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IMPROVEMENT IN O & M IN RURAL WATER SUPPLY IN JUNAGADH  
DISTRICT IN STATE OF GUJARAT - INDIA.

C O N T E N T.

No.	Description.	Page No.
	Summary.	
1.0	Introduction.	1 to 11
1.1	Background.	
1.2	Problem description.	
1.3	Objective, scope and limitations of the study.	
2.0	Methodology.	1 to 6
✓ 2.1	Literature study.	
✓ 2.2	Field study by interviews.	
2.2.1	Assessment of problems (causes and magnitude)	
2.2.2	Study of organisational and financial aspect.	
3.0	Results.	
3.1	Lierature overview.	1 to 80
3.1.1	introduction.	
3.1.2	Key aspects.	
3.2	Field study.	
3.2.1	Magnitude of problem.	
✓ 3.2.2	Causes for failure.	
3.2.3	Study of Non technical causes.	1 to 30
3.2.3.1	Selection of village.	
✓ 3.2.3.2	Approach to the people. ✓	
✓ 3.2.3.3	Description of causes for defunct WS system.	
3.2.3.4	Case study of a village for organisational problem.	
✓ 3.3	General Conclusions	
4.0	Recommendations.	
✓ 4.1	Panchayat level.	1 to 8
4.2	Board level.	
4.3	Government level.	

ANNEXURE.

IMPROVEMENT IN O & M OF RURAL WATER SUPPLY IN JUNAGADH  
DISTRICT IN GUJARAT STATE - INDIA.

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1.0            INTRODUCTION.

1.1            BACKGROUND.

During IDWSSD, The concerted efforts have resulted in large scale expansion in service coverage in water sector in many countries including India. In India, at the end of the decade, 90 % of the rural population inhabited in more than 574000 villages were provided by safe water supply systems under various programmes. In state of Gujarat, about more than 11500 no. of villages were provided with safe water supply system. But, like in many developing countries, operation and maintenance phase of the WS system has received very low priority compared to new construction of the system.

Inefficient operation and poor maintenance of the WS system is one of the major hinderances in achieving the over all goal of health benefits. Unless the problem is resolved, system will continue to deteriorate resulting in declining levels of service and wastage of investment funds. New investment does not seem justified if the O & M issue is not dealt with and if the sustainability of existing system is not guaranteed before investing in construction of new system which in their turn will rapidly deteriorate. It is reported in global forum in Oslo, Norway, that more than 50 % of the existing system in LDC's are not reliable, not sustainable or inefficient as a result of poor O & M.

In Gujarat, looking to the financial resources available, it is decided that these WS systems are to be operated and maintained by local community (Village Panchayat). However, looking to the

poor performance and some administrative problem of comprehensive (In Gujarat state it is termed as regional ) water supply system, it was decided at later stage in 1983 that regional water supply systems will be operated and maintained by an autonomous authority called Gujarat Water Supply & Sewerage Board. But, individual piped village water supply system is to be maintained by local authority at village level.

However, approximately 1/3 of the executed piped individual systems are not utilized or are under utilized by the community. The people of these villages are using conventional (unsafe) sources or facing difficulties. As a result access to reliable drinking water is not assured on a continuous basis. The objective of the project to provide safe water to all is not fulfilled. The benefit of the large scale investment in this sector is not achieved.

In spite of responsibility of O & M of the WS system, only some of the panchayats are able to organise for O & M of water supply systems but some of the panchayats are not. State Government has provided financial and technical assistance many times during drought period for rejuvenation of the systems but even then it becomes defunct after sometime.

The causes of failure of systems are require to be investigated. It seems it is a problem of operation and maintenance. GWSSB has no more liabilities for O & M after handing over the system to Panchayat.

As per present system, the problem can be considered at three different levels for operation and maintenance.

- (1) Present government policy.
- (2) Present GWSSB policy.
- (3) Village panchayat.

The details of present policy is described in the following chapter no. 1.2.3 under the title of problem description.

## 1.2 PROBLEM DESCRIPTION

### 1.2.1 General

Depending upon the geo-hydrological condition of the area, sources for water are selected. Most of the villages have ground water as source in the Saurashtra region. There is no perennial river in this region.

### 1.2.2 Existing status of water supply.

#### 1.2.2.1 Initialisation of water supply project.

After getting request from village people, GWSSB will investigate the present status of water supply. The State Government will recognise the need of WS system in the village. Then, GWSSB will plan and prepare water supply system as per norms sanctioned by the Government. At the time of planning and preparation, Village panchayat (local body elected by community) is asked to consent to take over the water supply systems for O & M. If they do not consent for the O & M by passing resolution, they will lose opportunity of having the water supply system at free of cost. Hence almost every village panchayat consents for O & M.

#### 1.2.2.2 Selection of service level and technology.

As per present norms, depending upon the population, either hand pump, simple well (only well without pipe line and SP) or piped water supply system are proposed. If the population of the village is less than 500 (as per census 1981), either hand pump or simple well will be provided. The selection of the hand pump or simple well is based on geo- hydrology of the village. If

population of the village is more than 500 (as per census 1981), piped water supply system is provided.

There are two types of piped water supply systems. These are (1) individual and (2) regional water supply systems. Generally, individual water supply systems are provided for each village. But, when good ground water is not available in nearby (say 2-3 km) area for more villages located in same geo-hydrological situation, the water supply system based on common source (generally well) is prepared to cover the population of these villages. The wells are dug. The pumping machineries are installed. The storage tank and a pipe net work (generally branch type) are created to bring the water up to the villages. This type of the system having common source is called regional water supply system.

#### 1.2.2.3 Construction and handing over of WS system.

After getting the consent from village panchayat, the system is prepared and executed by GWSSB. After the construction of the system is over, it is put in operation for trial run for a couple of weeks. When it is found satisfactory, panchayat is requested for taking over of system for operation and maintenance. The president of the Panchayat on behalf the Panchayat signs the handing over note prepared by GWSSB and possession of the system is thus transferred to village Panchayat.

Simple well system is constructed by district panchayat under revenue ministry of state Govt. For HP, drilling of bore and installation of HP is done by GWSSB. Initially, the village panchayats were supposed to maintain and repair HP. But, looking to the more no. of failures repeatedly, Govt. decided to repair by GWSSB during drought period and that onward, GWSSB continued to maintain and repair till to day.

1.2.3 Description of present policy.

1.2.3.1 Implementing agency.

(1) Present Govt. policy.

At present, the recognition of problem village is done by the State Govt. Also, state Govt. arranges fund for the rural water supply systems. The specific service levels are finalised by Government for providing water supply in villages. Also, during the drought year all sort of assistance is provided including restoration and operation of WS system so that people will get water (minimum 14 lit. per capita). State Govt. provides legislative support when necessary. More over State Govt. arranges funds for O & M of regional WS system.

But, common (generalised) level of service will not be acceptable for all villages having different culture and socio-economic status. The O & M is expected by village panchayat. No direct attention is given about the ability of panchayat for O & M. This requires change in planning and preparation of project. Mere resolution from Gram panchayat has not served the purpose in all respect.

(2) Present GWSSB policy.

At present, GWSSB performs all activities regarding rural water supply. The Board implements all policies approved by Government about water supply for rural area. Also GWSSB has to prepare the draft for policy regarding planning and implementation. Also GWSSB prepares draft plan for providing drinking water to village people during the drought year and after approval and financed by state Govt, implement the same. Recently GWSSB has established a training institute which provides training to field staff of its employee and other field workers in the sector.

As per present norms, GWSSB has no direct responsibility about O & M of individual piped WS system unless other wise specified in critical situation like drought year. Hence, the board is never monitoring the O & M of WS systems. Moreover, present set up of Board is rather sole technical set-up than socio-technical set-up. Thus only technical aspects have been looked at more and often social aspects of the system are neglected.

(3) Village panchayat.

The village panchayat is constituted by election. The main functions of panchayat are often limited to agricultural activity. Their major attention is for agricultural loan, subsidy etc. for seeds and fertilisers. Only one personnel called MANTRI (who is paid by panchayat ministry) is available. In addition to above functions he has to maintain other administrative activity namely land record, revenue, crop record, birth and death record etc.

The village panchayat is responsible for O & M of individual piped WS system. But, the Panchayat does not seem to be active effectively for operation and maintenance of water supply systems due to lack of finance or organisation. Hence, when there is a break down of water supply, panchayat is not able to restore the supply of water. This requires changes in village panchayat.

1.2.3.2 Present policy for O & M.

Following are the responsible organisations for O & M of different type of systems.

No.	Type	Organisation.
1	Individual piped	Village panchayat
2	Regional piped	GWSSB.
3	Hand Pump	GWSSB (only maintenance)
4	Simple well	Village panchayat.



Here, it will be worth to note that due to different organisation responsible for O & M, depending upon the system people of different villages are getting disparity for payment. The hand pumps are maintained by GWSSB and people of these villages are not asked to pay. The regional piped WS systems are maintained by GWSSB. The people of these villages are asked to pay but the water supply is not discontinued even if they do not pay. The people having individual WS system will not get water sooner or later if they do not pay. But, people have no choice to select the regional or individual WS system as it is decided by the Govt. depending upon the comparison of the cost.

#### 1.2.4 Magnitude of problem.

In Junagadh district, there are 1024 villages. Government has recognised the need of safe water in 923 villages. Till the year 1989, Govt. has covered 792 no. of villages. This coverage is provided either by hand pump, simple well or by piped water supply systems. The following are the break-up of the coverage under both programmes.

PROGRAMME	NO. OF VILLAGE COVERED
1 Hand pump & Simple well	133
2 Piped water supply	659
	----
Total	792 No.

Thus, Government has achieved 90 % coverage by providing water supply system in this district. But real access to safe water by people have a quite different picture.

Unfortunately, performance of these panchayats are very poor for O & M. It is estimated that 1/3 of the systems are not functioning well. The average construction cost of individual piped water supply system will be Rs. 0.40 million. Total

investment for individual water supply systems is approximate Rs. 250 mill. in this district. About Rs.85 millions are not utilised as aimed for. If we extrapolate for the whole state, it will not be less than Rs.1400 milli.

1.2.5 Description of assistance provided by Govt. during critical period.

The Government assisted technically as well as financially to restore the water supply of defunct system during drought periods. During the drought period, generally all conventional sources will dry. There will be an acute shortage of drinking water. The Government provides some fund from the relief fund. The relief funds are arranged for relief activities planned for the problem created by drought. These activities include employment (work) for poor farmer and farm labourers, grass for cattle, import of food grains and distribution to the people and drinking water supply arrangement. The restoration of WS system will generally be cheaper than providing water through tankers. So, state govt assisted to restore WS system technically as well as financially for

- 1 ✓ Improvement of source (deepening of well, drilling of bores in wells etc.)
- 2 ✓ Payment of energy bill including arrears and arranged power supply.
- 3 ✓ Repairs/ replacement of pumping machinery and other works.
- 4 ✓ Payment of operation charges if necessary.
- 5 ✓ Repair and maintenance of HP and installation of new HP and deep tube wells.

As soon as drought season is over, Govt. stops its relief activities. As a result of this, the assistance from the Govt. also stops. Now, O & M is once again a responsibility of village panchayat.

The detailed study is required to know the causes of failure and to change the policies for O & M. Generally held opinion among the administrator is that, it is a financial problem. But this may not be only a reason. There might be a many more reasons for failure of O & M. By careful study of causes, the remedial measures can be recommended for future planning for harvesting the benefits of investment in WS sector.

### 1.3 OBJECTIVES, SCOPE AND LIMITATIONS OF THE STUDY.

#### 1.3.1 OBJECTIVES.

The aim of protected drinking water to all is not met yet. The Govt. has left O & M on panchayat. Some of the systems are not self sustaining as the panchayat is not effectively active to operate and maintain water supply systems. Hence for effective maintenance and operation study will be done to know

- 1 How many individual piped WS systems are not functioning in Junagadh district of state of Gujarat?
- 2 What are the reasons for defunct of individual piped WS systems?
- 3 What is the existing structure of organisation the panchayat have ? How they manage the cost for O & M ? Is it well ? If not, what are the problems ? What are the causes for these problems ?
- 4 What can be done for improvement in O & M strategy for individual WS systems ?

#### 1.3.2 SCOPE AND LIMITATIONS OF STUDY.

The O & M problem of WS system can be seen form various angles. The O & M for regional WS systems is entrusted to the GWSSB since last seven years. No doubt, the O & M of the system is improved at greater extend. It is more reliable and more punctual than it was in past. At the same time huge amount is spent for this

improvement. A well experienced and systematically organised with enough financial resources can definitely improve the O & M of the system as in the case of regional WS systems.

But contrary to this, individual WS system are supposed to be operated by community. The coverage by regional water supply is only 15 % of the piped WS system. The coverage by individual WS systems is 85 % of the piped water supply. Here we will discuss the individual piped water which is a major part and it is to be operated and maintained by the community.

Considering time constraint and large no. of systems the study is limited to one district (i.e. Junagadh district where I am working since more than 10 years). Of course, as the systems are managed by same norms through the state, it will be helpful for strategy improvement for whole of the state.

The O & M of the regional WS systems and hand pumps are done by GWSSB. As a result of this, the systems are less vulnerable to failure and immediate actions are taken to restore supply. Hence, in spite of having chance for improvement in O & M of regional WS systems, it is not dealt with here.

There may be many causes for failure of individual WS systems. The source may have inadequate water yield or its quality might have deteriorated with the passage of time due to saline water intrusion. This type of purely technical problem is to be looked in by the Govt. and/or by GWSSB. A better appraisal of ground water potential, monitoring of its withdrawal and recharge etc. needs a separate study along with its cost effectiveness. No doubt, reliability and availability of water is one of the prime condition of sustainability of WS system. However, being limited available time for this study, this is kept beyond the scope of this thesis.

