YEMEN ARAB REPUBLIC
MINISTRY OF AGRICULTURE
AND FISHERIES

KINGDOM OF THE NETHERLANDS
MINISTRY OF FOREIGN AFFAIRS
NETHERLANDS DEVELOPMENT
ORGANISATION

RADA INTEGRATED RURAL DEVELOPMENT PROJECT

An inventory of completed water supply schemes

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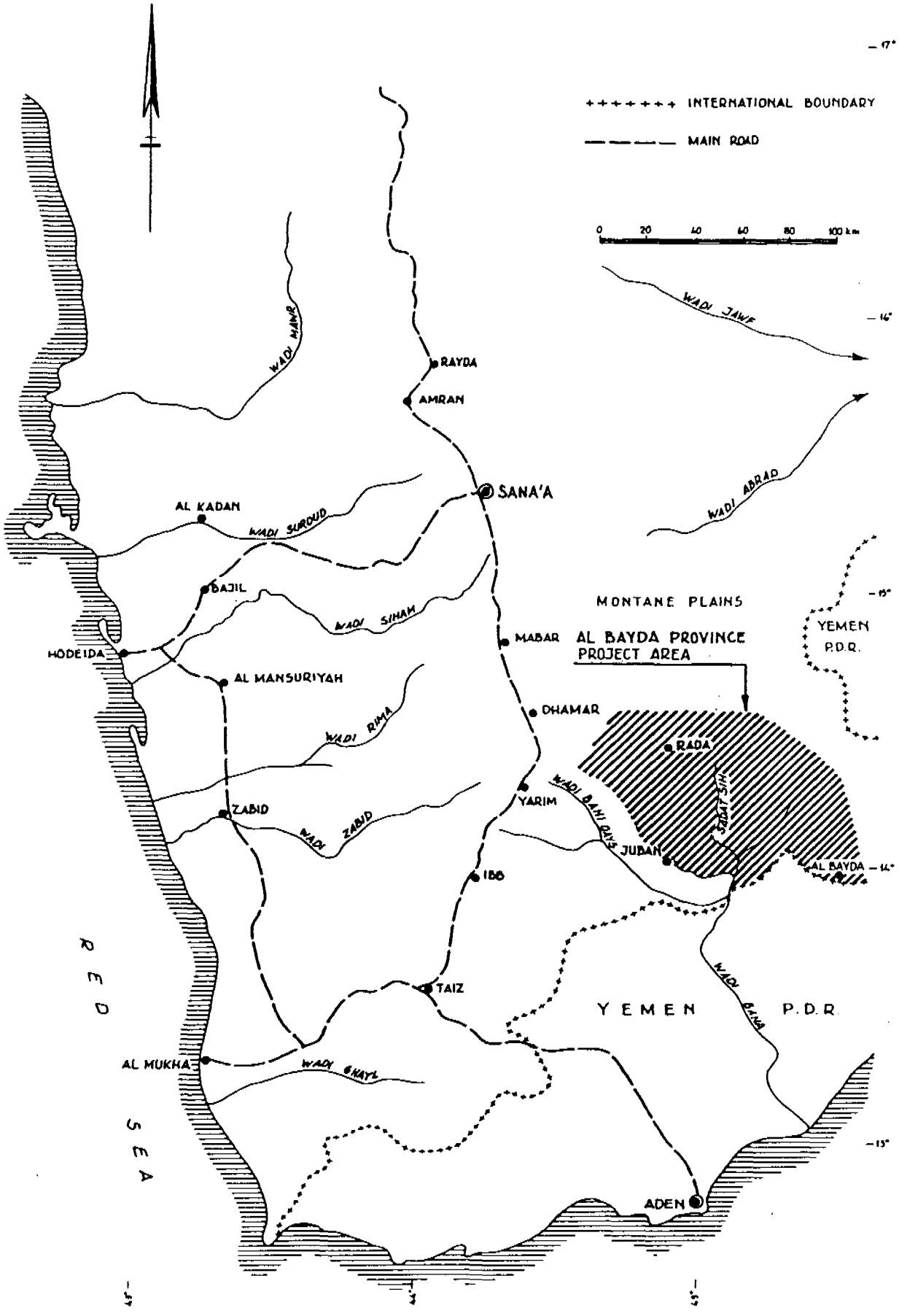
4.08.046

April 1987

SNV
Sana'a, Yemen Arab Republic

YEMEN ARAB REPUBLIC



CONTENTS

Summary

Out of the fourtytwo visited schemes, eight (19%) were not working for different reasons. Five had a dry well and little interest to improve the situation. Three of them are located in an area where is very little chance to find water. One has internal problems about contribution, one has a broken pump and in one village the well gives such a small quantity of water that it is not enough for the village. The broken pump will be repaired and the shallow well of the last village will be deepened though there is not much hope that more water will be found.
The rest of the schemes were in good condition and well maintained.

About fifty per cent of the working schemes are using watermeters to collect the contribution. The villages that do not have water meters, pay a monthly sum per head or per house. The schemes where people pay a fixed amount are using more water than the schemes with meters. There is even one village where the people have to pay for the trees.

In most of the villages the water use is less than expected. The reservoirs are filled once in two or three days. The people are very careful with the water, especially in the metered villages.

1.Management & Maintenance

In most of the villages the scheme is operated by one man. He takes care of the engine, collects the money, buys oil and diesel and fills the reservoir. When pump or engine needs to be repaired, most of the time it is done by an engineer from Rada'. Many operators would like to know more about how to repair pump and engine. Broken pipes are repaired by the villagers themselves.
The collected money is for running costs. No funds are created for replacement.

