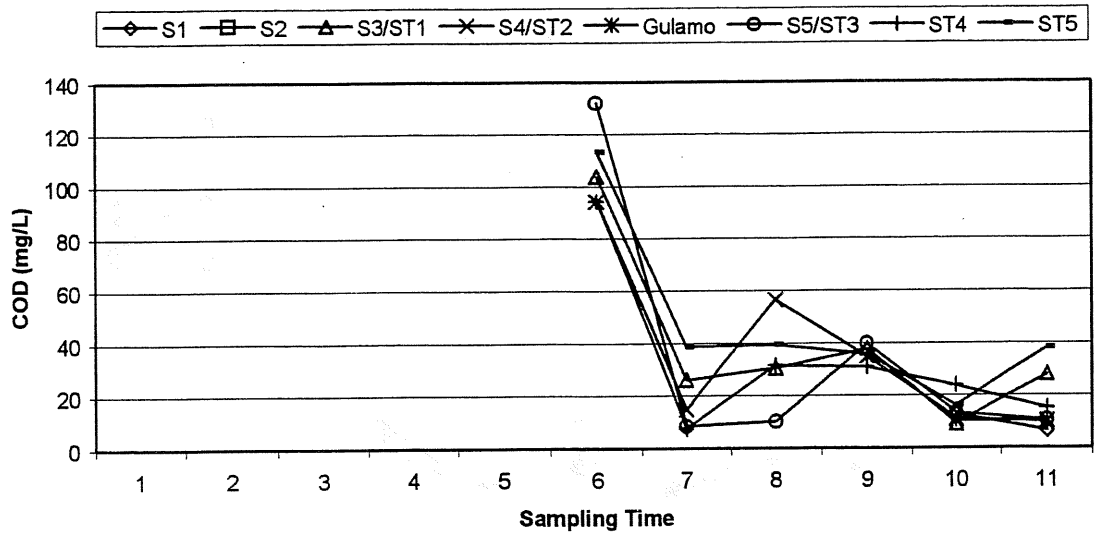

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Table 7.8 Monthly Morbidity rate of Malaria (per 1000) in the areas near the dam and Distant from the Dam (1997)

Table 7.9 Monthly Morbidity Rate of Malaria in Rimbo Datar 1994-2001 (per 1000)

Appendix 7 Health

Table 7.1 Infant Mortality Rate and Under 5 Mortality Rate

	National	West Sumatra		Riau	
		Total	50 Kota	Total	Kampar
Infant Mortality Rate (per 1000)	41.44*	47.35	Na	31.27	Na
Under 5 years old Mortality Rate (per 1000)	81	81	Na	72	Na

* data from 1997, **data from 1993

Data source: Health Profiles of Republic of Indonesia, Riau Province, West Sumatra Province, Kampar Regency, and 50 Kota

Table 7.2 Rate of Protein-Calorie malnutrition in infants (%) (2000)

National	West Sumatra		Riau	
	Total	50 Kota	Total	Kampar
20.7	14.2	17.38*	2.68	2.38

* data from 1999

Data source: Health Profiles of Republic of Indonesia, Riau Province, West Sumatra Province, Kampar Regency, and 50 Kota

Table 7.3 Population and Annual Morbidity Rate of Malaria in the Areas Near the dam and Distant from the Dam (per 1000), (1997-2001)

	Population	1997	1998	1999	2000	2001
Distant from the dam in W. Sumatra	22,114	NA	NA	0.1	0.3	NA
Near the dam in W. Sumatra	3,411	16.71	NA	11.1	13.78	NA
Distant From the dam in Riau	105,147	NA	NA	2.5	3.2	3.4
Near the dam in Riau	39,816	NA	NA	NA	NA	11.56

Data source: Health Centers

Table 7.4 Monthly Morbidity rate of Malaria (per 1000) in the areas near the dam and Distant from the Dam (2001)