The health awareness of the community has also great effect on the realisation of need. If community will not feel need of safe water, then community will not like to pay any effort to restore the WS system in case of failure. So health awareness of the community has direct influence on the sustainability of the WS system. For the awareness of community, effective health and hygiene educational programme is also equally important. For this, present status of awareness and present system of health education, if any, is necessary to study but it needs a separate study. Hence, this aspect is also not dealt here.

## 2.0 METHODOLOGY.

### 2.1 Literature study:

During last decade; IDWSSD, water supply section is highly promoted by most of the national Governments. Also various international organisations have played a vital role in promotion of this sector by sharing the experiences. These are well expressed in articles of journals, proceedings of the conferences and reports.

Literature study will enhance the knowledge on the subject and it will help for perception of problems in depth. It will also help to decide the approaches and methodology of field study.

The literature related to the subject on community WS system in general and piped WS in particular will be collected and operation and maintenance aspect will be studied. The causes of failure will be studied in depth. More emphasis will be given on financial and organisational aspects. As discussed in scope and limitations, different type of technology for WS or different tools for community involvement, its assessment procedure, need and technic for health & hygiene education will not be studied unless otherwise relevant to the objectives.

### 2.2 Field study by interviews.

#### 2.2.1 Assessment of problems:

For the improvement of the O & M, it is necessary to assess the problem in two aspects [1] The causes of problem and [2] the magnitude of the problem.

##### 2.2.1.1 Magnitude of problem

There are about 1100 village in Junagadh district and 14000 villages in Gujarat state. After formation of the board (GWSSB) in a year 1981, all activities related to drinking water supply including preliminary survey and recognition of need are entrusted to GWSSB. Any type of information regarding situation of water supply at any time is collected by the GWSSB. The GWSSB maintain its offices at zonal, circle, district and subdistrict levels. These offices have some information about the systems within their jurisdiction. So information about the functioning of system will be obtained from the district level office of the GWSSB.

#### 2.2.1.2 Causes of failure.

The Government may have some assessment for reason for failure. But, being GWSSB a technical organisation, perception of problem have hardly crossed the boundary of technical problems. From the employees of the GWSSB, we can know the technical cause of failure. But for the other cause of failure like organisation and finance, we have to go in the village.

#### 2.2.2 Study of organisational and financial aspect.

Primarily, the essential aspects of any communal activity are considered as follows:

- 1 Appropriate technology.
- 2 Finance and organisation.
- 3 Realisation of need.
- 4 Community participation during the planning, construction and O & M.

The causes of failure may have only one aspect or may be combination of many aspects. Many aspects are interlinked with each other.

Considering the time available for this study, we will have to limit our study objectives.

Above mentioned four aspects are discussed in short which shows why and which aspects are studied for this thesis.

#### 1 Appropriate technology.

In this area, the individual piped water supply have more or less same technology. General schematic diagram is enclosed in annexure. About 60 % systems are working well with this type of technology. Moreover, the change in adopted technology [that too, after construction] for improvement in O & M does not seem a wise decision. It can be a last measure only. But, looking to the magnitude of problem, we will study the possibility of improvement in technology so that it will increase the sustainability of WS system.

By my own experience in this area, I have observed that the people of this area are well conversant with the operation of the electrically operated pumps which are provided in W.S systems. Every village has a basically agriculture as their profession. On an average 100-150 electrically driven water pumps are operated and maintained individual by farmers for their farms. In case of failure of pumps, mechanics are available in nearby towns who knows and does needful repairs commercially. So, lack of technical skill does not seem as short comings for O & M of W.S systems. Hence, we are not going to review the technology. So, this will be omitted by selecting the village where there is no technical failure. However, based on field experience, some suggestion in the technical matter will be made which will contribute to improvement in sustainability of piped WS system.

#### 2 Financial and organisation aspect.



Like most of the govt. of developing country, the state or national Govt. has limited financial allocation for water supply and sanitation sector. Moreover, due to high target for coverage of water supply during last decade, obviously new water supply system has a higher priority than O & M. The system will be more sustainable if O & M is based on community.

Some finance will be required for O & M of the W.S system. Usually the necessary funds are expected from the beneficiary. As the beneficiary are large number of individual persons, an effective organisation is equally important for financial aspect, like collecting money, arrangement of payment for wages of operators, fuel bill and spareparts and repairs. Also, organisation will be needed for deciding the various other task of operation and maintenance like to decide the wages of operators, selection of operators. Thus organisational aspect is studied in depth for the selected village [where organisation is the dominating cause of failure.]

### 3 Realisation of need.

If O & M is to be done by community, community must realise the need for safe water. If they have not realised need of safe water, they will turn for alternate sources if it is easily available. For realisation of need people must have health awareness. This requires health and hygiene education programme. This altogether is a separate field of study. Here, we will omit this issue by selecting a village where alternate source are also difficult.

### 4 Community participation during the planning, construction and O & M.

The community participation is well recognised for efficient and sustainable O & M. However, for the defunct system, planning and

construction of the system is already over. Now, it is useless to discuss this issue for the system which are already completed. Of course, community participation will play a vital role for O & M of the system. For this, by taking interview of the beneficiary, we are involving the community for planning for strategies of O & M. Moreover, whole system is to be managed for O & M by community. Hence, it might have enough involvement of community at least in O & M.

Therefore, the selection of the villages will be based on following criteria:

- 1 The village must have individual piped water supply system.
- 2 There must be sufficient potable water in the well of the system for this village.
- 3 The system should be in the possession of village panchayat for operation and maintenance.
- 4 The village system shall not have any such technical failure so that it have not run right from the beginning.
- 5 The people and the panchayat have felt the need of water supply system.
- 6 The condition of the system shall be such that it can be start at the least possible efforts and does not required major repair like replacement of pumping machinery or rehabilitation of power supply.

The primary selection will be carried out with discussion with the board officer and employees. A list of such possible villages will be finalised for visiting these villages.

After selection, these villages will be visited. The president and other member of the panchayat will be contacted. Their opinion will be known with subjective dialogues. The approach to the people/leader will be finalised after literature review on O & M of community piped WS system as described above in general and finance and organisation aspect in particular.

2.2.3 Study of legal situation and present norms through interview with employee of revenue department.

Before proposing any change in strategy for improvement in O & M it is necessary to know the legal framework and present norms regarding finance and organisation. At present, the village panchayat is managed by revenue department of state government. Therefore problem of O & M of rural water supply system will be discussed with personnel of revenue department.

The formal dialogue will be started with the introduction of self and objective of the study will be described. The dialogue will be continued with the question like how can we improve the situation of O & M in village, what change in policy is required etc. Also questions regarding power delegation for collecting fund will be discussed.

With the extensive interview with the villagers, the gathered information will be studied and analyzed for causes of failure. From the study of real causes, we will be able to formulate some recommendations for improvement in O & M. at the following level:

- (A) Village panchayat.
- (B) Board (GWSSB).
- (C) Government.

The analysis of interviews and formulations of recommendations etc, work is done with the help of experts arranged by I. H. E., Delft.

### 3.0 RESULTS.

#### 3.1 LITERATURE STUDY.

##### 3.1.1 INTRODUCTION.

During the IDWSSD major effort have been made to increase the investments in water supply and sanitation to provide coverage to unserved population. Unfortunately, investments in increasing operation and maintenance skill for the system have not been kept in pace with increase in coverage. As a consequence, many systems are not providing full service as they were designed to deliver. The needs for rehabilitation grows more and more every year.

Under the influence of IDWSSD, India has invested about 5000 million dollars only in rural water supply to provide safe water to people residing in about 574,000 villages. But real access to safe water by rural community is still a big challenge. The no. of systems which are not functioning are discouragingly high. The O & M should, therefore, have the highest priority among the sector activities. Regrettably, O & M is rarely so regarded by the organisations responsible for implementation or by national govt. with a backlog of unmet demand i.e., unserved area. But, there is an increased recognition for need of effective maintenance at global level.

During last IDWSSD, this sector has gained lot of experiences for maintenance. The above experiences are well documented in various books, articles of journals and proceedings of conferences etc. The study of these literatures will give overviews of the present state of art on this subject. Also it will help for in depth perception of the problem for any system. This will also help in deciding the approach for field study.

3.1.2

KEY ASPECTS.

The maintenance problem is reported by many agencies in rural WS system, WASH - 1981, WHO - 1983, Sunderesan - 1982. Most reports point at lack of maintenance capacities and lack of finance as major causes of maintenance problem. But, there are other reasons too. For piped WS system attention to O & M is very recent only. Most of them were expected community based O & M.

As summarised by Hofkes, 1982, most of the developing countries in Asia have not clearly allocated the responsibilities of monitoring of WS systems. Hence, result of any attempt for improvement in O & M. are not available for evaluation. After review of 65 documents on this subject and interviews with the experts in the fields, Teun Bastemeyer and Jan Teun Visscher have noted myriad of reasons for poor O & M. Also, working group on O & M of water supply and sanitation system was established by WHO, on ad hoc bases. The first meeting was held at Geneva in Feb. 1989. Also second meeting was also held in Geneva in June 1990 and attendees from some 25 different countries were all water and sanitation specialists, involved in operation and maintenance in their respective countries. The objective of Geneva meeting were to seek ways and propose concrete initiatives to improve the O & M of WS and sanitation facilities in developing world. In this report they have listed the causes of failure of WS system. They have also identified the key issues.

From the above literatures, the author has prepared the summarised list of causes titled under different key issues for O & M. and is as follows:

- 1 Technology choice.
  - [1] Selection of technology without user's consultation.
  - [2] Inadequate water.
  - [3] Poor construction.

- [4] Lack of scope for extension and upgradation.
  - [5] Selection of service level without user's consultation.
- 2 Institutional arrangement and legislation.
- [1] Low profile of O & M.
  - [2] Undefined task.
  - [3] Undivided responsibility.
  - [4] Improper structure without involvement of community.
- 3 Financial viability of maintenance system.
- [1] Inefficient use.
  - [2] Higher operative cost.
  - [3] Improper budget.
  - [4] Inadequate tariff.
  - [5] Improper system of collection of money.
  - [6] Unaccountability and book keeping.
- 4 Man power development.
- [1] Lack of training.
- 5 Logistics.
- 6 Monitoring and control.
- [1] Inadequate data.
  - [2] Lack of communication.
  - [3] Improper management information system.
- 7 Political interference in
- [1] awarding a contract.
  - [2] Selection of site for source.
  - [3] Propaganda for free water.
  - [4] Fixing the service level.

The above points are interrelated and are to be jointly examined, e. g. technology choice and involvement of user. Basic definition

of appropriate technology means that technology which takes an account of users' acceptability, affordability and willingness to pay. It also considers the users' capacity to maintain such technology subject to its technical feasibility. Further, affordability is also related with O & M cost of the system which is highly influenced by how it is operated and /or maintained or say how it is designed. Chemically treated system will have higher operative cost than simple treatment like slow sand filtration, or simple hand pump may have the cheapest one. Also cost recovery will be more effective when tariff (O & M cost) is low. Thus technology choice, users' involvement and financial management are very closely inter-related. The real assessment of the situation for individual WS system along with users is necessary. Identification of contributing causes along with the magnitude will be the first step. Magnitude of causes will be difficult to measure, however, comparison of the magnitude is not so difficult after full involvement of users. A consorted effort from all direction will lead to fast result.

#### 3.1.2.1 Technology choice.

The technology for WS system should primarily based on the maintenance capacity. It is necessary to select level of technology for which the maintenance requirements are affordable for users and should be technically feasible for the sector agency. Involvement of the users in decision - making about the service level and the type of technology will lead to better operation & maintenance. The concept of effective demand as described by J. Kabermatten, 1990, comprises this aspect.

The project should be designed for 'effective demand' i.e. users choice of system or technology based on his own judgement of acceptability, willingness and ability to pay. This requires the project developer to work with community. This often results in iterative process to find the solution which are acceptable and

affordable. This approach not only allows the user to decide what he is able and willing to pay, but it requires designer to base his design on cost and/or ease of maintenance.

Willingness to pay often depend on the service level provided, but also on the appropriate financial procedure properly controlled by independent authorities to avoid misuse of funds.

Maintenance of higher level of technology will ask in some cases daily tasks which are beyond the capacities of the communities. It can't be simply assumed that needed operators will eventually be trained. It also means that operators (users or operating agency's employees) need to be consulted in the design process. Project design is to explicitly consider the ability of users to maintain the constructed facilities or pay their O & M.

The construction of the system component shall be strengthly and sturdy enough to prevent often breaking or collapse during normal occasional load. System shall be reparable with average skills and common tools and plants. Poor or shoddy construction of system requires often repairs which increases O & M cost. Target of wide coverage has influenced system design such away that system have least capital cost, many times overlooked O & M. e.g. Lower capacity of pump will reduce the capital cost of the pump but increase pumping hours resulting in higher operating cost (wages).

In a WS system design, a source for the water is most crucial component of the system. Many times, well is developed or constructed to cope with the future requirement of the users. But with the passage of time, ground water table decreases due to uncontrolled abstraction of water and/or insufficient recharge during drought year. Sometimes it is possible to increase yield from well with augmentation (deepening, widening or drilling bore), but cost will be too high to finance by community.



Sometimes this may not be feasible at all. This will reduce reliability of the system in spite of every possible effort and best management skill. Reliability is one of the most dominant factors for sustainability of WS system.