2.Sanitation

The solid waste still seems a bigger problem than the waste water. In most of the villages is waste water in the streets but mostly it isn't more than a puddle close to the houses. Some small trees or shrubs could solve this problem. In some villages there are big pools of stagnant waste water where children can play. The use of water is not very high and some people made soak aways.

The house connections could be improved. Most of the time you see a lot of half inch pipes laying next each other because everyone wants his own connection from the reservoir or from a connection point. These half inch pipes can break very easy and are often fixed with pieces of tube. This causes pollution when the lines are not under pressure. Instead of this they could make an inch or 1.5 inch pipe and connect it from there.

3.Conclusions

The weak point in the management is the replacement of pump and engine. There are no funds reserved for replacement. When an engine breaks down, they have to collect money from the population for a new one. Will the community be able to raise this amount of money ?
This problem has not occurred yet, but can be expected in the coming years, since the first schemes are eight years old.

Encouraged by this inventory the district training centre in Rada' (DTC) started a course for pump operators in the rural areas. The purpose of the course is to teach the operators how to maintain pump and engine and how to carry out small repairs.
The DTC also uses a mobile training unit to visit villages with a waterscheme and gives on the spot training to pump operators.

4.Visited Villages

4.1. BAIT GHAWLAYS 870415

The RIRDP provided this village with a distribution system. The elevated reservoir was built by the village. This scheme was completed in 1979 and is still working without big problems.
The reservoir is filled every day in one hour. The villagers have to pay 5 YR. monthly for each tree they have.
monthly contribution : 50 YR./house
inhabitants : 300
daily consumption : 40 l/head

4.2. AL QAHARA 861012

The village watersupply scheme of al Qahara was completed in the end of 1979. Before that the project deepened the shallow well, builded a 35 m^3 reservoir and installed pipelines.
After one year this shallow well was dry and they shifted then to an other well. The government provided the village with a bore-hole in 1982. The scheme was connected to the borehole in 1985.
The roof of the reservoir is made of prefab concrete slabs and cracked. They have to be replaced by a new roof. The distribution lines are in good shape. There is no waste water in the streets and a few people use waste water for the gardens. Toilets were made after the completion of the scheme. There is no other water used then the water from the reservoir.
The reservoir is filled every day in 2 hours. They use water meters.
price paid per m^3 : 5 YR.
inhabitants : 1000
daily consumption : 35 l/head

4.3. MUSALLAH

The village of Musallah has two water systems, one from the project and one made by the villagers themselves. Both are working well but it is difficult to get an idea about the quantity of water that is used in this large village. There is a lot of wastewater in the streets. The village will be included in the Rada' sewage project.

4.4. BAIT AL UMAYSI

The project provided in the past some technical assistance to a private waterscheme in this village. Bait al Umaysi becomes its water from this waterscheme at this moment and applied for a new scheme in co-operation with Bait al Ya'aysi.

4.5. AL QUSAIR

The request for a waterscheme for the village Al Qusair was received during the last quarter of 1979. The village was provided with a shallow well and a reservoir of 25 m³. After some problems with the engine the scheme became operational in 1980. Since two years the shallow well is dry and the village becomes water from the nearby located militairy camp. This camp has a borehole and fills the reservoir every day. The water is good and the distribution system is intact.
The pump and engine disappeared and nobody knows were they are. The pumphouse collapsed. The people don't pay for the water.
There is no waste water in the streets and some use it for the gardens. Nobody made a bathroom in the house. The women wash the clothes outside.

4.6. AL GHAWL AZRAQ 861012

The shallow well in Ghawl Azraq is not good from the start, they used another well for four years. Now they are using a private borehole, pump and engine. The pump and engine of the project are still there but not in use because it was too small for the borehole. The distributionlines are in good condition. Repairs are done by a contractor.
There is waste water in the streets and some of it is used for gardens. The people made bathrooms inside the houses. They use only water from the reservoir. The women wash the clothes in the house except blankets. They pay no contribution for the water. The reservoir is filled daily in one hour. The houses are direct connected to the reservoir.
monthly contribution : no
inhabitants : 400
daily consumption : 60 l/head

4.7. AL AJMA 870208

The village of al Ajma originally had a shallow well but got a borehole later. The scheme was completed in 1981 with a distribution system and an elevated concrete reservoir of 40 m³.
The condition of the scheme is good. The same can be said about pump and engine. They had some small repairs on pump and engine wich were repaired by an engineer from Rada'. The distribution lines are intact, if pipes are broken, they are repaired by the village. The water goes first to storage tanks on the roof.
More water is used than before the implemantation. There is waste water in the streets and it is not used for gardens. There are no toilets made in the houses. The water they use in the village comes only from the reservoir. For the washing of clothes the women sometimes go outside.
The scheme is operated by one man. He fills the reservoir every day in 4 hours and that costs 10 liter diesel. The people pay when the money is spent. The operator is paid 600 YR per month. The reservoir is cleaned every six months.
monthly contibution : unknown
inhabitants : 500
daily consumption : 80 l/head

4.8. GHAWL AD DRA 870208

The design for the waterscheme for the village of Ghawl ad Dra was made in 1979 and completed in 1982.
The condition of the scheme is good. The condition of pump and engine is good. The pump has been repaired at a cost of 3000 YR. The villagers repair broken distribution pipes.
They use more water then before the implemantation and there is waste water in the streets. Little waste water is used for gardens and a few people (3 or 4) made a bathroom in their house. The water goes first to storage tanks on the roof.
The 425 people of Ghawl ad Dra pay a fixed amount of 5 YR. per head and they pay when the money is spent,normally every three weeks. The scheme is operated by two people and filled every two days. It takes 4 hours to fill the reservoir of 40 m^3 at a cost of 10 l diesel. The operator is paid 300 YR.
monthly contribution : 7 YR.
inhabitants : 425
daily consumption : 50 l/head

