

APPENDIX C

PARTICIPATORY APPROACH

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CHAPTER 1 INTRODUCTION

Projects that take a participatory approach reinforce the sense of ownership and responsibility of the beneficiaries for the projects. In the framework of the privatization policy initiated by Tunisia since 1987, Water Users Groups, GIC, are created in the rural areas and all or parts of the responsibilities related to the operation, maintenance and management of water supply system are transferred to these groups. Community participation has been a strategy adopted in these rural water supply projects since 1997 to promote the sense of ownership of the community for ensuring project sustainability. Through participatory approach focusing on community participation, needs may be determined and users' commitment to the project may be an outcome of participation.

CHAPTER 2 OBJECTIVE OF PARTICIPATORY APPROACH

The participatory approach adopted in this Study aims to enhance local people's consciousness on the objectives and benefit of the rural water supply and raise their consciousness on the participation in the management of the projected water supply system through GIC activities. The fulfillment of this objective will promote the sense of ownership and responsibility of the future beneficiaries for the project and prepare them to participate in the operation and maintenance of the future water supply system.

CHAPTER 3 PARTICIPATORY APPROACH

3.1 Approaches Applied

3.1.1 Sensitization Program

The main approach adopted in this Study to promote participation of rural communities is the Sensitization program currently applied by DGGR for rural water supply projects. The Sensitization manual developed by DGGR was applied to the Sensitization program implementation. To promote community participation in line with the objective described in Chapter 2 above, the program was applied to incite the population to express their needs and opinions with respect to the water supply system, (such needs and opinions were transferred to the feasibility study to be taken into consideration prior to formulating the final conclusions), make the population to commit themselves to participate in the subprojects and by doing so to sign up a commitment form for revolving fund (the minimum commitment is 80% of the beneficiaries for the subproject at the end of the feasibility study), and encourage the emergence of a local leadership able to lead the future GIC.

3.1.2 Introduction of Didactic and Visual Tools

As supporting approaches to make messages to be communicated more memorable and informative and then to make Sensitization program more effective, use of didactic and visual tools was recommended to sociologists of the local consultant firms. The following visual tools were introduced in different ways.

(1) Network Layout in a Large-sized Community Map

In the second visit of the Sensitization program, network layout in a large-sized community map was used to confirm visually, on the instruction of the JICA Study Team. A map large enough and comprehensible enough to be seen from a distance allows participants ‘visual sharing’ and also allows them to understand more of what the water supply system is to realize for their community.

Understanding the water supply system as their own property is a first step to raise the awareness of ‘ownership’, which is indispensable factor to ensure sustainability of the subproject.

(2) Posters Prepared by the DGGR

Different posters representing the following situation were introduced to disseminate the role of GIC, the importance of financial participation of prospective users, and their involvement in the daily O&M for the water supply system to be realized.

- 1) A man taking a 20-liter plastic tank filled by water from a communal tap beside a tap keeper,
- 2) Faucet with an image of piggy bank (considered as GIC bank),
- 3) Communal tap in rural area with a water storage tank, and
- 4) A cash register connector with a 20-liter plastic tank.

(3) Pictures Presenting Critical Incident (analytic methods)

Some pictures of problem situations extracted from the document on sanitary education prepared by DGGR were used for the purpose of helping participants developing analytical ability. An A3 sized picture illustrating unsanitary situation around the communal tap was presented to the participants and the sociologist asked them to analyze what problem is being conveyed in the proposed picture and how it could be avoided.

3.2 Result and Effect of the Sensitization Work

This section focuses mainly on ‘participation’ or ‘participatory’ from qualitative aspects in relation to the objective presented in the Chapter 2.

3.2.1 Effect for Illiterate People

When appropriately used, visual tools were effective and they seemed to become an ‘equalizer’ between the literate and illiterate, between the talkative and the less talkative. The positive effect on participants was provided through analytical

method using illustrations in the Ghraissia subproject in Le Kef where illiterate and literate women were presented. Asked to analyze unsanitary situation of water service point, the participants, women, sometimes including children, discussed actively what causes of pollution around water service points exists and how to prevent them from pollution.

3.2.2 Type of Participation

The type of participation observed during the Study may be divided into two: active participation and passive participation. The former is classified as participation that allows dialogue and two-way communication and interaction between sociologists and participants. On the other hand, the latter is one-way teacher-student kind of communication between sociologists and participants where no dialogue exists and different superficial information is advertised for the participants.