System design should have the scope for augmentation, extension and upgradation of service level. In the passage of time population will grow and may settle in new areas. Technology selected must have a capacity for extension and augmentation without incurring high cost of replacement, e.g., height of service reservoir should be sufficient enough to supply water without additional pumping in this new area. With the passage of time, many people may get more financial resources and they will prefer higher service level e.g. house connection to public stand post. Also, house connections have better cost recovery and are always encouraged. So, system needs scope for upgradation of service level. If system is unable to upgrade the service level, it will reduce the users' satisfaction which is a prime factor of sustainability.

### 3.1.2.2 Institutional arrangements and legislation.

Inadequate O & M is tied to many institutional problems, most of which are not amenable to without institutional changes. The system will invariably fail as long as the institutional environment concentrates on expansion and neglects O & M. Until organisations of developing countries behave as operators rather than builders, they will forever be building because their neglect of maintenance will require them to rebuild. The organization must become multi-disciplinary.

Institutions should develop and establish career paths for operating personnel which are as attractive as those of design and construction to encourage young talented personnel to consider operation as an option.

For the O & M, main activities include over all management, preventive maintenance, repairs, revenue collection, training and monitoring. For better and effective O & M, detail analysis of activities is required for clear division of task and responsibility among different unit and level of organisations. While dividing the responsibility of different task to responsive personnel, the capacity of each individual also should be considered including resource made available to him like tools, spare parts, means of transport, finance and time.

The planning process should develop a dynamic plan responsive to users preference, i.e. various standards depending upon affordability and willingness to pay. An institution with full involvement of users as a partner will increase the control over the maintenance resulting better functioning of the system.

There are two main types of institutional arrangements based on the method of functioning. (1) centrally organised institution and (2) decentralised institution.

(1) centrally organised institute.

This type of institute is autonomous body having various staff levels, operates many systems in whole area and will be sole responsible for O & M. e.g. Kerala water authority; in Kerala, Gujarat Water Supply and Sewerage Board; in Gujarat.

(2) Decentralised institute.

This type of institute is comparatively very small, operates only one individual system. Generally this is formulated at village level, e.g. Gram Panchayat, Water committee.

Both types of institutes have some positive points and some negative points. Generally centrally organised institute have better management skill for O & M., well organised structure, and having enough technical skill for operation and repairs, are rich

in experiences in WS systems. This institute may perform its task impartially without favouring or disfavouring any personal interest of any group if they exist among village community. Also this centralised institute will not use the WS system as tool for political gain. In contrast to this, decentralised institute is more vulnerable for use of WS system as a political tool. This type of institute is lacking in management and other skills and experiences.

Streefkerk, 1986, has done field study in Gujarat, India on this subject for six weeks and reported that functioning of either type of system is affected negatively by mismanagement by those in control for reasons of personal gain and/or political power. However, problems are greatest with decentralised (panchayat run) systems. Revenues are not properly collected and/or used. Streefkerk concluded that centrally operated systems are a better solution for the poor in Gujarat. However, author Streefkerk himself says that this paper does not go into long term organisational and financial implication of this recommendations.

The village level committee may perform better revenue collection. As reported by Shri Bhatt, 1990, in Banaskantha district of Gujarat 76 % (19 out of 25 ) villages have no problem in collecting revenue. Even no problem in paying maintenance is seen by 83 % .

As in Malawi, reported by Inyambo, 1990, community based management approaches have been developed and found wider application in rural WS sector. The community participation has been promoted during the planning, implementation and management of WS system. Efforts were directed at maximising the involvement of communities especially women, in decision making, as abases of sustainable development. In addition a sense of ownership was built with a view to improve the responsibility in O & M. Community organisation (water and tap committee) were assisted

with training in simple accounting and financial management. As a result of this, now Malawi has begun implementing UNDP funded project aimed at co-ordinating and promoting community management of rural WS (decentralised institute).

However, as mentioned earlier, no cost comparison data for O & M are available for both type of institutes. But cost for O & M by centrally organisation may be higher due to higher direct charges particularly due to high transport charges. The experiences of the author say that for many systems, cost of transport is much higher than the material and labour required for ordinary (but essential) repair jobs. But, performances of centrally organised institute for O & M. is much higher than decentralised institution.

Also, Shirhatti, 1990, in his evaluation report states that O & M, cost is 33 % higher than estimated cost in Santalpur regional system maintained by GWSSB (centrally organised institute), even though, field office has engaged only 2/3 of required technical supervisory staff. This gives indication that centralised system may be more effective and reliable, but chances are more that those may be a costlier choice.

#### 3.1.2.3 Financial viability.

The provision for the maintenance requires careful and realistic assessment of the need of resources. No system can function without payment of maintenance. When beneficiary has to contribute for O & M. a appropriate system of collection and accounting is to be established and organised. It has learnt from the experience that such system has to be developed prior to construction and in close consultation of the community.

Long term financial viability shall include cost of replacement, expansion and rehabilitation of the system. Price escalation due

to inflation shall also be estimated while working out the cost.

Difference in income level for different users may make it more difficult to manage the system by community. Different service level and different tariff may be a potential solution for different in income level. Also a well defined budget for maintenance organised is important to ensure that full attention is given to maintenance. Adequate control of expenditure by independent authority may increase the efficiency of organisation. Sometimes it is the inefficient use of funds rather than a lack of money which contributes to poor operation and maintenance.

The large scale construction of water supply system has led to growing deficits for O & M. Still in many countries, water is expected free supply. So, assistance for O & M, as given for construction, is also expected. As reported by Cristine van Wijk, 1990, it is a matter of impossibility for central water agency to adequately maintain and finance large no. of WS system. As reported by Lindeyer and Bhimrao, 1984, in India, annual cost of supplying water to 500 millions people requires national expenditure about Rs. 9200 millions which is equivalent to 1/3 of total budget for rural water supply of sixth five year plan. So it is next to impossible to finance the cost of O & M by central govt. C. van Wijk, 1990, insisted in her paper for community management of WS system for long sustainability. In this approach of management, beneficiary will contribute for O & M cost.

What are the ways to get this contribution by community? C. Wijk and Sijbesma, 1987, has nicely answered these question in book 'What price water?' published by IRC. The finance is needed to generate for the capital cost and/or recurring cost i.e. O & M cost.

There are two main options for finance contribution system from the users. (1) Community fund raising. (2) Regular charges. The first one will be more suitable for raising capital cost and latter one is more suitable for recurring cost.

For regular charges like O & M, choice has to be made between

- 1 Flat rate (unmetered).
- 2 Graded rates.
- 3 Mixed system.
- 4 Water metering.
- 5 Indirect charges.

The option shall be selected with consultation with community. The community may need the assistance to make wise decision.

#### 3.1.2.4 Man power development and training.

The people will have to be trained to carry out their tasks and responsibilities. The community must have enough capacity to perform their task regarding maintenance like technical repairs, book keeping, operation and preventive maintenance. Also, motivation to trained personnel is necessary in better functioning of the system. The community needs sufficient and clear information to make wise decisions. In addition to joint decision making, agency must help community to set up viable water management organisation and assist them in defining the organisation's task, responsibility, status and authority, and train its members and employees in maintenance, management and financing.

Also, a reward and appreciation system will be required. This may be in form of cash or kind. Training is of no or very little use if the organisation structure does not provide scope for newly acquired knowledge and skill.

At village level, opportunities for job promotion are very

limited or not at all. Provision of piece of land for growing vegetables will be useful tool. This will reduce the risk of leaving village to find better jobs.

Members of the community will be the best judge for selection of the caretaker and if caretaker is selected by the community, then community will provide full support to perform the tasks of maintenance. The training to be given, to only who is selected by the community.

#### 3.1.2.5 Logistics.

It is an exceptional case where spare parts are readily available in the local community. Sometimes it is not possible to get the spare parts even in near by towns. Some special type of spare parts have need to be arranged from the manufacturer situated far from the village. This can be arranged by involving private supplier or through the Govt. Careful monitoring is needed for availability of such spare parts for quick restoration of supply in case of failures.

Also transport facility should be examined, particularly in worst climate like wet seasons, whether it will hamper the supply of materials and spare parts needed for O & M. Sufficient stock of often needed material and most vulnerable parts should be kept to minimise the problem.

All major repairs may not be possible to carry out at site. Sometimes, it is necessary to have a workshop for typical job which requires special tools and heavy machinery. These workshops could be integrated with independent organisation or it can be utilised for private commercial institutes.

In a pumped, piped water system, running of the pump is prerequisite for operation. The necessary fuel either diesel,

petrol or electric power shall be made available. Many national governments are subsidising electrical charges for WS system. In such case, eventhough diesel pump set is provided as stand by pump, people will not prefer to use it in the case of imposed power cut, as it costs more money. In such case, it will be better to provide separate low power transmission line for WS system to make it possible to supply power even power cut is imposed for whole village. Experiences of author say that most cases in Gujarat, this is more acceptable by the community than to have diesel pump as a stand by unit.

### 3.1.2.6 Monitoring and control.

Monitoring of a maintenance system involves the formulation of maintenance standard and collection, processing and interpretation of data on functioning and use of the system and equipment involved in.

Following are the indicators for monitoring which should be used for comparing that what is there and what should be there.

- 1 quality of installed facility.
- 2 water consumption and provision per point.
- 3 maximum no. per water point.
- 4 acceptable water quality.
- 5 water pressure at a point.
- 6 acceptable no. of break down in definite span of time.
- 7 acceptable duration of break downs.
- 8 stock and quality of spare parts and repair material.
- 9 level of preventive maintenance.
- 10 cost of maintenance.
- 11 revenue collection.
- 12 punctuality of supply.
- 13 leakage.
- 14 regular payment of fuel, wages and other repairs cost.



15 users satisfaction.

The data collected in the monitoring process needs to be compared with standard set for. Also action needed shall be taken in case of sub standard function of the system. The collected data shall be used to improve the performance of the system and the organisation through the staff and community. Careful monitoring will also enable timely modification of maintenance system.

Quality control is also important and should include regular checks. Quality control is only possible when standard are agreed upon and linked to formal contracts indicating the rights and obligation of the users and responsive agencies.

#### 3.1.2.7 Political interferences.

Political interference has been identified as a serious contributing cause to poor O & M. This is most noticeable in countries where the government is directly owning, operating and maintaining WS system. Water is used as a political tool in many cases.

In some countries for political reason water is free. This decision not to charge for water makes in difficult to run a self financing viable system, even if the government provides funding. Also, when govt. is in short of cash, often it is the water supply facilities which are soft targets and experience greatest budget cuts.

It is quite often that local political person successfully influence the selection of site for wells. Interested person attempts to change the places from otherwise most appropriate one to either too far or too near to his own field. Intention of this is either to reduce the effect of this well on the yield of his own nearby field well or to use the water available from this WS

well.

Political interference is often evident in choice of technologies. The govt. officials are pressurised to support one reason or another to purchase particular type or brand of pump or pipe which may not be best or most appropriate selection. Similarly work contract may be awarded for political reasons rather than on the bases of performance with the result the completed facilities may be shoddily constructed.

Working group on O & M, sponsored by WHO, concluded that a precondition for the better management of water facilities was to devolve the responsibility of managing system from govt. to autonomous agencies which will manage the facilities under technical, financial and administrative guide lines by govt. and allow the facilities to be managed according to efficient business practices.

#### 3.1.2.8 Involvement of community including women.

Though the community involvement is not separately titled, it has vital role to play in most important key aspects like technology choice, institutional arrangements, financial viability etc. Moreover, community managed WS system has (if properly organised) more sustainability, effectiveness and economically. Hence it is worth to discuss here in detail.

Traditional engineering approach is to identify problem, design a solution, construct the resultant project and leave O & M consideration to local authority. With the 'effective demand' based method, this is no longer adequate. Instead of 'top - down' approach, 'bottom - up' approach is a definition of users involvement. The advantage of community participation are put forward by White, 1981 as below.

- 1 Participation reduces cost of the ws project.

- 2 With participation, more people can be served.
- 3 Participation allows for adaption to local situation.
- 4 Participation increases the chances of proper use and continuous functioning of improved facility.
- 5 Participation can catalyst for further socio - economic development.

These advantages and aspects are discussed in depth in 'community participation and women's involvement in WS and sanitation', compendium paper prepared for DGIS and OECD/DAC by IRC.

In a proceedings of meeting group on O & M, 1990, described that now, the users participate in decision making right from the beginning with project identification, through all intermediate steps of implementation up to ending how the system will be operated and by whom. As a consequence, the responsible institute must equip itself to work with community by adapting its structure and by engaging appropriately qualified staff.

Users' participation in project design is important not only because it allows a determination of willingness to pay but it permits the user to determine his involvement in O & M activities.

Community participation is recognized to be the key to long term sustainability of WS system. How to organise and maintain users interest and how to help user in their task of O & M of the system is well known among the behavioral scientist, field staff and community workers. The problem is that traditional public utility staff, in keeping with institutional priorities, have little interest or incentive to promote community participation. Also intensive effort of education in parallel to institutional changes are required. Alone education will not be sufficient.

Institutions have to organize staff unit capable of working with community in improving O & M. The training of present staff is essential and it will be necessary to engage additional staff (community workers).

Within community men and women both should be involved. Wijk-Sijbesma, 1985, describes the benefit of women involvement. It can contribute to the achievement of specific project objectives of functioning and use of facilities and also attainment of wider specific goals.

As a domestic manager, women decide where to collect, how much water to collect and how to use it. In their choice of water sources, they make reasoned decisions based on their own criteria of access, time, effort, water quantity, quality and reliability. Their opinion and needs have important consequence for acceptance, use and readiness to maintain new supplies. There are various benefits of women's involvement like economic, health and project benefits. Time and energy gained may also be used for community development and educational activities. As a prime beneficiaries, they have promoted the interest and willingness of men to contribute to improving water supplies.