4.9. Al KHABAR 870209

The request for a watersupplyscheme in Al Khabar was made in 1979 and the scheme was completed in march 1982.
The condition of the scheme is good. The pump and engine are in good shape, no repairs up till now. The distribution system leaks but will be repaired by the villagers. They use more water now and there is waste water in the streets. The waste water is not used for gardens and some people made a bathroom in their houses. The reservoir is filled every day in 8 hours. The reservoir has a capacity of 50 m^3 and it cost 70 l. diesel to fill it. The scheme is operated by one man who get paid 1500 YR. per month. The houses are directly connected to the reservoir.
price paid per m^3 :?
inhabitants : 400
daily cosumption : 125 l/head

4.10. QARN 'ATTA' 861103

The project started in 1980 in Qarn 'Atta' with the digging of a shallow well. The pump and pipes were provided by the Ministry of Public Works. A 40 m^3 elevated concrete reservoir was constructed and the scheme was completed in the last quarter of 1982.
Two years ago the shallow well fell dry. Reservoir and pipes are in good condition. Most of the house connections are neglected. The village is not very active trying to improve the situation. It took them two years to come to the project to ask assistance for locating an other watersource.

4.11. DRAYBAH 870209

During the third quarter of 1980 a pumptest was carried out in the village Draybah. The borehole (96 m) produced 23 l/s. RIRDP constructed a 100 m³ masonry reservoir and the scheme was completed in 1982.
The scheme is in a good condition ,there are no problems with pump and engine, only some pipes are added to the pump.
There is no waste water in the streets. The waste water is not used for gardens. People made bathrooms in their houses and because the quantity of the water is going down they get the water for the washing of clothes from somewhere else.
One man is operating the scheme. The reservoir is filled every day and it takes three hours to fill it. The operator is paid 1500 YR.
monthly contribution: 4 YR./head
inhabitants : 1160
daily consumption : 85 l/head

4.12. AISHAMA 870216

In the village Aishama the watersource is a spring. The project started in the fourth quarter of 1981 and finished a year later. At the moment of visiting the pump was broken and the villagers were trying to repair it. The pump looks old and the engine looks new. It is possilble that the project provided a second hand pump. The engine is still in a good condition. The spring gives only a little bit of water so they use the water very carefully. The women wash the clothes outside the house in another spring. The drinking water comes from the reservoir. The reservoir has a capacity of 15 m³ and is filled half every 3 days. This water is consumed in 3 to 4 days.
There is no waste water in the streets because they don't have waste water.
inhabitants : 150
daily consumption : 15 l/head

4.13. UDHAYA 870219

In 1981 the project started with the digging of a shallow well and the construction of a wall to protect the shallow well from the flood during the rainy season. The scheme was completed at the end of 1982 with the completion of a 30 m³ masonry reservoir. At this moment the system is not working for 6 months and nobody feels responsible to take any action. They say there is only a little bit of water in the well and the pump doesn't work anymore. The engine is still in good condition. When the system was working they use to fill the reservoir every 2 days in 2 hours. Average consumption: 100l/day/head. The people paid a fixed amount according to what they could afford.

4.14. NUFFAN 870325

The condition of the scheme of Nuffan is good, the pump is good and there were some repairs on the engine but now everything is working without problems. The reservoir is cleaned every two months. The distribution lines have some minor leakages which are repaired with tube. According to the representative there was little waste water in the streets and the water is used for gardens. One house has a bathroom. The women wash the clothes in the house and all the water they use comes from the reservoir.
The reservoir is filled every day with 25 m³ water in 1.5 hours.
monthly contribution: 6 YR/head
inhabitants : 250
daily consumption : 100 l/head

4.15. UTEIFA 870415

The condition of the village water supply scheme of Uteifa is good. The pump and engine are in good shape and there have been no repairs up till now. The distribution lines have no leakages and if there are some they are repaired by the operator. The operator takes care of everything. He collects the money, fills the reservoir and checks the system for leakages.
There is waste water in the streets. Some of the waste water is used for gardens. Other people made soak-aways, mostly those who built a new house with bathroom. In the existing houses nobody made a bathroom. The clothes are washed outside the house most of the time.
The reservoir is filled every second day. All the houses have meters and are direct connected to the reservoir. Some houses have an extra storage tank.
price paid per m³ : 5 YR.
inhabitants : 600
daily consumption : ?

4.16. AL WAGA' 860910

The waterscheme of Al Waga' is in good condition. There are some complaints about one part of the village that does not get enough water when the reservoir is almost empty. The reservoir is cleaned regularly. The engine is in good condition and very big for this scheme. It uses a lot of diesel. The distributionlines are intact though houseconnections are often repaired with tube. There are no parts of the scheme disconnected. The waste water runs away in the streets. The women wash at home and fetch the drinking water from another borehole because they think this water is salty.
monthly contribution : 6 YR.
inhabitants : 400
daily consumption : 75 l/head

4.17. QARN AL ASAD 870308

The survey for the waterscheme in the village Qarn Al Asad was made in the third quarter of 1979. The scheme was completed by the end of 1983.
The condition of the scheme is good there are no complaints. When there are problems with pump and engine it is repaired by the operator and leakages in the distribution system are repaired by the people who damaged the pipes. The waste water is used for gardens and some people made toilets in the houses. The 270 m^3 reservoir is filled every day and one day one half of the village is provided the other day, the other half. The reservoir is filled in 10 hours. Some houses have tanks and others are direct connected to the reservoir.
price paid per m^3 : 5 YR.
inhabitants : 3500
daily consumption : 80 l/head

4.18. AL QARRY

The project started in Al Qarry in the beginning of 1981 with the digging of a shallow well. After a lot of problems and little co-operation the scheme was handed over in the end of 1983, but the village refused the engine and wanted a new one. The scheme is still not working and not maintained, parts of the distribution lines are disconnected, the shallow well is dry and nobody cares about it.