2001	Jan	Feb	Mar	April	May	June	July	Aug.	Sep	Oct	Nov	Dec
Near the dam in W. Sumatra	1.17	0.88	1.17	NA	1.17	NA	0.88	0.88	1.47	0.00	1.47	0.00
Distant from the dam in W. Sumatra	0	0	0	0.00	0.09	0	0.00	NA	0.00	0.00	0.00	0.00
Near the dam in Riau	0.55	1.23	1.11	0.65	1.26	1.23	0.68	0.90	0.90	0.88	1.33	0.83
Distant From the dam in Riau	0.18	0.25	0.33	0.33	0.40	0.37	0.23	0.22	0.19	0.35	0.23	0.28

Figure 7.1 Monthly Morbidity rate of Malaria(Per 1000) in the areas near the dam and Distant from the dam (2001)

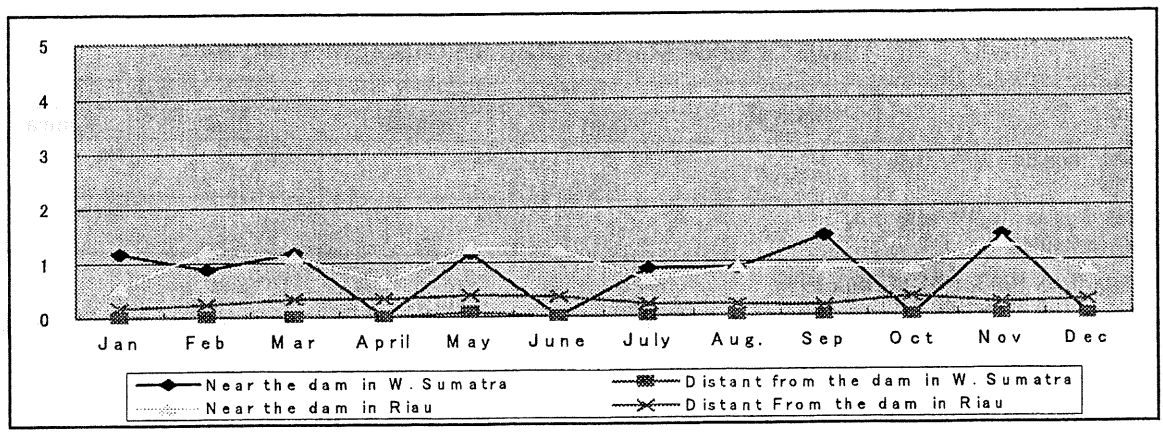

Table 7.5 Monthly Morbidity rate of Malaria (per 1000) in the areas Near the dam and Distant from the Dam (2000)

2000	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Near the dam in W. Sumatra	0.88	2.05	2.05	1.17	0.00	2.05	0.59	1.47	0.88	0.00	1.47	1.17
Distant from the dam in W. Sumatra	0.05	0.00	0.05	0.09	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00
Near the dam in Riau	NA	NA	NA	0.33	0.50	NA	0.90	0.68	NA	NA	NA	NA
Distant From the dam in Riau	0.37	0.30	0.13	0.20	0.16	0.31	0.19	0.29	0.34	0.33	0.30	0.25

Figure 7.2 Monthly Morbidity rate of Malaria (per 1000) in the areas near the dam and Distant from the Dam (2000)