Wijk, 1989, has suggested 10 steps for women involvement as below.

- 1 Orient male management and staff how women's involvement helps realise technical project objectives.
- 2 work with women field workers and /or local intermediators.
- 3 Discuss with local leaders and authorities why and how to involve in planning and management of water services.
- 4 Inform women about project and project meetings along different channels and encourage their participation.
- 5 Organize meetings at times and places suitable to women.
- 6 Facilitate women to hear and speak out, by sitting together not at back, and use of translation into vernacular.

- 7 Stimulate dialogue by way of presentation, invitation of comments/ questions/ criticism, insertion of discussion break involvement of respected and representative spokeswoman.
- 8 Where participation of women in general, or poor women, is difficult, organise separate meeting at suitable time and places.
- 9 Explain tasks and authority in maintenance/ management/ hygiene education/ finance before choosing local candidate ; discuss which are best done by women, and who are most suitable candidates.
- 10 Give training adapted to women's condition and role, and include follow-up visits for monitoring and support.

Siri Melchior, 1989, states women are not a special interest group in water and sanitation, they are mainstream interest group. They need both beneficiaries and partners. Siri Melchior has described some obstacles in full scale implementation of women involvement. These are summarised as below.

- 1 Many still do not understand what women's participation is.
- 2 Many believe that women's participation is marginal to project success.
- 3 Many believe that it costs too much, takes too much time, it is too complex managerially.
- 4 For worker outside the community, many feel that they can't encourage the women's involvement, it is too sensitive issue.
- 5 Many have tried to get participation but women have not come for meetings. (It requires specific skills.)
- 6 Many engineers don't care for development while many social scientist are too academic and too micro-level.
- 7 No evaluation data are available on large scale project to justify cost in financial, social and political terms.
- 8 Many organisations have women involvement division and

incorporated in their policy but not translated programmatic terms.

It has been recognised that 'hardware' approach is not enough. What still to be recognised fully is that 'software' approaches are, in their way, as technical as hardware approaches. They need time, funding, and expertise to develop and implement. About time, it is recommended by Siri Melchior, 1989, let project plan be event driven rather than calendar driven. About cost very less data are available but it shows about 10 to 35 per cent of the total cost depending upon the situation. C. Glennie, J. Chauvin, 1988, have mentioned that cost of community participation may add 3 to 17 per cent to project cost, but estimated gain from improved reliability are higher. For promotion purpose more cost/benefit data are required.

In her paper, Wijk, 1989, has described the concept of 'community management' instead of community participation. For sustainability, community management concept is more effective than community participation. In report of Asia and Pacific Regional Consultation on 'Water Supply & Sanitation - Beyond the Decade', the community based management of water and sanitation services in rural area is one of the three identified area to achieve over all sector objective of 1990s.

More than participation, community management emphasizes communities own decision-making power over those water supplies or component for which they hold or share responsibility, and stresses the importance of crucial period after construction. Earlier, delegation of maintenance to local council has often not successful, because project concern was planned and implemented as the same way as the system operated and maintained by central water agency. Village councils or village organisation were neither involved in local planning nor prepared for local management.

In addition to joint decision-making, the agency must be able to help communities set up for viable water management organisation, assist them in defining the organisation's responsibilities, tasks, status and authority, and train its members and employees in maintenance, management and financing. The essential elements for sound administration of community managed WS system are

- 1 capacity to make budget.
- 2 run a pragmatic book-keeping system.
- 3 exert financial control
- 4 regularly account to users for local services and financing.

Also, community needs sufficient and clean information to make wise decision. Much attention is also require to build local management skill and monitoring community performance in maintenance and management. The right and means of control are important for assurance of adequate services. Misuse of power for private purposes cannot always be prevented, but its risk can be reduced considerably when all users, men and women, are aware of have access to explicit means to control on local management and financing.

## 3.2 FIELD STUDY.

### 3.2.1 MAGNITUDE OF PROBLEM.

If the O & M is not looked in by the Govt., the objective of the investment will not be fulfilled. Magnitude of the problem will give strong argument for priority for the O & M.

As described in methodology, magnitude of the problem can best be known from the authority which is planning and implementing the WS programme in the sector. In Gujarat, GWSSB is the planning and implementing agency for the rural water supply in the state. The organisation set up etc. for the GWSSB is already described in the introduction chapter, hence it is not repeated here. The author has visited various field offices of GWSSB in the district including most lowest level field offices i.e. sub-divisional offices situated at sub district (Taluk) level. The idea was to get the latest and maximum information direct from the persons himself who are working in the field at village level.

Whole district is sub divided politically in 15 sub-district (Taluk). The GWSSB has 8 sub divisional offices situated at taluk level headed by two division offices. The GWSSB has conducted survey for each piped water supply system through their sub divisional technical staff.

As O & M of the WS system is not the liability of GWSSB, the GWSSB employee has no need to go in village to know whether the system is functioning or not. He is not expected too, by the higher authority to visit this village unless otherwise some complaint they receive about shortage of water.

However, in April 1989, premonsoon (critical situation) survey was conducted for the whole district. Each village was visited by one of the technical staff of the GWSSB for assessment of water



supply situation to enable to chalkout a plan in advance in case of no/less rainfall in time. If rain is delayed, the ground water table goes down tremendously and water crises may arise. The basic objective of the survey was to know whether water will be available or not and what may be the probable time for the crisis. This will be useful to the GWSSB officer to plan his activities like deepening of well, drilling of tube well, provision of pump etc. to cope with the crisis and to forecast financial need more accurately. It was no matter which way the people get the water and whether WS system is functioning or not.

The format for this inventory is annexed here with. The abstract from this inventory is given in Table - 1. The causes of failure of the schemes were not included in this inventory.

In April; 1989, 659 no. of villages had been provided with the piped WS systems in the district. 83 no. of villages were covered with regional WS system and 576 no. of villages were provided with individual piped WS system. Out of these 576 completed individual WS system, 365 are working and 211 are not working. (fig. 1) Taluk wise break up is shown in table 1.

Here, it may be made clear that 'not working' i.e. 'defunct' WS system means water is not pumped from well and not supplied through public stand post. Its bacteriological quality aspect or its hygienic use is not considered. Also, in view of broader aspect of the health benefit, 'functioning' of the WS system means effective supply of the water through stand post and **ALL** people should use **ONLY** this water. But this aspect is not considered here as it is more related with social awareness and health and hygiene education rather than O & M of the WS system.

It can be seen from the above analysis that about 37 % of the completed individual piped WS system are defunct in the district. The taluk wise magnitude of the defunct WS system is worked out

so that priority for the action can be decided among the different area. As shown in the table, the highest % of defunct system is 95 % in Mangrol Taluk, followed by next highest of 68 % in Keshod taluk. Lowest one is 8 % in Kutiyana taluk. There is no relation among the geographic division of area and % of failure. As the reason of the failure is not given it is not possible to conclude the reasons for this wide variation. This is appended in annexure.

Another survey was conducted by GWSSB in September, 1991. The format is enclosed in annexure. This time, causes of failure of WS system were also incorporated as a part of survey. The inventory was prepared by GWSSB. Also, abstract of the inventory was improved and updated by adding information available through personal conversation with the lower level field staff of GWSSB. The abstract of the improved inventory is given in table 2.

In September - 1991, 766 no. of villages had been provided with piped water supply system in the district. Out of these 766 villages, 91 no. of villages were covered with regional WS system and 675 no. of villages were provided with individual piped WS system. Out of these 675 completed individual WS system, 551 individual piped WS system are working and 124 individual piped WS system are not working (fig.-2). Taluk wise break up is shown in table 2. Taluk wise magnitude of the defunct system is worked out and given in the table appended in annexure.

It can be seen from the table that 18.5 % of completed piped WS system are not functioning in the district. As shown in the table the highest % of defunct system is 39 % in Porbandar Taluk, followed by next highest of 26 % in Veraval taluk. The lowest one is 8 % in Mendarda taluk. The coastal area (Porbandar and Veraval taluk) has higher % of failures.

While comparing inventory of April-89 and Sept.-91, it can be

seen the percentage of defunct WS systems has decreased substantially.

Above reduction was beyond expectation as O & M capacity of the community might not increase without special effort within shortspan of two years. The above aspect was discussed with GWSSB authorities. The Government of Gujarat has allocated a special fund for rejuvenation of the defunct individual systems in the state. The Govt. of Gujarat spent Rs. 10.58 millions for the rejuvenation of 214 defunct piped individual WS systems in the last two years.

The taluk wise no. of schemes funded by the Government for the rejuvenation of the individual piped WS system in last two years is given in table -6 appended in annexure.

The above money was spent (by Govt. through GWSSB) for improving source(wells), power connection, repair/replacement of pumping machineries and/or repairs of other ancillary civil works. The above amount is equivalent to 24 to 30 months' direct charges of O & M for these 214 WS system or this is equivalent to one years avg. out lay for decade's master plan for providing new WS systems in the district. The above money was expected from the beneficiaries of the WS system by Govt. This was extra burden to the Govt. as communities were not performing their task of O & M.

However, above rejuvenation works were carried out in **same fashion** as it was before. No money and/or efforts are put in for social aspect like community involvement and/or organisation which are necessary as described in literature review. So, long term sustainability of these WS systems are not guaranteed. It will not be surprise if the % of the defunct will increase once again. However, it is too early to conclude very firmly.

### 3.2.2 CAUSES OF FAILURES.

As reviewed in literature, various causes for failures are interlinked. Moreover, any individual WS system may have only one reason or it may have many more reasons for failure. We can categorise causes of failure in two broad general spectrum on the basis of ability of community to overcome these problems.

- [1] The causes which are beyond the capacities of community.
- [2] The causes which are within the capacities (after strengthening by normal training) of community.

The increase in salinity due to ingress of sea water or decrease in yield of well are the causes which are far beyond the capacity of the village community. However repairs to standpost and pipe line or pumping machinery are the causes which are well within the strengthened capacity of community. Therefore, the causes of failure are categorised based on above two aspects, as follow:

- [1] Source failure (beyond the capacity of the community).
- [2] Other than source failure (within the capacity of the community).

Of course, for any specific village, both causes may co-exist. So, no. of villages having both the causes simultaneously are also worked out as a third category.

As mentioned earlier, in Sept.-91, causes of failure were also included as a part of survey. Following are the list of causes mentioned in the abstract of inventory as a result of survey.

- 1 Quality of water.
- 2 Quantity of water.
- 3 Power problem
- 4 Pumping machinery problem.
- 5 Problem of repairs of ancillary civil works like pipeline, standpost, storage tank etc.
- 6 Poor financial position of the Panchayat.
- 7 Others.

The GWSSB is basically a technical organisation. Each and every office is headed by technical person. All field workers are technical persons. So, causes of failure are looked in depth only for technical aspects. For social aspect only one general reason i. e. poor financial position of Panchayat, is quoted.

As per inventory made in Sept.-91 and updated with information, available from personal discussion, the defunct WS systems are divided in above mentioned three categories. The abstract of above causes of failure are given with taluk wise break up in table 3.

Following are the break up of 124 no. of defunct individual piped water supply schemes in Junagadh district categorised as above para.

No.	Category.	No. of villages.
1	Only source problem.	31
2	Other than source problem only.	69
3	Both, source and other problem (combined).	24
	TOTAL ( 31 + 69 + 24 )	124
4	No. of villages having source problem ( 31 + 24 )	55
5	No. of villages having other reason ( 69 + 24 )	93

It will be worth to note here that the ground water condition in this district is highly depend on amount of rain and its intensity during monsoon season. During last two year ground water is either not recharged or less recharged compared to normal average year. So it is quite possible to have high no. of villages having source problem. It can be seen from the table - 3 that no. of villages having a quantity problem are almost double than no. of villages having quality problem. These problems can effortless be solved if Nature favours. However, the benefit of God bless may not reach to the community due to other causes.

About 45 % of defunct system have the cause of source failure. In Gujarat, Junagadh district is drought prone area. It is experienced that in avg. one year will be a drought year for every three year. Rainfall decreases upto 20% of avg. rainfall. Also, the ground water abstraction increases every year for agriculture and other commercial use as electric power is available at every village. Moreover, in drought year, as rain water is not available and other surface water sources give insufficient/ no yield, the irrigation by ground water is the only alternative for survival of farmers. This results in decrease in yield of water from well for the WS system.

The improvement of the existing source was discussed with field staff of GWSSB. Most of the source (wells) are already improved to the possible extent during the last three consecutive drought years (1985 -1988). Most of the wells are deepened upto 30 - 35 m depth. Also horizontal/ vertical bores are drilled at bottom or side of well. It will not economical to bring water from far distant place by planing new system than to supply by tankers for 4-5 month in three years.

There are 69 no. of villages ( 55 %) have problems other than source only. Overcoming of these problems might be within the capacity of community. Moreover, for the village where there are combine causes (of source and other than source), other causes may be within the reach of community. It may be cheaper, more reliable and highly essential alternative to overcome these problems by community by strengthening the capacity of the community than by directly solving the problems repeatedly.

### 3.2.3 STUDY OF NON-TECHNICAL (SOCIAL) CAUSES.

It is necessary to find out the underlying causes for social aspect. It is not possible to find out these causes from the information available from the GWSSB. For this each village shall

be visited and the surveyor has to discuss with the people. But, considering the time constraint for this study, it was decided to go to some of the villages of any one sub district where there is problem other than source and discuss with the members of the panchayat/leaders to know the underlying causes.