4.19. GHAWLAYS AS SAYANIM

In the beginning 1983 a borehole was drilled in Ghawlays as Sayanim and the whole scheme was completed by the end of that year. The scheme is in good condition and working without any problems.

4.20. AL HAJAR 861007

The request for a waterscheme in Al Hajar was received by the project in 1979. In the last quarter of 1983 the village had a borehole drilled and the scheme was completed in the third quarter of 1984. The scheme is in good condition, the reservoir has been cleaned twice. Uptill now there has been no repairs for pump and engine. The pumphead is leaking oil.
The water they use comes only from the reservoir, sometimes women go out to wash clothes in the wadi, for it costs money to wash at home. All houses use storage tanks on the roof.
There is dirty water water in the streets and some people have made gardens. No toilets were made because the people are waiting for the project to come with a pilot project for sanitation and solid waste disposal.
The reservoir is filled every two days. Watermeters are used to pay the contibution.
price paid per m^3 : 5 YR.
inhabitants : 750
daily consumption : 50 l/head

4.21. AL KHADRA 861026

The project started in Al Khadra in 1980 with the digging of a shallow well. After some problems about the contribution in '81 the scheme was almost completed by the end of 1982. The next year the watersource was changed to a borehole and the scheme was finally completed by the end of 1984. The condition of the scheme is still good. No repairs were needed for pump nor engine and the distribution lines are intact.
There is no waste water in the streets and some use it for the gardens. Half of the village made a bathroom. The reservoir is the only watersource. It is filled every other day.
price paid per m^3 : 5 YR.
inhabitants : 600
daily consumption : 80 l/head

4.22. AL KHILAW 870216

The waterscheme in Al Khilaw was finished in 1984 and is still in a good condition. Repairs are done by the operator and the reservoir is cleaned every two months. There are some leakages in the distribution system but they will be repaired by the villagers. In this village pilotschemes for sanitation were constructed in two houses and the mosque. The 30 m^3 reservoir is filled half every day in 1.5 hours, because there is not more water in the shallow well. The villagers pay a fixed amount of 5 YR. per month and the operator is paid 1000 YR. each month. All the houses have tanks to store the water.

4.23. RADHA 870219

The waterscheme in Radha is not working anymore because the shallow well is dry for the last two years. The women bring the water from other shallow wells near the village when the pumps are working. The water from these wells is used for irrigation and the women collect water from the pump.

4.24. SUAR 870415

The water scheme of Suar which was completed in 1985 is still working without big problems. There have been some problems with the engine but they were solved by the village. The distribution system is in good shape. All the houses have watermeters.
There is waste water in the streets and nothing of this water is used for gardens. Nobody made a toilet in the house. In the dry season the borehole gives only a small quantity of water and the women have to fetch water from near shallow wells.
The reservoir is filled every other day in 2-3 hours.
price paid per m^3 : 10 YR.
inhabitants : 550
daily consumption : 30 l/head

4.25. AQABAH AR RIYASHIYAH 870310

In the beginning of 1983 a borehole was drilled in the village Al Aqabah Ar Riyashiyah. The waterscheme was completed in the end of 1984. The scheme is in good condition. There are some minor leakages which will be repaired by the villagers. Repairs on pump and engine are done by an engineer. There is no waste water in the streets and it is not used for gardens. They use the water careful because there is not much water in the borehole. Some of the women wash the clothes in a nearby shallow well. The drinking water comes from the project's reservoir.
Watermeters are fixed and they pay 7 YR. per m3. The reservoir is filled every day in 8 hours. Some houses have tanks the rest is direct connected to the reservoir.

4.26. HAWAT 861005

All the houses in Hawat have storage tanks on the roof. The scheme is in good condition and the reservoir has been cleaned once since the opening of the scheme. Up till now there were no repairs needed for pump and engine. The foundation of the engine has been reinforced by the village. When there are leakages in the distribution system it is repaired by the village. The operator complains about spare parts which have not been supplied together with the engine.
After implemantation the use of water has not increased. There are no problems with waste water. Some people use the waste water for gardens. Nobody made a bathroom. The women wash the clothes in the wadi because the water costs money.
All the houses have water meters. The operator reads the meters, collects the money and pays the running costs from these funds.
The reservoir is filled every two or three days in 8 hours.
price paid per m^3 : 7 YR.
inhabitants : 2000
daily consumption : 15 l/head

4.27. WADI SIR 870208
(DAR AL HAMRANI, DAR AL HAJIB)

The condition of the scheme which was completed in 1984 is good. There have been no repairs on pump and engine and the lines are intact. They use more water since the system is installed but there is no waste water in the streets nor used for the gardens. Nobody made a toilet in his house. Most of the women wash the clothes in the wadi and the drinking water comes from the reservoir.
The 75 m^3 reservoir is filled every 3 days in 8 hours. The people pay a fixed amount of 5 YR. per month.