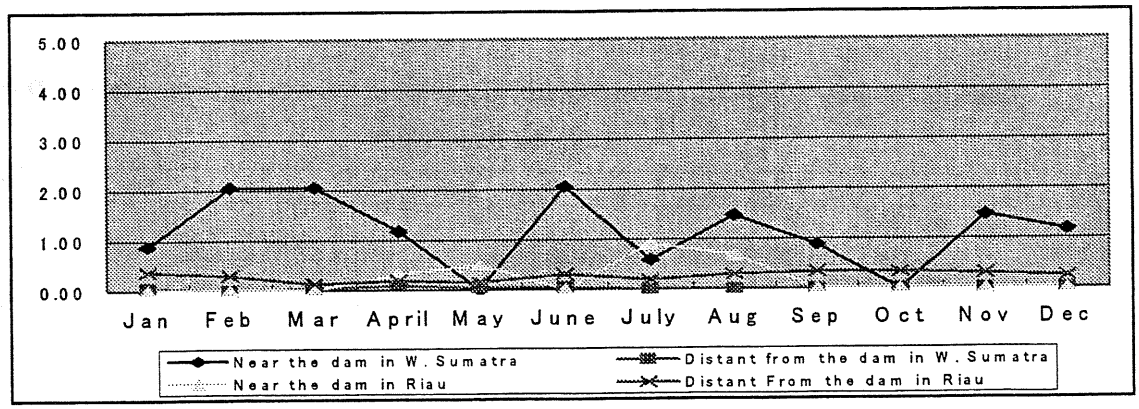

Table 7.6 Monthly Morbidity rate of Malaria (per 1000) in the areas near the dam and Distant from the Dam (1999)

1999	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Near the dam in W. Sumatra	1.17	1.47	1.17	1.17	1.17	0.88	0.59	1.17	1.76	0.00	0.59	0.00
Distant from the dam in W. Sumatra	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00
Near the dam in Riau	NA	0.18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Distant From the dam in Riau	0.25	0.25	0.10	0.09	0.38	0.28	0.16	0.23	0.16	0.15	0.29	0.19

Figure 7.3 Monthly Morbidity rate of Malaria (per 1000) in the areas near the dam and Distant from the Dam (1999)

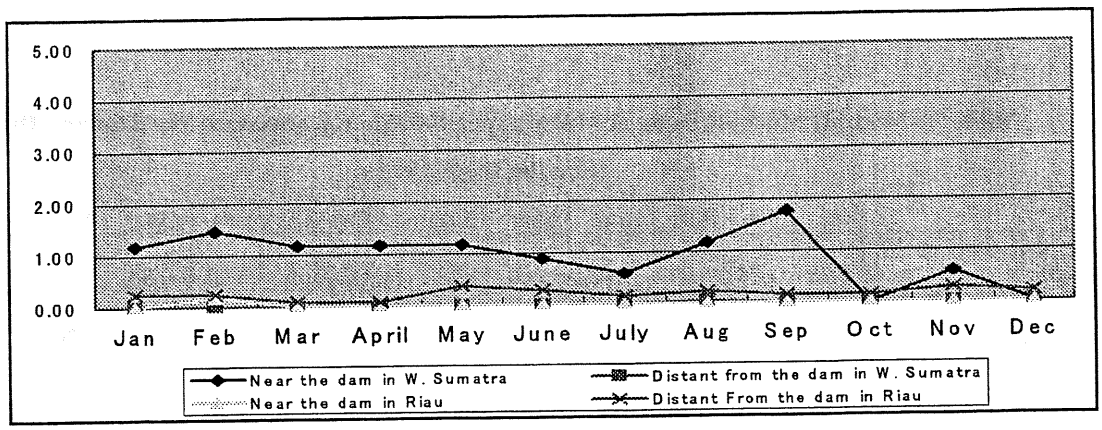

Table 7.7 Monthly Morbidity rate of Malaria (per 1000) in the areas near the dam and Distant from the Dam (1998)

1998	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Near the dam in W. Sumatra	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00
Distant from the dam in W. Sumatra	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Near the dam in Riau	0.50	0.45	0.30	0.38	1.00	0.10	0.23	0.20	0.20	NA	0.13	0.30
Distant From the dam in Riau	NA	NA	NA	0.13	0.10	0.11	0.23	0.16	0.21	0.32	0.26	0.22

Figure 7.4 Monthly Morbidity rate of Malaria (per 1000) in the areas near the dam and Distant from the Dam (1998)