(1) Active Participation

As for active participation, the extent to which the Sensitization meeting was actively participatory depended much on the skills of the sociologists. Good cases were observed in particular in the Thleijia subproject in Gafsa, Baten Trajma subproject in Gabes and Chouamekh subproject in Medenine, for which experienced and skilled sociologist organized Sensitization meetings. When using large-sized network layout to confirm prospective users' opinions in the second visit of Sensitization, he invited participants to write their localities on cards and to put them by themselves beside prospected water service points indicated in the said map. In such a case, having a concept of water supply system, participants showed apparently their active participation in the confirmation of water service points, for which they communicated their expectations in the first visit. When the information is visually shared among all the participants, the degree of participation was enhanced, because it was not only the talker but also the silent that concentrated on the Sensitization meeting. Cases presented in the previous section showed also good facilitation of the sociologist to maximize participation for all the participants including the

illiterate.

(2) Passive Participation

As mentioned above, passive participation was relatively frequent in most of the Sensitization meetings assisted by the JICA Study Team. It was observed sometimes that the information was only delivered without interaction between sociologists and participants. Although visual tools are introduced in the Sensitization meeting, if their utilization are not appropriate in terms of ‘visual sharing’, the introduction of visual tools have less effect on raising awareness of the participants than expected. For instance, when the size of prepared illustration was too small to be seen by participants sitting a little bit far from the hung illustration and when sociologists did not take the audience’s reaction and overall situation of the meeting into consideration, participants sometimes lost their interest in the meeting.

3.3 Situation Analysis (Problem Analysis)

The following caused frequent cases of passive participation and insufficient approaches for enhancing active participation.

3.3.1 Sociologist Side

(1) Insufficient skills in public speaking

Public speaking skills are fundamental skills for sociologists who are frequently required to communicate with a large audience in group meetings. However, some of the sociologists working for the Sensitization program lacked much of the skills required for public speaking: eye contact, enough moderate speed of speaking, confirmation of participants’ reaction during talking, voice loud enough to be heard by all participants. Skills in verbal communication should be assured before trying to use visual tools, because visual tools cannot complement insufficient verbal communication.

(2) Insufficient Skills in Effective Use of Visual Tools

When visual tools are used in public speaking all participants must be able to see them clearly and the participants reaction to them must be confirmed. As for community map indicating network layout with water service points to be installed, cases were often observed of maps prepared without taking visibility and comprehensibility into consideration. These cases are observed in the subprojects such as Sidi Fredji subproject in Ben Arous, Jouaouda subproject in Jendouba, and Chelalga subproject in Kairouan. Good combination of ‘verbal’ and ‘visual’ skills were lacking for some of the sociologists.

Insufficient required skills of sociologists are closely related to less experience in works for community participation, considering the fact that community participation has only recently been introduced for rural water supply projects in this country.

3.3.2 Target People’s Side (social constraints)

Insufficient participation, in terms of mobilization and of degree of participation can be attributed to the following causes.

(1) Insufficient Support from Local Authorities

Some of the Sensitization meetings did not mobilize sufficient number of participants in relation to total number of targeted families. Sometimes, local authorities (OMDA) did not inform the target population of the Sensitization meeting probably due to insufficient understanding on community participation.

(2) Social Constraints

The following social constraints are often listed as some constraints on participation. Unless sociologists take a sufficiently sensitive and facilitative approach, the degree of participation may be limited due to these social constraints.

- 1) Diffidence in the presence of authority or foreigners,

- 2) Fear of speaking up in group meetings,
- 3) Low self esteem,
- 4) A sense of powerlessness, and
- 5) Lack of experience in working with groups.

3.3.3 Other Aspects

In general, reliable supporting materials may complement insufficient experience of workers (sociologists). The Sensitization manual should be helpful for sociologists who are not sure how to raise motivation of prospective users or how to take active participatory approach.

According to some sociologists and judging from Sensitization work carried out, the Sensitization manual fails to clarify how the themes to be explained in each visit should be dealt with in a manner to truly involve beneficiaries' participation. It only enumerates the themes and it is up to each sociologist to explain them in his or her own way, which lacked in-depth explanation in some of the Sensitization meetings.