4.28. ABBAS 870401

The scheme of Abbas was completed in 1985. Soon after the completion there was no more water in the shallow well. A possilble solution is to dig a few meters more. Other wells, near this one, do have water but nobody seems to be interested.

4.29. AL HAMRAH, AL MANSOURA, MAWGASSAH 870208

This scheme was completed in the third quarter of 1985. The engine is still in good condition but there are some problems with the pump impellors. This will be repaired by an engineer. The reservoir is cleaned every other month.
The waterconsumption has increased since the installation of the waterscheme and there is waste water in the streets. Nobody made bathrooms. The women wash the clothes inside the houses and they use no other water then the water from the reservoir.
The reservoir is filled every 2 to 3 days in 8 hours.
monthly contribution: 3 YR./head
inhabitants : 600
daily consumption : 70 l/head
price per m^3 : 1.5 YR.

4.30. JUBAYR 870208

The representative of Jubayr made a request for a water scheme in the last quarter of 1979. Due to problems with the shallow well, which appeared to be dry, the scheme was completed in the end of 1984. During the first year after completion, the scheme has not been used because the villagers refused to pay contribution to the representative. They were convinced that this scheme was a gift from the government. Now these problems are solved and the scheme is working perfect. The reservoir is cleaned two times up till now. They use more water now then they did before and there is waste water in the streets. The waste water is not used for gardens and nobody made a bathroom. Only the water from the reservoir is used.
The reservoir is filled every three days in 3 hours.
price paid per m^3 : 15 YR.
inhabitants : 500
daily consumption : 20 l/head

4.31. FERAZA'A 861026

The condition of the scheme in Feraza'a is good. The reservoir is regularly cleaned, there are no problems with pump or engine and the distribution lines are intact. There is waste water in the streets and nothing is used for the gardens. Some people made toilets in their houses. All the water that is used in Feraza'a comes from the reservoir. The reservoir is filled every day in 10 hours. Most of the houses have tanks but some are direct connected.
price paid per m^3 : 8 YR.
inhabitants : 1000
daily consumption : 75 l/head

4.32. AN NUBAH 870310

The construction of this scheme started in the begining of 1985 and was completed after six months. The scheme is in perfect condition only the production of the watersource is very low. The watersource of this village is a spring.
THere is no wastewater in the streets and it is not used for gardens. Nobody made a bathroom. The clothes are washed outside in another spring and the drinking water comes from the reservoir. The reservoir is filled every other day for one third in two hours. All the houses have storage tanks on the roof. There is a special system for paying the contribution, one month they pay 5 YR per m^3 and the other month 15 YR. in this month they buy diesel.
price paid per m^3: 10 YR.
inhabitants : 700
daily consumption: 18 l/head

4.33. BAIT GHAMIS 870415

In Bait Ghamis the project installed a pump and engine, a pump-house and a rising main. The rest, borehole, elevated reservoir and distribution system, was installed by the ministry of public works. A few months after the completion of the scheme, the representative complained that the borehole did not give enough water and applied for another borehole. The people are still complaining about salty water and they say that the engine is too small (16 hp). The reservoir is filled once a week in 12 hours.
monthly contribution : 30 YR./house
inhabitants : 100
daily consumption : 250 l/head ?

4.34. BANI ZIYAD 870218

The survey for the waterscheme of Bani Ziyad started in 1979 and after a lot of problems the scheme was completed in the beginning of 1986. The scheme is in a good condition and pump and engine are in good order. The wastewater is not used for gardens but goes straight to the wadi or to pits. There are bathrooms made in the houses and they only use the water from the reservoir.
The reservoir (50 m^3) is filled every second day in two hours. All houses are directly connected to the reservoir. Watermeters are installed for the contribution.
price paid per m^3: 7 YR.
inhabitants : 1000
daily consumption: 25 l/head

4.35. MAJLAIN

The scheme in Majlain was completed in the end of 1986 and the only problem they have is lack of water. The shallow well gives only a little bit of water that is pumped away in 20 minutes and it takes a whole day to recover.

4.36. FURGHAN

New scheme, completed in 1986. The reservoir is filled every three days.
price paid per m³ : 5 YR.
innabitants : 900
daily consumption : 30 l/head

4.37. ASSARA 870208

New scheme. The reservoir is filled every two days in 4 or 5 hours. They have plans to fix watermeters.
monthly contribution: 4 YR. children 2 YR.
inhabitants : 330
daily consumption : 114 l/head

4.38. DHI KALIB AL ASFAL

The scheme in Dhi Kalib al Asfal is not yet operational because of problems with the pump.

4.39. AL QARIA SAWDAH

The project only provided pump and engine and a pumphouse. The rising main was replaced from the old shallow well to the borehole.The people are complaining about the quality of the water, they say it is dirty. The reservoir is filled daily. The village is very dirty.
monthly contribution : 5 YR./head
inhabitants : 400
daily consumption : 60 l/head

4.40. AL KHARAB

New scheme. The pumphouse is built at this moment. The scheme is operational but the borehole does not produce much water.

4.41. SURM AL SHADADI 870209

New scheme. The water comes only from the reservoir.
The reservoir is filled every two days in 2.5 hours.
monthly contribution: 2.5 YR.
inhabitants : 340
daily consumption : 75 l/head

4.42. AL QAUZ

The scheme in Al Qauz is ready to use but the villagers refuse to pay their contribution to the representative. Therefore he is the only one who uses the scheme at this moment.