As organisation and technology are two essential aspect for O & M, the organisational aspect will be studied in more depth by visiting the people of any one village where the dominant cause of defunct is the organisational problem as a case study. This village can be selected among the above villages. It is true that visit of any one village may not give the solution for all the villages but typical approach and requirement of the organisation can be seen. This can be applied with slight modification for many of villages.

#### 3.2.3.1 SELECTION OF THE VILLAGE.

As described in methodology selection of villages is to be done primarily with discussion with the GWSSB field staff. Objective of the field study is to know the detail causes for social aspect (Technical aspects are already looked by GWSSB). As per GWSSB, only one cause i.e., poor financial position is given for failure. Also, the criteria for assessment of financial position are not decided. The matter were discussed with GWSSB field staff. If the panchayat is not able to pay wages for operator it is termed as the poor financial position. Poor financial position may be a problem of organisation. It was decided to select one village for detail study of organisation. The selection of one villages will be done in such away that the organisation is dominant cause of defunct in this village.

The above villages can be selected from any sub district. But Porbandar Taluk has highest % of deduct system and it was more convenient to approach these villages. So, PORBANDAR taluk was

selected. As per inventory and discussion with the GWSSB employee, in PORBANDAR taluk, there are two villages where poor financial position is the cause of defunct. Also, nonpayment for energy bill and subsequently power disconnection also shows a poor financial position because the payment of bill does not ask any skill except money. Thus the four villages viz. BABALVAV, PALAKHADA, VADALA and PATA were selected to visit.

Moreover, in village Rojivada the water from well of WS system was turned to saline. But, people of this villages were using the water from another well which was very near to this village. So causes of failure of this system can be ractified by the community if properly organised. So this village was also decided to visit.

In next nearby taluk RANAVAV, no such villages were found. So, next to Ranavav, in KUTIYANA taluk two of villages were found. But, in village Ramnagar there was no adequate water hence only one village named HAMADPARA was decided to visit.

Following is the list of villages where the schemes are not functioning in spite of good sources (prepared after discussion with GWSSB field staff).

No.	Name of village	Taluk name.
1	Babalvav	Porbandar.
2	Rojivada	Porbandar.
3	Palakhada	Porbandar.
4	Vadala.	Porbandar.
5	Pata	Porbandar.
6	Hamadpara.	Kutiyana.

The above villages were visited by the author and causes of failure were discussed in depth with the president of the village panchayat and other available village leaders.



### 3.2.3.2 APPROACH TO THE PEOPLE/ LEADER.

As mentioned earlier, various causes of failure are inter linked. Based on the literature study and their inter linkage, a frame was prepared by author. This frame work and their inter relation is shown in fig.-3. This frame work was used to lead the discussion with the leader/ people to know the cause of failure. Each aspect is mentioned in rectangular box and is also numbered. According to this number the list of indicator is prepared. Following are the indicators used for each aspect.

- 1      Functioning of WS system.
  - Water is pumped and supplied through the SP.
  
- 2      Technology.
  - Water is available adequately.
  - Quality of water is potable (not brackish or saline).
  - No other technological failure like collapse of well etc.
  
- 3      Organisation.
  - In spite of no technical problem, WS system is not working.
  
- 5      Tariff.
  - Wheather there is any criteria for raising the fund or not.
  
- 6      Physical organisation.
  - Who operates pump?
  - Who arranges repairs?
  - Who fix the supply timing?

- 7 Service level.
  - Whether there is house connection or not?
  - Location of HP/SP
  - Location of other alternative source.
  
- 8 Affordability.
  - President and others opinion for affordability of tariff for low income group people.
  - people have denied to pay in past due to non affordability.
  
- 9 Financial organisation.
  - President or any other person has stated the 'fund shortage' as the cause of defunct.
  
- 10 Willingness to pay.
  - People are denying to pay in spite of demanding money?
  - People have paid in past?
  - People are paying for other similar service (cattle requirement)?
  
- 11 Community involvement.
  - Any decision regarding tariff, service level, operators, budgeting, accounting system etc are taken by president or taken by jointly with other members of the community.
  
- 12 Realisation of need.
  - Availability of water form alternative source and its service level.
  - People's eagerness to restore the system.
  - People are satisfied with conventional source.

In the beginning of the talk, the author has introduced himself as one of the GWSSB officer but now studying at Netherlands in

the field of water supply of their area. It was made very clear in the beginning that at present the author is not talking as a part of Govt or GWSSB. It was also made clear that this talk is not for any commitment or fixing of any responsibility for defunct WS system. People were motivated to give very free opinion about water supply and cause of failure including hardship for getting water, need, affordability, willingness to pay and present organisational aspect. The author has feeling that people have opined freely as they have taken active part in discussion without any hesitation.

Of course, before starting the dialogue, a requirement of fund for O & M is to be worked out. The people will definitely ask the counter question about what will have to be paid. They may ask about probable system for collection of fund. So, expenditure per capita per year or per month will be worked out. If there is no contribution till to day, it will be better to ask to contribute only for direct charges which includes energy charges, wages for operators and repair jobs, purchase of spareparts and materials for repairs etc. The indirect charges like depreciation and interest etc will not be counted though it is necessary. This can be asked at later stage by little increase in contribution if once the systems has started for functioning.

During the discussion if some contradictory opinion is received and will make it difficult to conclude then the same point is also further discussed with the other members and the same member whoever found necessary to get clear picture about the cause of failure. The concept of the field study was to find out what are the causes of defunct, which are the lacking aspects and how can we solve this problem with the community and what can be done for adaptation by the people.

Also, similar talk will be held with other respective member of the society like school teachers, ex-president, president of

voluntary organisation, if any etc.

For village Hamadpara, for assessment of real constrain for O. & M., the detailed inquiry was made in two stages.

(1) First Stage.

In first stage, about 40 - 50 houses (approximately 10 %) were visited and their opinion, interest and response with respective to the informative ability were noted through detailed inquiry. The inquiry will be based on the frame work as explained earlier. For getting fare picture of the true representative of the village, the people from 40 house were inquired. The selection of the house was done in the following manner.

The whole residential area was divided in five region depending upon the geographical situation like streets, roads etc so that in each region equal no. of houses are situated. In each region, houses were selected based on their financial condition. We will select both type of houses i.e. (A) High income. (B) low income. The size and the condition of the building was used as a parameter for this. Also, the assistance from the village people was taken in selection of house, but guiding principles were explained to them. In each region, if people of different caste are residing, one or two houses from each caste were selected. The women were also motivated to opine by involving elderly women (with regarding as mother during talk) in discussion if there are two women in the house (Generally, in Indian rural society it is quite common).

(2) Second Stage.

In second stage, more responsive and informative person were selected and invited for further talk. In this talk various problems of O & M were discussed in length. Possible alternative

solutions for their problem were also be discussed at length to make system functioning.

The president was requested not to spend his time with the author for inquiry (to avoid his influence on people). But, the moral support of president and other leader for further inquiry for detailed cause of failure was obtained by narrating objectives of the inquiry and studies. He was requested to introduce few person (one from each zone) who introduced the author to house hold. The president was requested to ask these person to opine very freely. The introducer, in his introduction requested as above to opine freely without any hesitation. The author also repeated often the same thing during discussion.

### 3.2.3.3 DISCRPTION OF CAUSES FOR DEFUNT WS SYSTEM.

Following are the brief outcome of the discussions.

#### 1 Village Babalvay.

The population of this village is 543 as per 1981 census, and main occupation of these villagers is agriculture. The village is situated on one of the major district road and small in size w.r.t. average village in the district. The ground water in this village is of good (potable) quality and sufficiently available at depth below 25 to 30 m.

The village was provided piped WS system in 1989-90. The well, pump house, pumping machinery, pipeline, storage tank and one public stand post near the storage tank are the component of the scheme. The storage tank and SP are located near (at the outskirts of) village. There is also one hand pump located in the centre of the village. The quality of water from the HP as well as from the well is quite potable and acceptable to the villagers. The scheme was constructed and commissioned to the

satisfaction of Panchayat i.e. President of the Panchayat. Unfortunately, piped WS was short lived in spite of all structures including pump were in order. The matter was discussed with president. At first glance, shortage of fund **for payment for wages of operator and energy bill was the cause** stated by the president. When the author discussed and asked about the contribution from the people, he stated that he had asked but villagers were not willing to pay.

When discussed with others, the author came to know that people were not convinced about reasonability of the expenditure estimated by the President. Some had feeling that it was higher than what it should be. President is a strong leader and no people would like to question his decision. One of the villager (who wish to be anonymous) told that the president was asking high amount for operation charges to make it unacceptable to people so that he could use the water of well for his own farm which close to the pipe line.

The above matter was discussed with the president and he clarifies that he has asked only Rs. 100 per house hold per year. But, 30 % household are not living in the villages, only 70 to 80 no of household are living in the villages. The people who were not using the WS system are denying to pay so rest had to contribute more. The estimates made by president seems quite reasonable. Also, stand post is located at border of the village while HP is located at the centre of the village. As HP is maintained by GWSSB people are not asked to pay for O & M of HP. So, HP is more attractive alternative to piped WS system. But, some people are still interested in piped WS system as it provides water for their cattle also. Some people were interested also in house connection but cost estimated by president is Rs. 500 per HH only for pipe line. This may be higher side and non affordable to even avg. household. President was feeling lack of power to recover water tax from each and every house hold. In

short the following are the conclusive cause of defunct of piped WS system.

- 1 HP is the satisfactory and attractive alternative for avg and low income group people. Piped WS system could not compete to HP.
- 2 Majority of high income people are living out side of village and are not willing to pay for piped WS system as they do not need it.
- 3 Tariff was fixed by president without taking people in confidence. Estimated expenditure was not convincing to some people.
- 4 Strong leadership was one of the hindrance to bridge the conceptual gap for the estimated expenditure between the people and leader or to be very precise, say the manager.
- 5 Location and no.of SP was not decided as per wish and will of the people. Otherwise piped WS system might be attractive alternative as it would provide main pipe line across the village to facilitate house connection at affordable price.
- 6 For such small village having population less than 1000 and considerable % of HH are residing out side of village, cost of operation per HH for piped WS may be too high to afford. Piped WS system is not the appropriate choice.
- 7 Pre-set up of organisation for fixing cost recovery system was not there till the O & M phase. This set up is prerequisite to bring all hidden causes to surface.

## 2 Village Rojivada.

The population of this village is 1682 as per 1981 census and is situated about 25 km from the taluk head quarter and interior to main road. The quality of the ground water of this area is good and acceptable by the public but availability is more vulnerable.

The WS system was provided in 1984. The well is constructed about

1 km away and storage tank is constructed near the boarder of village. Three SPs are constructed in different area of residence. The yield in the well of the WS system was not sufficient and hence water was not supplied through SPs. People are fetching the water by rope and bucket from the old well named Bhamaria well located very near to the village. This well is also used for filling cattle trough by voluntary organisation called Gaushala Samiti - a committee for cattle house. People are contributing fully to voluntary organisation for filling the cattle trough for their cattle. The pumping machinery provided on the system well is in order and in working condition. In the opinion of the leader/member, the people desire the water through SP and are willing to pay for the same. This can be seen as they are contributing fully to voluntary organisation for filling the cattle trough for their cattle.

The WS system can function without much cost by shifting the pump from present WS system well to old well. But question was who would do this? No leader came forward to do this task. The Samiti member was asked by author to extend their services for the people of their own village. Unfortunately, he was too loyal to its organisation. He said that the Samiti is only for cattle and fund raised during religious festival was only for this purpose and can not be spared for other tasks. When author persuaded to work for welfare of the people who contribute for his work he argued that it is a task of the village Panchayat.

The President of Village panchayat was asked by author about the difficulties for functioning of the WS system. First, he said there is **no water in the system well**. When advised to use pump of system and old well, he feels that permission from Govt. is necessary as it is installed by Govt. Moreover, he has not tried to get any contribution from people which is very important to run the system. Of course, he has no doubt about willingness of people. The following are conclusive causes of defunct of piped



WS system.

- 1 Inadequate water in the designed system during the draught year.
- 2 The people have no leader who take initiative to overcome the crises.
- 3 There is sound voluntary organisation who can perform better job but task is not given to them.
- 4 People have not sense of ownership of WS system. President still believes that for any change in WS system, a consent from the Govt. is required. It was difficult for the weak leadership.
- 5 No systematic organisation was formed which has easy approach for the people.
- 6 People are not fully aware of their right to ask the panchayat for water supply.

### 3 VILLAGE PALAKHADA.

Population of this village is 1181 as per year 1981 census and is situated on coastal highway about 25 km from taluk head quarter. The main occupation of this village people is agriculture but soil is less fertile compared to average village in this area. Peculiarity of this village is that about 90 % of the people are from one class only and they have close family relationship. The ground water of this village has the influence of sea water. The shallow top aquifer is recharged by fresh rain water and available water from this top (upto 5-10 m) aquifer is of good quality but quantity of this water may not be sufficient particularly in summer or in draught year.

Water supply system was constructed in year 1976. The open dug well, pump house, pumping machinery, pipe line, storage tank and three public stand posts are the components of WS system. The WS system was defunct in past but govt. restored after necessary

repair in 1985. The system functioned till 1988. Now people are drawing the water by rope and bucket as water is not supplied through SP. Quality of this is not so good but people are using same water in the absence of other alternative. If people desire to have better quality they have to go about 1 km away in private field. 80 % of water is used from well of the WS system by rope and bucket and 20 % of water is used from far away well.