The manual also fails to clarify how the work items defined in the program should be executed taking beneficiaries involvement into consideration. For example, no clear explanation is given on when topographic survey should start and why. Therefore, the methodology of the Sensitization work in relation with technical work was not sufficiently respected.

With these considerations in mind, the existing Sensitization manual needs to be improved in order to 1) assimilate the Sensitization methodology, 2) communicate messages more efficiently and effectively, and 3) ensure outcomes required in each visit. It should be noted that the improvement on the manual suggested does not necessarily aim at forcing sociologists to always follow the manual, but at ensuring relatively high work performance on the average for any sociologist working for community participation. It is recommended to include in the existing Sensitization manual the following:

- (1) More detailed and practical examples on how to explain each theme (example of dialogue is possible) and example messages to be communicated to the target population.
- (2) Useful and recommendable examples of didactic and visual tools (e.g. image of water supply system with each facility for the first visit and network layout for the second visit) and explanation on effective use of such tools.
- (3) More detailed flow diagram explaining on when technical works take place in relation to Sensitization works and how outcome of Sensitization works is integrated in technical works.

3.4 Measures Taken during the Work

To correct some of the deficiency in organization of the Sensitization meetings, the following instruction were made by the JICA Study Team to sociologist of the local consultant firms through mid-term review or general daily evaluation on Sensitization work.

3.4.1 Improvement of General Organization of Meeting

- (1) Closer co-ordination with each CRDA and local authorities to increase participation rate and to ensure efficient Sensitization work (e.g. their support for collecting contracts for revolving fund is crucial)
- (2) Well-prepared meetings in terms of time, places, and number of participants, so that sociologists work in comfortable and relaxed ways, paying attention more to participants.

3.4.2 Improvement of Skills Required for Working in Community Participation

- (1) Basic communication skills required for public speaking
- (2) Basic skills in community participation

More participants-oriented approach by listening to them, encourage them to analyze and find solution for their life was insisted.

CHAPTER 4 GENDER PERSPECTIVES

4.1 Definition

Gender perspectives describe perspectives on the social and cultural relationships between men as a sex and women as a sex that create and reproduce systematic differences in their positioning. Gender, age, ethic, race, economic status, and so on are factors to carefully look at in social analysis. They are a few important factors to be considered for a project demanding community participation. As there is a social strata in a society which makes differences between sex, age, ethnic group according to cultural and socio-economic and political context, when community participation aims to involve all the stakeholders of a target community, it is fundamental to pay attention to every kind of difference attributed to each stakeholder so that all the prospective users benefit equally the outcome of the project and all the users will be equipped with “ownership” of water supply system in the future. Women’s and men’s different roles in society and their interrelationship have an effect on project impact for each stakeholder including access and control over project benefit, therefore gender perspectives are important to be taken in consideration for participatory approach.

4.2 Significance of Gender Perspectives for the Current Project

Special consideration to women’s active involvement is prerequisite for the current project for the following reasons to reach equal and equitable participation of all prospective users.

- (1) As reported in the previous concerned documents such as SAPROF report, women tend to be socially and culturally more marginalized than men in most of the localities concerned (Gender relations take different forms under different circumstances and they may be changed over time; therefore, gender relations cannot be generalized uniformly for all the subprojects concerned and this difference needs to be carefully analyzed. In this respect, it cannot be assumed that women are always more marginalized than men everywhere.). As current social position of women, they have less

chance to access public meetings or information than men. It is same with a water supply project, as it is a public matter for a community.

- (2) They are main users of the water supply facilities as well as men and it is women who are mainly in charge of water related tasks (transport, daily domestic use) in most of the subprojects (As gender relations differ under circumstances and from locality to another, it cannot be generalized that water related tasks are always taken by women. For example, in subprojects in Le Kef and the Mahrouga subproject in Sidi Bouzid, almost all women do not participate in water transport, which is done by men.). They are relatively important stakeholders in terms of daily management of water supply system.

Active participation of both men and women should be guaranteed equally so that opinions and perspectives of all prospected users may be reflected in the design of water supply system to the maximum.

4.3 Approaches Taken

To maximize participation of both men and women, which enhance effect of participatory approach, the following approaches were taken for the current project.

4.3.1 Open All Three Sensitization Meetings to Women

Women have less chance to participate in public meetings due to the fact that they are less mobile, they are likely to be more busy for work, and they tend to be neglected in public matters; therefore, it was requested to the local consultant to organize meetings for women in all the three visits of Sensitization meetings for following purposes.