ANNEXES

A. List of villages with a completed waterscheme.

name	completed in	page	working
1. Bait Ghawlays	'79	4	+
2. Al Qahara	'79	4	+
3. Musallah	'80	4	+
4. Bait Al Umaysi	'80	4	+
5. Al Qusair	'80	5	+
6. Al Ghawl	'80	5	+
7. Al Ajma	'81	5	+
8. Ghawl Ad Dra	'82	5	+
9. Al Khabar	'82	6	+
10. Qarn 'Atta'	'82	6	- dry well
11. Draybah	'82	7	+
12. Aishama	'82	7	+
13. Udhaya	'82	7	- dry well
14. Nuffan	'82	8	+
15. Uteifa	'82	8	+
16. Al Waga'	'82	8	+
17. Qarn Al Asad	'83	9	+
18. Al Qarry	'83	9	- dry well
19. Ghawlays As Sayanim	'83	9	+
20. Al Hajar	'84	9	+
21. Al Khadrah	'84	10	+
22. Al Khilaw	'84	10	+
23. Radha	'84	10	- dry well
24. Suar	'84	11	+
25. Aqabah	'84	11	+
26. Hawat	'84	11	+
27. Wadi Sir	'85	11	+
28. Abbas	'85	11	- dry well
29. Al Hamrah	'85	12	+
30. Jubayr	'85	12	+
31. Feraza'a	'85	12	+
32. An Nubah	'85	13	+
33. Bait Ghamis	'85	13	+
34. Bani Ziyad	'86	13	+
35. Majlain	'86	13	- little water
36. Furghan	'86	14	+
37. Assara	'86	14	+
38. Dhi Kalib Al Asfal	'86	14	- broken pump
39. Al Qarya Sawdah	'86	14	+
40. Al Kharab	'86	14	+
41. Surm Al Shadadi	'86	14	+
42. Al Qauz	'86	14	- internal problems

nb 1: 2 schemes not being in order - progress reports
nb 2: not all schemes in usual agreement

B. List of villages ever visited by RIRDP.

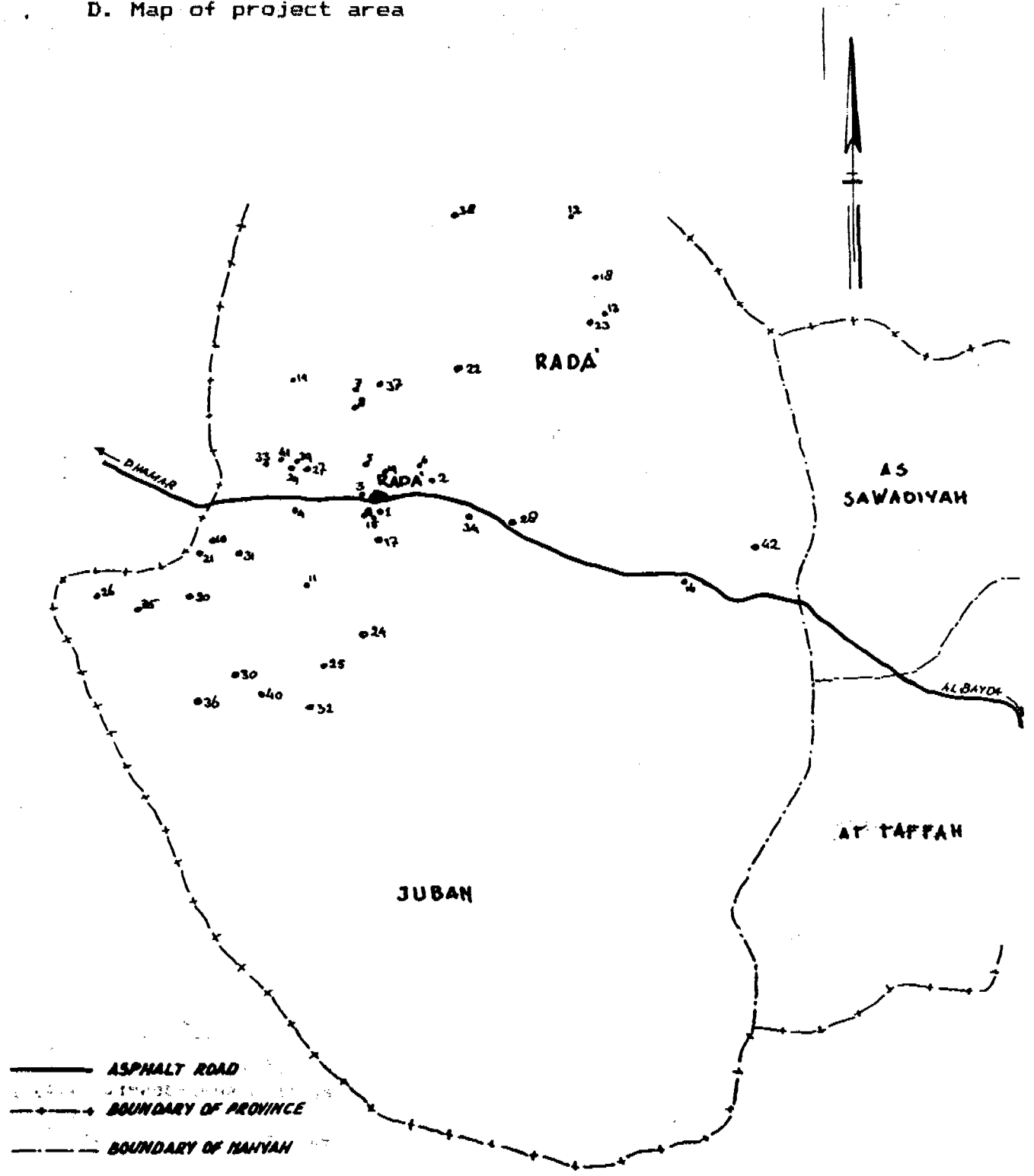
Since the project started, more than one hundred villages requested a water supply scheme. Uptill now only (42) resulted in a scheme. This list is mentioning the names of villages, visited by the project and how, according to the progress reports, the RIRDP assisted. Also the villages are mentioned, whose schemes are under construction. The rest of the vilages cannot be recovered.