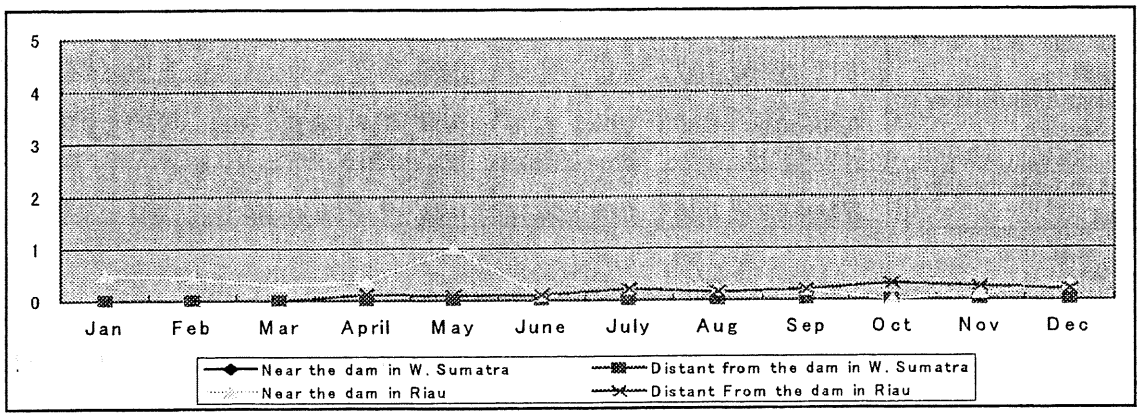

Table 7.8 Monthly Morbidity rate of Malaria (per 1000) in the areas near the dam and Distant from the Dam (1997)

1997	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Near the dam in W. Sumatra	0.88	1.76	0.59	7.92	0.00	3.52	0.00	0.00	0.00	0.88	0.59	0.59
Distant from the dam in W. Sumatra	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Near the dam in Riau	NA	0.43	0.43	NA	0.18	0.45	NA	0.40	NA	0.50	0.28	0.25
Distant From the dam in Riau	0.29	0.20	0.20	NA	0.25	0.17	0.14	0.10	0.15	NA	0.16	0.19

Figure 7.5 Monthly Morbidity rate of Malaria (per 1000) in the areas near the dam and Distant from the Dam (1997)

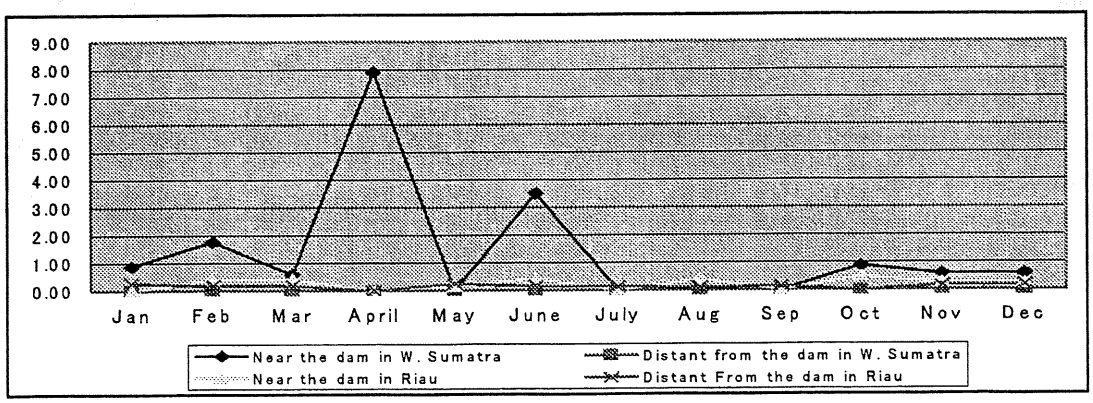

Table 7.9 Monthly Morbidity Rate of Malaria in Rimbo Datar 1994-2001 (per 1000)