- (1) Disseminate project information equally to women at first,
- (2) Reflect equally all prospective users' opinions on the subprojects, and
- (3) Enhancement of understanding on responsibility to be taken at community level in O&M of the water supply system.

To ensure women's participation in Sensitization meetings, it was requested to the local consultant firms to assign female sociologists, considering social and cultural tendency in most localities that men coming from outside of a community cannot have direct contact with women.

To promote active participation of both women and men, appropriate judgment of type of meeting was also requested. Taking the actual tendency that woman is less mobile and less active in social or public terms into account, the Sensitization team requested to the local consultant to guarantee women's mobilization through separate meetings or individual visits. It was also instructed to select appropriate time in a day, especially considering time convenient for women who tend to be more occupied than men with their domestic work. The types of Sensitization meetings held during the study are divided into three as follows:

- (1) Meeting with the community (mixed meeting where both men and women are equally invited): Whether it is possible to hold mixed meetings depends on social and cultural conditions of each locality. In some localities, men accept meetings with women and women can give their voices during the meetings. In others, it is still difficult to hold mixed meetings due to social and cultural constraints (men refuse and women hesitate to go out).
- (2) Separate meeting, when it is difficult to hold mixed meetings, especially if its organization is not suitable for women.
- (3) Individual house visits were also made when it is difficult to mobilize women or when they have less chance to speak out in mixed meeting.

4.3.2 Enhancement of Hygienic Notion of Women

To promote women's involvement in daily management of the water supply system in the future such as preserving hygiene around water service points, activities related to public hygiene were carried out.

This approach aimed at promotion of women's participation in daily management

of the water supply system through raising their awareness on public hygiene on the assumption that women are main users of the water supply system due to their daily water related tasks. In most societies men and women are assigned tasks, activities, and responsibilities according to their sex. Different values are ascribed to their different tasks. The gender division of labor differs from one society and culture to another, and within each culture, it may also be changed with external circumstances and over time. As a result of those conditions gender division of labor differs from subprojects, so it is not necessarily women who take in charge of water related task mainly and there are localities where men are also involved in water related task such as transport of water. Therefore, this approach was not limited to women and it was instructed to target all prospective users including children.

4.3.3 Promotion of Gender Sensitive Approach

The approach is to look at gender relations carefully, recognizing that development actors are both women and men, that they are constrained in different ways and that they may consequently have differing and sometimes conflicting needs, interests, and priorities. To improve women's participation, it is not enough to encourage women only because there remains social and cultural constraints including male bias. In this respect, it is necessary to make more efforts to get men's understanding and promoting attitude. As review on the Project 2000 revealed, women's and men's roles related to gender were not necessarily included in Sensitization meeting and that women's work and importance of women's role in water supply were limited for a separate meeting for women only. This insufficient involvement necessitated inclusion of themes on women's role for meeting with men also.

Women's active involvement in effective use and management of water supply system in the future depends much on men's understanding on women's important roles. Therefore, in addition to efforts to mobilize women to Sensitization meetings, the JICA Study Team requested to include a theme on gender roles relating to water in a Sensitization meeting with men as well as that with women so that women's participation may be more broaden to managerial level through

men's understanding of women's important role related to water.

4.4 Result and Effect

The result and effect of Sensitization analyzed from gender perspectives are summarized below.

4.4.1 Ratio by Sex

To ensure women's participation, it is fundamental to ensure quantitatively sufficient number of women at first. According to the Sensitization manual, at least 30% of the total number of women is to be contacted for community with 100-150 families. For the present study, it was instructed to organize meetings for women for all three visits of Sensitization, so more increased contact was expected (equal as men's participation rate). In summary women were not sufficiently mobilized in terms of the number of participants in Sensitization meetings.

In the first visit, 11 subprojects out of 43 subprojects counted no women participants in the first visit (please refer to the Table C.4.1). Two of subprojects out of 43 subprojects showed very poor mobilization of women compared with men (women's ratio is around 10% compared with men's participation).

In the second visit, this ratio was relatively improved compared with that of the first visit. A few subprojects counted no contact with women. Average ratio in the total of subprojects was also improved.