Al Januba and Ar Rubat	- Request in 1979
Sudan	- Request in 1979, borehole in 1986
Masub ar Rasam	- Shallow well deepened in 1980 no further activities
Al Manasah	- Consists of 7 different villages. The work started in 1980. A borehole was drilled and pump and engine installed. Two reservoirs were built and completed in 1981. Pipes were stolen and there were fights between the different villages about the borehole. It was decided to redesign the scheme and to give each village its own borehole. But there was no co-operation from the villages.
Sharahah	- Shallow well deepened in 1980
Shakbah	- Pump and engine installed in 1981. no activities till the end of 1982. It would be completed with the assistance of Public Works.
Al Musiad	- Has spring. pump and engine installed in 1982. People wanted to abandon village.
Zaghem	- Shallow well deepened
Al Abl	- Borehole, pump, engine and pumphouse installed in 1983. Village refuses borehole. New borehole location not accepted. Rejected in 1985
Talab	- Borehole in 1983. Pump, engine and pipes from Public Works
Najd as Shuwarahah	- Borehole and pump and engine in 1984. Borehole not good.
Wadi Riyam	- Still waiting for pump and engine. Rest of scheme is completed
Al Lahbi	- Waiting for pump and engine rest completed.
Wadi Matar al Asfal	- Under construction
Mawkal	- Borehole in 1985 not succesfull
Al Hamaida	- Under costruction
Rakeb al Mutrash	- Completed except pumphouse
Ad Dhahaki	- Under construction
Qurada	- Constructed by Public Works (Transcentury)
Ar Rubat (Dina'm)	- Under construction
Al Jauf Ariyashiya	- Under construction
Luma'an	- Under construction
Khalagah	- Under construction
Sharafah	- Surveyed in 1986
Haid al Majil	- Under construction
Wadi Matar al Alla	- Surveyed in 1986
Mawkah	- Surveyed in 1984. No co-operation from the population
Al Nadhim	- Surveyed in 1987

C. List of waterconsumption and charges.

		daily consumption l/head	price per m³ YR.
1.	Bait Ghawlays	40	50/month/house
2.	Al Qahara	35	5
3.	Musallah		
4.	Bait Al Umaysi		
5.	Al Qusair		
6.	Al Ghawl	60	free
7.	Al Ajma	80	
8.	Ghawl Ad Dra	50	7
9.	Al Khabar	125	
10.	Qarn 'Atta'	–	–
11.	Draybah	85	4
12.	Aishama	15	?
13.	Udhaya	–	–
14.	Nuffan	100	6/month
15.	Uteifa	?	5
16.	Al Waga'	75	6/month
17.	Qarn Al Asad	80	5
18.	Al Qarry	–	–
19.	Ghawlays As Sayanim		
20.	Al Hajar	50	5
21.	Al Khadrah	80	5
22.	Al Khilaw		
23.	Radha		
24.	Suar	30	10
25.	Aqabah		7
26.	Hawat	15	7
27.	Wadi Sir		5/month
28.	Abbas	–	–
29.	Al Hamrah	70	1.5
30.	Jubayr	20	15
31.	Feraza'a	75	8
32.	An Nubah	18	10
33.	Bait Ghamis		30/month/house
34.	Bani Ziyad	25	7
35.	Majlain	–	–
36.	Furghan	30	5
37.	Assara	114	4
38.	Dhi Kalib Al Asfal	–	–
39.	Al Qarya Sawdah	60	5/month
40.	Al Kharab		
41.	Surm Al Shadadi	75	2.5/month
42.	Al Qauz	–	–