President of the village Panchayat stated financial constrain as a cause for defunct. There was no money available for **payment of energy bill and power got disconnected**. When discussed the issue to raise the fund by voluntary contribution from the people, he denied to do so because people are alleging for mishandling of money. When discussed with other leader (member of Panchayat), reason was same. In past, fund was raised by voluntary contribution by the people for payment of energy bill. But system can not work for want of repair of pump. The fund raised by voluntary contribution was not adequate for the repair of pump. People felt that in spite of they contributed for WS system, they did not get any benefit. Some people might have considered this case as mishandling of money and might have alleged in past. The leader might have worked honestly and sincerely eventhough they were blamed. So no body came forward to take leadership.

When asked about compulsory contribution as a water tax, he stated that if he asks for payment, his relation will get strained. They do not prefer to strain their personal relation for the sake of general people. When the author asked for suggestion for solution, he clearly opined that Govt. should operate and maintain this WS system. The author explained that this would be costlier and people have to contribute almost double amount. Then also, he suggest that people would pay what ever amount is asked by Govt. The panchayat is not able to operate this system.

A voluntary agency - 'Gaushala Samiti' - member was also explained by author the difference in O & M cost when operated by Govt. from that when it is operated by the village people. When persuaded to come forward for the benefit of the people, he promised that he would for try for the same.

Following are the conclusive cause of defunct of WS system.

- 1 There is no systematic organisation so that sound financial management for O & M is possible.
- 2 There is no strong leadership. Lack of transparent account system made it more difficult.
- 3 Poor system of contribution has not allowed some cash reserve to carry over some incidental repairs. Also expenditure for recommissioning might be underestimated. The people have lost the confidence in leadership as they were not benefited in spite of their contribution.
- 4 Efforts put by the leaders for the community were not rewarded. Some appreciation for those who work for the community is a must.
- 5 No leader was ready to impose water tax due to personal and/or political gain in spite of Govt. made it compulsory by legislation. Social awareness and health & hygiene education is needed.

#### 4 VILLAGE YADALA.

Population of this village is 1481 in year 1981 and is situated 40 km. away from taluk head quarter. Main occupation of village people is farming. Also some families have one male member working abroad, either in arabian countries or in U.K. The quality of the ground water of this village is deteriorating day by day due to ingress of sea water. Also ground water table decreases considerably during summer or in drought year.

WS system was constructed in 1984 and has worked satisfactorily till 1986. During the scarcity period 1987-88, the well dried up and water was supplied by tanker. During scarcity a new well was constructed in 1986 near to village and people are using now water from this well with rope and bucket.

The matter was discussed with president and other leaders. They said that **pumping machinery are of under capacity and can not pump the water to storage tank.** Also they strongly believe that quality of water from this well will deteriorate in nearby future and so investment for replacement of the pump etc. are not attractive for them. Hence they are planning new shallow well and pumping machinery and one public stand post near the well.

The people working in other countries are voluntarily contributing for the development work of the village to voluntary organisations. There are three voluntary organisation.

- 1 Garbi mandal -organises religious festival
- 2 Gaushala Samiti - cattle house committee.
- 3 Telibiya Co-operative society -manages seeds and fertiliser for farmers.

These organisations have sufficient fund to carry out any developing work. Of course, above proposal for new well and pump will be costlier and will have low service level.

Following are the conclusive cause for the defunct of WS system.

- 1 Deteriorating quality of water from well has lost the attraction for the further investment.
- 2 Village people have no technical knowledge about availability of pump with higher head capacity in the market.
- 3 Installed pump might be under designed to cope with when ground water table decreases much. GWSSB has norms to design

the pump for 16 hours pumping rate which results in lower capacity which is not acceptable to the people. No details were available to know the existing pump capacity and required capacity of pump.

## 5 VILLAGE PATA.

The population of this village is 2440 as per 1981 census and is situated on coastal highway 50 km. away from the taluk place. The main occupation of this village is also agriculture and cattle breeding. The soil is less fertile than average village of the region. The ground water from deep aquifer is saline and not potable but top aquifer is recharged by fresh rain water. Hence water from top aquifer is potable.

Piped WS system was constructed 1983 with components: open well, pump house including machinery, pipe line, storage tank and three public SPs. The system functioned well till 1985-86. Water was supplied by tanker during drought period of 1986-87. Since then components like SP etc. are damaged and requires very minor repairs. This could be repaired with local skill only, if desired by villagers.

At present this well is utilised only for filling the cattle trough only. People are fetching the water from their own small sized (1.0 X 1.0 m) well dug in their court yard. About 80 % people have their own well dug by themselves. Some of the people who do not have this facility are using their neighbour's well and the rest are using the public well.

When the president is asked to supply water through SP, he pointed out funding difficulties for minor repair of the system. When the author asked to ask more contribution from people, he stated that nobody would like to pay more as they have satisfactory alternative system. He explained that digging of

well is not difficult and the drawing of water with rope and bucket is also not difficult as ground water is available at shallow depth (2 to 3 m).

The matter was discussed with other people in a group and they were asked to select option whether they would like to pay more for SP supply or they are satisfied with present system. Some people raised the question that in spite of their contribution they are not getting water. The author clarified that whatever amount they are paying is just sufficient for cattle trough filling. If they want SP supply they have to opt for higher contribution. Then he did not agree for more payment of water tax. He clarifies that once Tax is raised they have to pay continuously whether WS system works or not. So better to avoid non-beneficiary expenditure. No body agrees for raising water tax. Here it is worth to clarify that they have not opted for the raising of water tax in spite of affordability. It was not the case of non affordability, but it was a compromise for the non-guaranteed service in return against the continuous extra monetary burden.

Following are the conclusive causes for defunct of system.

- 1 People are getting good water adequately without difficulties. They have not felt necessity.
- 2 Health benefit of piped WS system are not known to them.
- 3 People are paying water tax without any direct benefit to them. (Every body is not regularly using a water from cattle trough for their cattle).
- 4 People were not sure about functioning of WS system in spite of payment of higher water tax.

### 3.2.3.4 CASE STUDY OF A VILLAGE FOR ORGANISATION PROBLEM.

#### 6 VILLAGE HAMADPARA.

The population of this village is 970 as per 1981 census and it is situated at 5 km distance from taluk head quarter. Main occupation of the villagers is also agriculture. The ground water in this village has more than 1500 mg/l TDS (not potable), but at the outskirts of the village, the ground water has potable quality. The village has primary school. For higher education student are going to nearest town Kutiyana, the taluk HQ.

Houses in the village are situated in one cluster. At centre of the village, there is a big square. A temple is situated at one side of this square. The covered roof of this temple and this square is often used for communal activity and public gathering. This is a common scenario in many villages of this state.

Like in most of villages, the women of this village are also fetching the water from wherever available. Generally, young house wife will do this hard task. It is quite common in village life to allot harder task to daughter in law than to daughter. Depending upon other task, daughter or daughter in law will go for fetching the water.

The WS system was constructed and handed over to village panchayat for O & M, in year 1989. The system was short lived and has been defunct since beginning of the year 1991. The people are using hand pump which is maintained by GWSSB. The quality of water is not acceptable for taste (saline) but people are using the same in the absence of other alternative. The scheme well is located far from the village. So people are using private field well for good quality of water for drinking purpose. O & M cost (Rs. 5 per HH per month) was contributed by people when the system was working.

The matter was discussed with the president. He stated that people are not paying tax so no fund is available for O & M. He was not able to manage repair charges of pump. When reason for denying the payment was asked and he stated that rival political group is eager to see his failure in managing the operation of WS system hence is not cooperating in getting payment. In his view, election for panchayat, state assembly and parliament has played active role in formation of group.

Other leader including president have clearly stated that people have great need of this piped WS system and are eager to restart the functioning of the system as the quality of water from HP is not good. Other problems like non functioning of pumping machinery, power connection, acceptance of water quality and availability of adequate water from the system etc., are not there.

The following are the indicators which show that, in this village, dominant cause of defunct is organisation.

- 1 WS system has sufficient and potable water.
- 2 People have felt need of WS system as stated by the president and other leaders.
- 3 Alternate source is either very far away or saline.
- 4 People paid in past and stopped now.
- 5 Pumps and other components are in order and can be commissioned without any extra effort. (Pump was repaired by commercial repairer but repair charge was not paid.)

So, it was decided to discuss with the people of this village regarding the organisationalal problem in depth.

A moral support from the president and other leader was obtained by explaining them that the author is eager to see how the system can be put in commission once again. It will be better to know why people have stopped paying.



Initially, the member of Panchayat were asked to contribute to the discussion regarding difficulties in the functioning of the WS system. The idea was to know what is the existing system of organisation for O & M.

President was operating this system. He has appointed one person as operator as per his will. The contribution from people was entrusted to voluntary worker in each zone (called FALIA). Considering the need, the president has proposed the tariff of Rs. 5 per HH per month and was agreed upon in one of the meeting with the leaders. The volunteers will collect money from each house every month and will give money to president. The secretary of the village panchayat will issue a receipt to volunteers through peon.

As people have stopped payment, these volunteers may be knowing the people's view for non payment. It was decided to discuss with them also. So the author has visited 10 house hold including volunteers house. The following is brief discussion on the outcome of visit in each Zone.

#### 1 Zone one.

The volunteer described that people are not denying for payment but not paying immediately. They would give some excuse or would ask to come afterward. If asked for second or third time, they were not prepared to pay immediately. Then he stopped to ask payment. He stated further that when some two or three respected leader would go and ask for the payment, they would pay immediately. His complaint was that no leader has taken interest to recover the contribution. The author visited other houses also. All family members including old women were asked to contribute in discussion for water supply system. Villager who introduce the author will also insist for free opinion without any hesitation and it were repeatedly told during the discussion.

No house hold has felt this contribution as nonaffordable. Every body was ready to pay. They also promised that if someone will ask for payment, they will pay immediately.

## 2 Zone two.

Volunteer was also one of the leaders. When author asked why people are denying for the payment, he clearly said that people are not denying but, he stopped to collect money. When author asked the reasons he said president had sent the message to collect Rs. 10 instead of Rs.5. He believed that he (president) should not raise the amount without discussion in the meeting. He alone can not decide this way. He also said that the people pay with full trust on him. Further he said that the people were paying to him happily. Also peon has denied to distribute receipts to each HH on his request to do so. He feels if peon who takes salary from panchayat do not distribute receipts, then why he should. He with drew his co-operation. The president have not asked him anything about this.

The people have no objection in payment even more for WS. NO body wish to come forwaord to put any question to leader or not ready to offer any help or services. They believe that it is a task of leaders and they themselves are not leaders.

## 3 Zone three

The people of this zone are paying regularly. The auther asked HH that when they are not getting the benefit of their payment, then why don't they ask their leader to make it function. They said that president says that when people are not paying how he can maintain O & M. and hence they decided not to pay now.

When asked women to send their husbands to represent for restoration of WS system, they expressed that they are quite

capable to perform their duty for fetching the water. They will not like to send their husband to send for a quarrel for the sake of others.

4 Zone four.

People are paying money as and when demanded by President. The reason given by President was taken as granted that some people are not co-operating by paying so WS system can not be functioned. People have no objection for payment. Every house hold is paying regularly. When asked that when they are facing difficulties for WS, why do not they take interest in functioning of the WS system. They replied that it is their misfortune that some people are not understanding and not co-operating. It is their bad luck that they have no good leader who can manage all these things. In this zone also, no body like to come forward to ask the leader or offer his service to the president.

5 Zone five.

People of this zone are the poorest. They have no land and they are farm labour. They have no free access to each private field well. So they are very eager to restore the system. They are ready to contribute any amount decided by the village leader. They have not any say about policy of cost recovery. These people are paying regularly as long as system was functioning.

When the author asked that when they are facing hard ship for fetching water why don't they ask the leader to start WS system. They replied that they cannot interfere in the functions of leaders. They feel their duty is only to pay. It is leader's duty to make the system in order. At the most they can stop payment.

Following are conclusions.

- 1 The collector was more a worker than a leader. The support from leader was lacking.
- 2 If neighbour are escaped from payment, people will try to escape from payment.
- 3 No household fees non affordablity. They are ready to pay even more for WS system.
- 4 No house hold wishes to ask the leader to start WS system or wish to come foreword to offer his help or services to commission the system.
- 5 No systematic organisation was established with clear responsibility.
- 6 Total free service makes nonresponsible. They can withdraw support anytime and paralyse the system at any moment. It is better to fix one employee who will work with responsibility and perform task regularly for his wages.
- 7 No review or monitoring of any task was done by any body. This does not allow early indication of any weakness in the system. Total failure is the only resultant.
- 8 Back up support from outside is needed for development of organisation till it is fully developed and gained some experiences.

### 3.3 GENERAL CONCLUSION

In Junagadh district of Gujarat state, 20 % (124 No.) piped individual WS systems are not working physically. As social aspects like finance, organisation, realisation of need and community involvement are not equally looked at with technical aspect, the rejuvenated WS system has enough possibilities to be the defunct once again. For the rejuvenation of the defunct WS system, 75 % of WS system has clearly shown the need of social aspect over and above technical aspect. For reaming 25 % of village social aspect may be suppressed by technical aspect. Thus, If the system is to be operated and maintained by the community (as being cheaper, more reliable and more efficient),

social aspect are more important and negligence will lead away from the goal of SAFE WATER 2000.

From the field study, it seems that no village has single cause for becoming defunct. It seems every cause has different magnitude in different villages. No village has systematic organisation. No efforts are put in to establish the organisation for O & M. What so ever form of organisation is there, it seems as selfborn. If organisation is properly established and well developed, it can solve many problem including finance. No village have shown the problem of affordability.