	Jan	Feb	Mar	April	May	June	July	Aug.	Sep	Oct	Nov	Dec
1994	NA	NA	NA	NA	NA	NA	NA	NA	0.00	0.29	0	0.29
1995	0	0	0	0.59	0	0	0	0.59	0.29	0	0.59	NA
1996	0.29	0.29	0.59	0	0.29	0.29	0.29	0.29	0	NA	NA	0.29
1997	0.88	1.76	0.59	7.92	0	3.52	0	0	0	0.88	0.59	0.59
1998*	0.59	NA	0.88	0.29	0.29	0	0	0	0	0	0	0
1999	1.17	1.47	1.17	1.17	1.17	0.88	0.59	1.17	1.76	0	0.59	0
2000	0.88	2.05	2.05	1.17	0	2.05	0.59	1.47	0.88	0	1.47	1.17
2001	1.17	0.88	1.17	NA	1.17	NA	0.88	0.88	1.47	0	1.47	0

Data source: Rimbo Datar Health Center

Figure 7.7 Monthly Morbidity Rate of Malaria in Rimbo Datar (1994-2001)

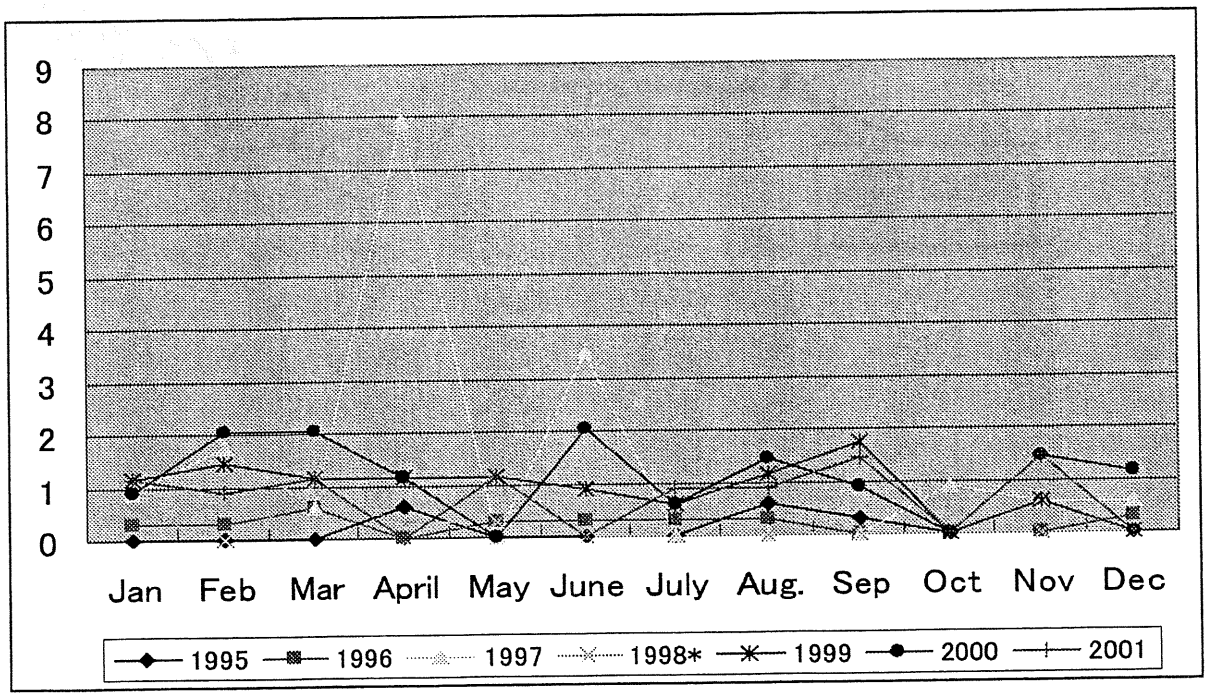

Figure 7.8 Mosquito's life cycle, malaria infection cycle and its countermeasures