D. Map of project area



E. Water Analyses

NR	VILLAGE NAME	NAHIYAT	SOURCE TYPE	SAMPLING DATE	ANALYSIS DATE	Elec.cond. microS	pH	Tot.hardness mg/l CaCO3	Tot.alkal. mg/l CaCO3	Calcium mg/l Ca++	Magnesium mg/l Mg++	Chloride mg/l Cl-	Fluoride mg/l	risk	Manganese mg/l Mn++	Iron (T) mg/l Fe++(+)	Sulphates mg/l SO4--	Nitrate mg/l NO3-	Phosphate mg/l PO4---	Potassium mg/l K+	Sodium mg/l Na+
1	Bait Ghawlays																				
2	Al Qahara	Qaifa	BH	860913	860915	1009	7.6	220	220	68	12.2	160	0.71		0.20	0.22	145	7.0	0.04	3.0	76
2	Al Qahara	Qaifa	BH	861012	861022	1120	9.2	320	210	90	23.1	135	1.10	*	0.20	0.04	125	9.5	0.04	3.9	100
3	Musallah																				
4	Bait Al Umaysi																				
5	Al Qusair	Qaifa	BH	861012	861022	1160	8.9	315	255	84	25.5	165	1.25	*	0.00	0.02	40	10.4	0.05	7.6	101
6	Al Ghawl	Qaifa	BH	860902	860915	821	8.4	260	220	72	19.4	120	2.01	**	0.00	0.02	24	9.7	0.07	5.5	73
7	Al Ajma	Qaifa	BH	860902	860915	636	8.6	260	260	76	17.0	60	1.37	*	0.10	0.02	18	12.8	0.02	4.0	53
8	Ghawl Ad Dra	Qaifa	BH	841120	841121			277	230	94	10.5		1.88	*		0.05	23	2.7		5.5	
9	AL Khabar	Al Arsh	BH	861123	861126	555	8.0	140	170	46	6.1	45	0.40		0.30	0.02	58	9.5	0.00	1.6	75
10	Qarn 'Atta'		Dry																		
11	Draybah	Al Arsh	BH	860729	860730	950	8.5	40	260	8	4.9	100	1.23	*	0.05	0.08	120	12.5	0.00	2.0	229
12	Aishama	Qaifa	SP	860902	860915	724	7.7	175	240	76		48	1.42	*	0.00	0.01	50	43.6	0.03	3.5	94
13	Udhaya		Dry																		
14	Nuffan																				
15	Uteifa	Al Arsh	BH	860922	861008	660	7.9	225	220	64	15.8	84	1.42	*	0.00	0.03	58	7.0	0.00	1.6	52
16	Al Waga'	Qaifa	BH	861201	861217	1146	7.3	325	240	86	25.5	90	2.00	**	0.00	0.05	270	27.6	0.06	4.2	159
17	Qarn Al Asad	Al Arsh	BH	860922	861008	900	7.7	320	229	114	8.5	70	1.28	*	0.00	0.03	160	2.2	1.07	2.0	78
18	Al Qarry	Qaifa	SW	841004	841007	2600	7.4	231	474	39	32.6	261	1.72	*	0.05	0.02	280	28.6	0.17	24.0	407
18	AL Qarry	Qaifa	SW	860913	860915	1503	8.1	180	420	44	17.0	120	1.99	*	0.00	0.03	160	17.2	0.03	7.0	271
19	Ghawlays As Sayanim	Qaifa	BH	861012	861022	1800	9.1	375	290	94	13.4	280	2.40	**	0.00	0.03	150	13.5	0.18	9.2	256
20	Al Hajar	Sabah	BH	861214	861217	506	8.2	220	200	68	12.2	25	0.35		0.00	0.04	17	14.8	0.00	1.4	21
21	Al Khadrah	Al Arsh	BH	870120	870121	504	8.1	260	250	70	25.5	40	0.50		0.00	0.04	0	14.8	0.05	5.8	21
22	Al Khilaw	Qaifa	BH	861201	861212	1249	8.1	420	245	110	35.2	110	1.78	*	0.00	0.08	320	14.8	0.10	4.4	150
23	Radha		Dry																		
24	Suar																				
25	Aqabah	Ar Riashiyah	BH	870120	870121	370	6.8	190	135	58	10.9	20	0.60		0.00	0.02	16	14.8	0.10	0.8	2
26	Hawat	Sabah	BH	861214	861217	533	7.8	240	200	64	19.4	25	0.40		0.00	0.04	28	14.8	0.13	1.9	17
27	Wadi Sir	Qaifa	BH	860902	860915	1539	8.9	320	300	112	9.7	300	1.22	*	0.00	0.03	88		0.00	5.2	227
28	Abbas	Rada	SW	851104	851107	1100	7.7	200	215	44	21.9	53	1.42	*	0.00	0.01	100	50.1	0.11	3.3	108
29	Al Hamra	Qaifa	BH	841110	841114	1250	7.5	275	260	74	21.9	126	2.00	**	0.10	0.02	28	7.5	0.10	5.3	62
29	Al Hamra	Qaifa	BH	870215	870216	730	7.6	320	280	88	24.3	120	1.80	*	0.30	0.03	30	14.8	0.00	5.8	76
30	Jubayr	Sabah	SW	861210	861217	609	7.6	270	235	88	12.2	25	0.30		0.10	0.06	23	21.0	0.00	2.3	20
31	Feraza'a	Al Arsh	BH	861123	861126	1048	8.0	180	300	30	25.5	75	0.40		0.70	0.06	155	14.8	0.00	3.4	184
32	An Nubah																				
33	Bait Ghanis	Qaifa	BH	861123	861126	867	7.9	280	290	76	21.9	110	1.60	*	0.20	0.1	20	14.8	0.05	8.2	89
34	Bani Ziyad	Rada	BH	870420	870421	559	8.0	260	230	80	14.6	30	0.02		0.00	0.05	29	14.8	0.00	6.7	23
35	Majlain	Sabah	SW	860823	860827	565	8.2	180	186	45	15.8	35	0.45		0.00	0.07	43	14.3	0.00	1.9	52
36	Furghan	Sabah	BH	860729	860806	785	8.8	20	260	14	2.4	48			0.30	0.05	80	0.0	0.02	2.2	181
37	Assara	Qaifa	BH	860722	860786	830	7.3	220	220	62	15.8	120	2.40	**	0.25	0.87	25	14.3	0.00	5.6	94
38	Dhi Kalib Al Asfal																				
39	Al Qarya Sawda	Qaifa	BH	870215	870216	1480	7.8	440	415	104	43.7	205	3.60	***	0.20	0.03	80	14.8	0.00	12.0	162
40	Al Kharab																				
41	Surm Al Shadadi	Qaifa	BH	870215	870216	598	8.5	280	250	70	25.5	105	2.00	**	0.10	0.01	18	14.8	0.00	4.2	68
42	Al Qauz	Qaifa	SW	870406	870407	913	8.0	295	205	60	35.0	60	1.80	*	0.00	0.05	250	21.0	0.15	4.0	108

* = Low risk for dental caries
** = Risk for dental caries
*** = High risk for dental caries, osteosclerosis