Following are the characteristics of good organisation.

- 1 It should be established systematically, well defined manner. The legislative support by the Govt. is a must.
- 2 The community should fully be involved. i.e., (1) It shall be established through the community, (2) Its structure shall be as per wish and will of the community. (3) It should be controllable by the community.
- 3 It should sustain during the transition of its personnel.
- 4 The interest should be created for the involved personnel in the organisation. The stronger the interest, the less fragile will be the organisation and it will be more stable and long lived.
- 5 It should have back up support till the time of maturity. Provision for assistance in finance management like accounting, budgeting, book keeping should be made.
- 6 It should be open enough for access for the community and be sufficiently transparent for wider acceptability and support of the community.

## 4.0 RECOMMENDATIONS.

### 4.1 FOR VILLAGE LEVEL.

#### 4.1.1 Establishment of an organisation.

For any activity, an organisation is a must. As discussed in literature review, for long term sustainability and effective functioning, community managed WS will be the appropriate solution for piped rural WS system. The following are the recommendation for establishment of organisation which will include all aspect like financial management, community involvement etc..

- 1 Organisation should be in the form of a committee. Its function should be independent of village panchayat but its members should be selected by the elected members of the village panchayat i.e., all committee members should be approved by general body of village panchayat.
- 2 No. of committee member should be decided by elective body of village panchayat, but should depend on the population of village and degree of unity or integration of various sections with one another. Care should be taken that no section shall feel that they are neglected. No. can be changed to accommodate any section of the community by the general body of elected member of village panchayat. Too many no. will be hard to organise and too less will lead to dictatorship. It will be better to start with 5 to 7 no. of member.
- 3 50 % of members should be appointed from elected member including one female member. Remaining 50 % of member should be nominated by village panchayat from potential worker in the field of WS including one female member.
- 4 Mantri, a secretary of village panchayat should be a member secretary of this committee.

- 5 An employee of GWSSB either T.A./ A.A.E./A.E. should also be a member of this committee.
- 6 This committee should elect one person from its member as chair person and chair person will be responsible to committee members and coordinate all activity. Mantri or member from GWSSB should not be a chair person.
- 7 Every year or every two year 50 % ( 25 % from each category) should be retired and new member should be joined in committee.
- 8 Form of organisation should be flexible to attract maximum community support.

#### 4.1.2 Objectives of the committee.

Over all objective of the committee should be to manage WS system in such a way that WS system should start functioning at the earliest and will be long term sustainable. The committee should identify the tasks for effective management of the WS system with the help of member GWSSB. Following is the general list of the tasks, but specific tasks should be worked out by the committee.

- 1 Operation and preventive maintenance of the pumping machinery including accessories.
- 2 Maintenance of other civil works including repairs of pipeline, SP storage tank pump house etc.
- 3 Handling of finance including collection, payment and book keeping and transparent accountability to public.
- 4 Preparation of alternate budget proposals on the bases of service level, extension and upgradation of system, experiences and data available from the previous year monitoring system. This may need more reiteration for compromising the facilities and tariff. The idea is to provide sufficient information as tools and means to committee for acceptance and approval of the budget.
- 5 Acceptance and approval of budget proposals.
- 6 Purchase of spare parts, tools and other materials.

- 7 Appointment of personnel and fixing wages for  
1 operators 2 repairer
- 8 Monitoring and control.
- 9 Liaisoning with Govt. and GWSSB and public relation.
- 10 Crisis management.
- 11 Division of responsibility for every task or activity among the committee members and appointed personnel. Also, list of responsibilities for each individual shall be prepared for clear concept of responsibility.
- 12 Fixing nominal reward for each committee member and appreciations for the dedicated worker for WS system. The idea is not to provide employment but to create interest for WS system.
- 13 Duration of interval between two meetings of the committee.
- 14 Review of process of selection/ nomination of committee members.
- 15 Fixing the priorities for extension and upgradation of the system.

For the above task necessary, policy decision shall be taken by the committee.

#### 4.2 GWSSB LEVEL.

##### 4.2.1 SOCIAL ASPECT.

- 1 GWSSB should appoint one A.A.E. or A.E. for each village as a committee member.
- 2 GWSSB should initialise the establishment of organisation of the village.
- 3 This A.A.E. or A.E. should be trained for the following social aspects of the community managed WS system through JALSEVA training institute of GWSSB.
  - 1 Identification of task and activity for O & M of piped WS system by the community.



- 2 Preparation of budget for performance of each and every task necessary for O & M.
  - 3 Development of transparent, easy and perfect book keeping system for financial transection as well as material account.
  - 4 To decide the criteria and procedure for selection of operators and evaluation criteria and procedure for performance.
  - 5 To scrutiny and compare various alternative proposal for its financial and other long term implication on sustainability of WS system.
  - 6 To decide the criteria for selection and election of committee member for division of responsibility of different task.
  - 7 General training to work with community and for the community including communication skill.
- 4 GWSSB has established SEU with the bilateral aid of Royal Netherlands Govt. The services of this unit should be utilised for training the trainers of GJTI.
- 5 The A.A.E. or A.E. should provide all technical support for repair job, quality control, preparing estimates and design for extension and/or upgradation of the WS system at free of cost. The GWSSB should not ask any payment from this village for this services. GWSSB should be able to perform this task with the existing staff. However, if necessary state govt should pay this charges instead of paying repeatedly cost of repairs of WS system.
- 6 Depending upon the progress in devlopment of skill in committee, frequency and duration of A.A.E.'s involvement should be decided. If committee is working satisfactorily without any constraint, AAE/AE may be replaced by TA/MISTRI. AAE /mistri can reduce its attendance in meeting of the committee only after one year satisfactory functioning of the system but he has to evaluate the functioning of the system at least every month in second year. If system is

- working nicely, this period can be extended to, for once in three month in third year.
- 7 A pair of AAE and Mistri should not be nominated for more than 25 villages.
  - 8 GWSSB should perform similar exercise in the village where system is working as a preventive measures.
  - 9 Necessary staff shall be made available at sub division level by transferring staff from the project sub division as work load for preparation of new scheme is considerably reduced and very less no. of new scheme are to be prepared compare to previous years. If necessary reorganisation of project circle should be done.
  - 10 Board should collect the information for review and monitoring about the progress in establishment of organisation at village level. Bottleneck should be identified and strategy should be revised to remove this bottleneck. The experiences gained in one area should be transfer to all field by organising seminar once in a month at district level and half yearly at state level. The field officers who have commissioned highest no. of schemes during the specific period by putting special effort shall be appreciated in this type of seminar to encourage this activity.
  - 11 The performance evaluation of divisional and sub divisional staff should include the progress of recommissioning of the scheme. Here, it shall be borne in mind that AAE/AE may be able to recommission the scheme only those systems which have problems, solutions of which are within the capacity of community. Unlike a coverage of WS system, it should not be viewed as figure of refunctioning of systems but his step by step approach to the community management should be evaluated. The criteria should be based on how many meetings he has attended, whether he has extended his full support to the community and his interest to work with community etc.

#### 4.2.2 TECHNICAL ASPECT.

- 1 New scheme should be prepared with fully involvement of the community i. e. on 'effective demand'
- 2 For along sustainability, house connection feasibility should be given weightage for deciding the plinth level of storage tank.
- 3 Pumping machinery should be designed for 8 hours of pumping to reduce wages for operators instead of 16 hours.
- 4 Peak factor for the distribution of pipe line shall be made at least 3 or 4 to be more realistic.
- 5 For new schemes, where ground water are not adequately recharged, location of sources should be done more scientific manner. Cost benefit of higher reliability and alternative arrangement in every drought year should be studied on the basis of experiences of various department.
- 6 For those village where adequate water are not available during summer or drought period, feasibility of rain water harvesting structure should verified by expert in this field.
- 7 The scheme should handed over with complete drawings as on site and operation manuals for pumps etc. Also maitenance shedule for each componenet should be included alongwith check list. It should also include the addresses for availability of spare parts and material for repairs.
- 8 In the cost estimates, provision for community involvement should be made. Initially, it may beestimated 5 to 10 % of the capital cost depending upon the cost of the WS system. In future it should be made more realistic on the bases of actual expenditure involed.
- 9 GWSSB should prepare a comprehensive plan for bacteriological quality aspect of the water from WS system. This aspect has always a low priority compared to quantity aspect.

- 1 Govt should pay establishment charge to GWSSB to build up or to strengthen the capacity of community instead of repeatedly paying cost of rejuvenation of the WS system.
- 2 Mantri/Talati i. e. village level govt employee under ministry of panchayat, should be motivated and made more responsible for his duty in promotion of WS system. He /she has high influence over elected body of the panchayat. If motivated properly, through block development officer, he/she may perform excellent role in formation and functioning of the committee.
- 4 If Mantri can not be involved, WS sector shall be made fully independent from revenue department and authority to impose and collect water tax should be transferred to GWSSB or other organisation fully dedicated to the water sector.
- 5 A rule shall be made that revenue earned as water tax can not be used for other development work by any authority. However if necessary, income from the other sources may be use for WS system.
- 6 Performance of Mantri is evaluated by block development authority. His active involvement in WS should be included as a parameter in performance evaluation.
- 7 To avoid willful negligence and create interest in the WS system, an WS allowance of Rs. 50 or so should be paid to those Mantri whose WS system was defunct and now working well since more than six month. This allowance should be stopped as soon as scheme is not functioning more than 15 days for lack of O & M.
- 8 Political leader should be convinced to give up idea for free WS by giving clear and simple understandable picture of its financial implications.
- 9 For the system where source is a cause of defunct, Govt, should provide fund for these villages. The system should be designed on 'effective demand' i. e. with fully involvement

- of community.
- 11 Control and monitoring should be imposed on abstraction of ground water during drought period at least in radius of influence of WS system well. If necessary due compensation should be paid for loss of crop due to want of irrigation by ground water.
  - 12 Govt. should promote R & D in the field of ground water recharge.
  - 13 For promotion of house connection, resolution passed on date 6-2-1988, for not providing more no. of SP shall be cancelled.
  - 14 Govt. should provide financial aid (loan and/or grant) to lay the distribution pipe line and other works to facilitate for house connections. Amount of loan should be linked with savings from income and expenditure (say 10 to 20 times savings per year).
  - 15 To provide wider opening for community involvement, state govt should frame the guideline for WS policy and policy should be framed at district level.
  - 16 As per present rule, water tax can be recovered from the defaulter by village panchayat by taking possession of land and other property. This power delegation to village panchayat is found too heavy tool to operate for effective water tax. A financial aid given to the individuals by govt. should be stopped for defaulter on the recommendation of the village panchayat. Necessary ammendment should be made in rules to equip village panchayat with appropriate tools to recover water tax from the willful defaulter.
  - 17 Some communities may not be able to organise in spite of full support and effort from out side, an option should be provided to operate and maintain by GWSSB provided they pay full O & M cost to GWSSB.

BREAK OF VILLAGES OF JUNAGADH DISTRICT AS ON APRIL, 1989.

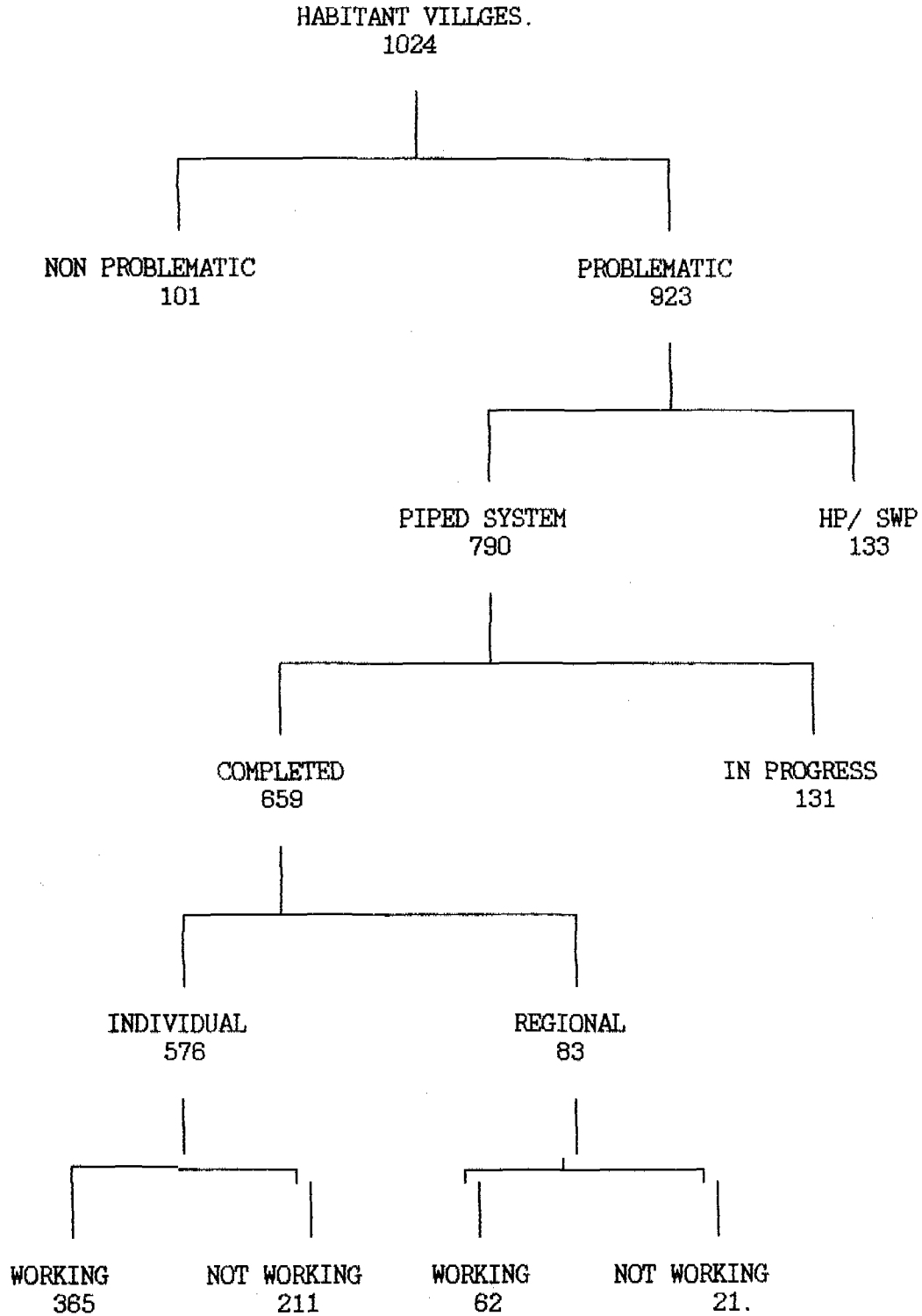


FIG. - 1

TABLE - 1

TALUKA-WISE STATUS OF VILLAGE WS SCHEMES IN JUNAGADH DISTRICT,  
AS ON APRIL, 1989.

Taluk Name	Total no. villa ages	No of non-ha bitant villa.	No. of habit- ant villa.	No. of non pro- blematic villages	No. of proble- matic villag.	No. of SWP/ HP.	No. of piped system.			Progress		Completed		Working		Not working	
							Tot	I	R	I	R	I	R	I	R	I	R
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
UNA	219	74	145	10	135	20	115	68	47	08	35	60	12	43	11	17	1
JUNA	79	00	79	18	61	09	52	52	00	07	00	45	00	41	00	04	00
MEND	47	02	45	09	36	08	28	28	00	08	00	20	00	15	00	05	00
TALA	99	21	78	20	58	15	43	43	00	17	00	26	00	21	00	05	00
VERA	100	00	100	5	95	12	83	83	00	00	00	83	00	49	00	34	00
MALI	62	00	62	1	61	6	55	55	00	02	00	53	00	34	00	19	00
MANG	63	00	63	1	62	3	59	26	33	07	00	19	33	01	19	18	14
KESH	53	00	53	7	46	2	44	44	00	00	00	44	00	14	00	30	00
PORB	76	00	76	19	57	7	50	38	12	9	0	29	12	16	6	13	6
RANA	54	1	53	0	53	22	31	24	7	11	0	13	7	7	7	6	0
KUTI	47	1	46	0	46	4	42	30	12	5	0	25	12	23	12	2	0
MANA	55	00	55	2	53	1	52	45	7	2	0	43	7	31	7	12	0
VANT	45	00	45	1	44	3	41	41	0	0	0	41	0	27	0	14	0
BHES	46	00	46	6	40	6	34	34	0	4	0	30	0	13	0	17	0
VISA	102	24	78	2	76	15	61	61	0	16	0	45	0	30	0	15	0
TOTAL	1147	123	1024	101	923	133	790	672	118	96	35	576	83	365	62	211	21

NOTE: The abbreviation used in above table are as under.

I: No. of village having individual piped WS system.  
R: No. of village covered by regional (comprehensive) WS system.  
HP: No. of village having hand pump as WS system.  
SWP: No. of village having simple well as WS system.

TALUK WISE MAGNITUDE OF DEFUNCT WS SYSTEMS.  
AS PER APRIL - 1989.

No.	Taluk	No. of completed system	No. of defunct system	% of defunct system.
1	Mangrol	19	18	95
2	Keshod	44	30	68
3	Bhesan	30	17	56
4	Ranavav	13	6	46
5	Porbandar	29	13	45
6	Veraval	83	34	41
7	Malia	53	19	36
8	Vanthali	41	14	34
9	Visavadar	45	15	33
10	Una	60	17	28
11	Manavadar	43	12	28
12	Mendarada	20	5	25
13	Talala	26	5	19
14	Junagadh	45	4	9
15	Kutiyana	25	2	8
	Total	576	211	37



BREAK OF VILLAGES OF JUNAGADH DISTRICT AS ON SEPT., 1991.

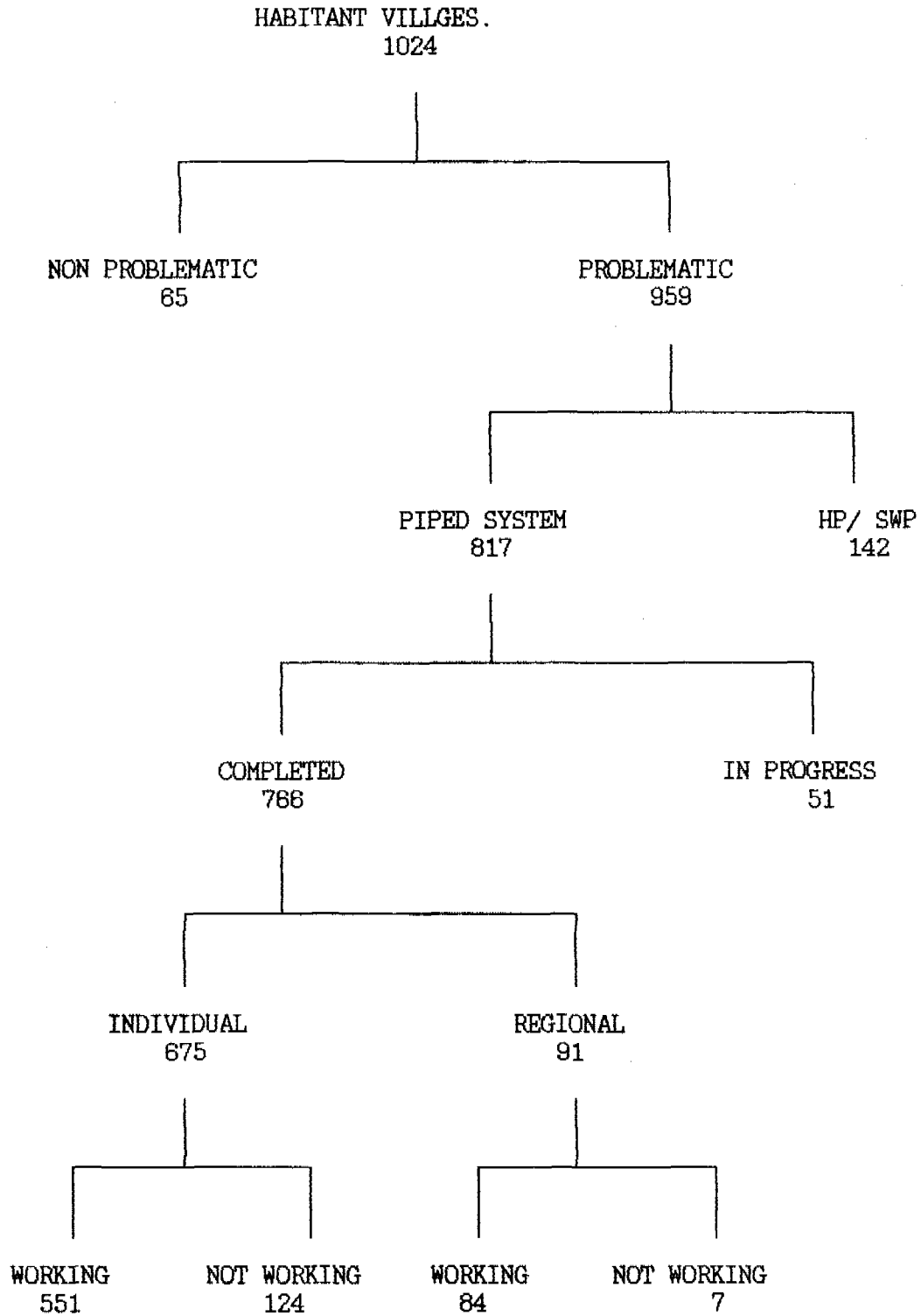


FIG. - 2

TABLE - 2

TALUKA-WISE STATUS OF VILLAGE WS SCHEMES IN JUNAGADH DISTRICT,  
AS ON SEPT., 1991.

Taluka Name	Total no. villa ages	No of non-ha bitant villa.	No. of habit- ant villa.	No. of non prob lematic villag.	No. of proble matic villa.	No of SWP/ HP	piped system			Progress		Completed		Working		Not working	
							Tot	I	R	I	R	I	R	I	R	I	R
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
UNA	219	74	145	8	137	20	117	77	40	0	28	77	12	61	11	16	1
JUNA	79	00	79	15	64	09	55	55	0	0	0	55	0	53	0	2	0
MEND	47	02	45	06	39	08	31	31	0	0	0	31	0	31	0	0	0
TALA	99	21	78	20	58	15	43	43	0	0	0	43	0	35	0	8	0
VERA	100	00	100	4	96	12	84	84	0	0	0	84	0	62	0	22	0
MALI	62	00	62	1	61	6	55	55	0	1	0	54	0	43	0	11	0
MANG	63	00	63	1	62	4	58	21	37	1	0	20	37	15	36	5	1
KESH	53	00	53	1	52	2	50	50	0	0	0	50	0	47	0	3	0
PDRB	76	00	76	1	75	7	68	48	20	7	7	41	13	25	8	16	5
RANA	54	1	53	0	53	26	27	20	7	1	0	19	7	6	7	13	0
KUTI	47	1	46	0	46	5	41	26	15	1	0	25	15	20	15	5	0
MANA	55	00	55	0	55	1	54	47	7	4	0	43	7	42	7	1	0
VANT	45	00	45	0	45	3	42	42	0	0	0	42	0	33	0	9	0
BVES	46	00	46	6	40	7	33	33	0	0	0	33	0	31	0	2	0
VISA	102	24	78	2	76	17	59	59	0	1	0	58	0	47	0	11	0
TOTAL	1147	123	1024	65	959	142	817	691	126	16	35	675	91	551	84	124	7

NOTE: The abbreviation used in above table are as under.

I: No. of village having individual piped WS system.  
R: No. of village covered by regional (comprehensive) WS system.  
HP: No. of village having hand pump as WS system.  
SWP: No. of village having simple well as WS system.

THE TALUK WISE MAGNITUDE OF THE DEFUNCT WS SYSTEM.  
IN SEPT., 1991

No.	Taluk	No. of completed system	No. of defunct system	% of defunct system.
1	Mangrol	20	5	25
2	Keshod	50	3	6
3	Bhesan	33	2	6
4	Ranavav	19	13	26
5	Porbandar	41	16	39
6	Veraval	84	22	26
7	Malia	54	11	20
8	Vanthali	42	9	21
9	Visavadar	58	11	19
10	Una	77	16	21
11	Manavadar	43	1	2
12	Mendarada	31	0	0
13	Talala	43	8	19
14	Junagadh	55	2	4
15	Kutiyana	25	5	20
	total	675	124	18.5

TABLE - 3

## ANALYSIS OF CAUSES FOR FAILURE OF INDIVIDUAL PIPED WS SYSTEM.

Name of taluk	Source			other problem						only both			no. of villages		
	qual ity	quan tity	tot	m/c	pow er.	anc. work	fin. posi	oth ers.	tot	sou rce	oth ers	comb ined	tot	having source	porblem others
PGR	7	6	13	0	2	3	2	1	8	9	3	4	16	7	13
RAN	1	11	12	1	0	0	0	0	1	12	1	0	13	12	1
KUTI	2	1	3	0	0	0	2	1	3	2	2	1	5	3	3
MANA	1	0	1	0	0	0	0	0	0	1	0	0	1	1	0
VANT	1	5	6	0	6	4	0	1	11	0	4	5	9	5	5
JUNA	0	0	0	1	0	0	2	0	3	0	2	0	2	0	2
MEND	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KESH	1	1	2	1	1	0	0	1	3	1	1	1	3	2	2
MALI	0	0	0	0	1	8	8	2	19	0	11	0	11	0	11
VERA	3	0	3	9	2	18	1	1	31	1	19	2	22	3	21
UNA	0	8	8	4	8	10	0	0	22	2	8	6	16	8	14
TALA	0	2	2	2	3	1	1	1	8	2	6	0	8	2	6
BHES	0	1	1	0	0	0	0	1	1	1	1	0	2	1	1
VISA	0	1	1	2	3	9	1	0	15	0	10	1	11	1	11
MANG	2	1	3	1	3	3	1	0	8	0	1	4	5	4	5
TOTAL	18	37	55	21	29	56	18	9	133	31	69	24	124	49	99

TALUK WISE NO. OF VILLAGES FUNDED BY STATE GOVT. FOR REJUVENATION  
FOR INDIVIDUAL PIPED WS SYSTEM IN 1989-91.

No.	Taluk Name	No. of WS system.	Total amount (Rs. in '000.)	Amount/village (Rs. in '000.)
1	Bhesan	15	685	45.6
2	Junagadh	21	1250	59.5
3	Keshod	24	1040	43.3
4	Mendarada	14	945	67.5
5	Mangrol	8	280	48.6
6	Malia	30	770	25.6
7	Talala	21	1160	55.2
8	Una	1	20	20.0
9	Veraval	28	1270	45.3
10	Visavadar	26	1560	60.0
11	Vanthali	12	430	35.8
12	Porbandar	8	540	90.0
13	Kutiyana	5	496	99.2
14	Manavadar	5	137	27.4
15	Ranavav	0	0	0.0
	<b>TOTAL</b>	<b>214</b>	<b>10583</b>	<b>49.5</b>