In the third visit, women were not necessarily mobilized in some of the subprojects, according to the visit accompanied by the JICA Study Team in Chouamekh subproject in Medenine, and to the report from the local consultant on other subprojects in the same governorate. The distribution and the collection of commitment forms for revolving fund, the important factor of the visit affecting the project execution, target households' heads, who are usually men holding control over decision making on family budget. Therefore women's participation tends to be considered less important compared with men's

participation, according to previous experience of those who worked for the Sensitization.

Under this tendency, the JICA Study Team instructed the local consultant to include women continuously in the third visit as prospective beneficiary users of the water supply system.

4.4.2 Effect on Women

Insufficient mobilization of women at initial stage caused the following effects.

- (1) Insufficient direct dissemination of information on the subproject. This may decrease women's motivation or sometimes cause opposition from women.
- (2) Insufficient confirmation of all prospective users' opinions on location, number and nature of water service points in the design of the water supply system. The needs and opinions were relatively picked up according to male opinions. For example, in one locality in the Batten Trajma subproject in Gabes, a meeting for women was not held, and it was only men who participated to tentative decision of location of their expected points of a *potence* and a communal tap with engineers and sociologists of the local consultant firm.

Although the women's participation ratio was poor in the first visit in general, some positive effect was seen. In other localities in the Baten Trajma subproject in Gabes, women's opinions were apparently equally reflected on deciding water service points. In three localities, just after separated meetings held simultaneously, some women, especially young women, took a walk in their locality to indicate their expected water service points with men, staffs of the AGR/CRDA, engineers and sociologists of the local consultant.

According to the minutes of Sensitization meeting of second visit in Oued Lagsab subproject in Kasserine, the Sensitization meeting was well appreciated by women who found themselves marginalized in decision making not only in water supply

but also other community matters. As another positive effect on women, the Sensitization meeting held at Sidi Harrah subproject in Kasserine was appreciated saying that this kind of community gathering may provide them with other encounters.

The degree of participation depends on the type of meetings and moreover skills of sociologists organizing meetings and acceptability of men and women of each locality. It was evident that separate meetings were more suitable for women than mixed meeting. In some cases, mixed meetings showed active participation of women. There was a case (Henchir Tounsi subproject in Kasserine) that women were more active than men in expressing actual water supply and men were listening to them while women were speaking. According to the minutes of Sensitization meetings and report from a woman sociologist in charge, women express openly their opinions and needs in mixed meeting in Sidi Bouzid where women are relatively active due to absence of men because of their migration for jobs. In Blahdia subproject in Sidi Bouzid, a woman presented herself as a candidate of tap keeper in mixed meeting and she was chosen as tap keeper against objection of some male participants.

Though women's active participation was observed in some mixed meetings, in most cases, mixed meetings still limited women's active involvement. In some mixed meetings attended by the JICA Study Team, men were dominant and women did not speak during the meetings.

A theme on hygiene was relatively well introduced to women in the second or third visits in most of subprojects, using different visual tools such as leaflets and large sized illustrations. In many cases, women found discussion on sanitary aspects useful and they reportedly understood how to prevent water service points from pollution and showed their motivation on hygienic preservation of service points in the future. As it will take long to see real impact at practical level, this effect needs to be monitored continuously whether women practice or not.

In spite of the improvement in the ratio of participation of women observed in the later visits, Sensitization meeting for women were organized at an unequal pace

compared to those for men. In the Beja and Jendouba, Sensitization meeting in second visit for only women were organized much later than those for men, around one month later. In such cases, it seemed difficult to reflect equally women's opinions on the design of the water supply system after men confirmed it.

In spite of efforts to mobilize women, Sensitization meeting did not draw much attention of women in some of the subprojects. In El Garia subproject in Beja, some female prospective users did not show interest in the project, as they considered that the project is men's matters and that they have no control over decision-making.

At managerial level, there still remain difficulties to integrate women in the operation and maintenance of the water supply system. In most cases, men were selected as tap keepers and female tap keepers were rarely selected. Men were nominated as tap keepers without asking women due to different factors such as the illiterate level, the mobility and the economic value of this task, though this task tend to be suitable for women considering their daily activities near water service points to be installed.

4.4.3 Effect on Men

In gender perspectives, as mentioned earlier, it is important to know approach both to women and men. However, it is still difficult to grasp effect on men compared to that on women, as effect on men was less reported.

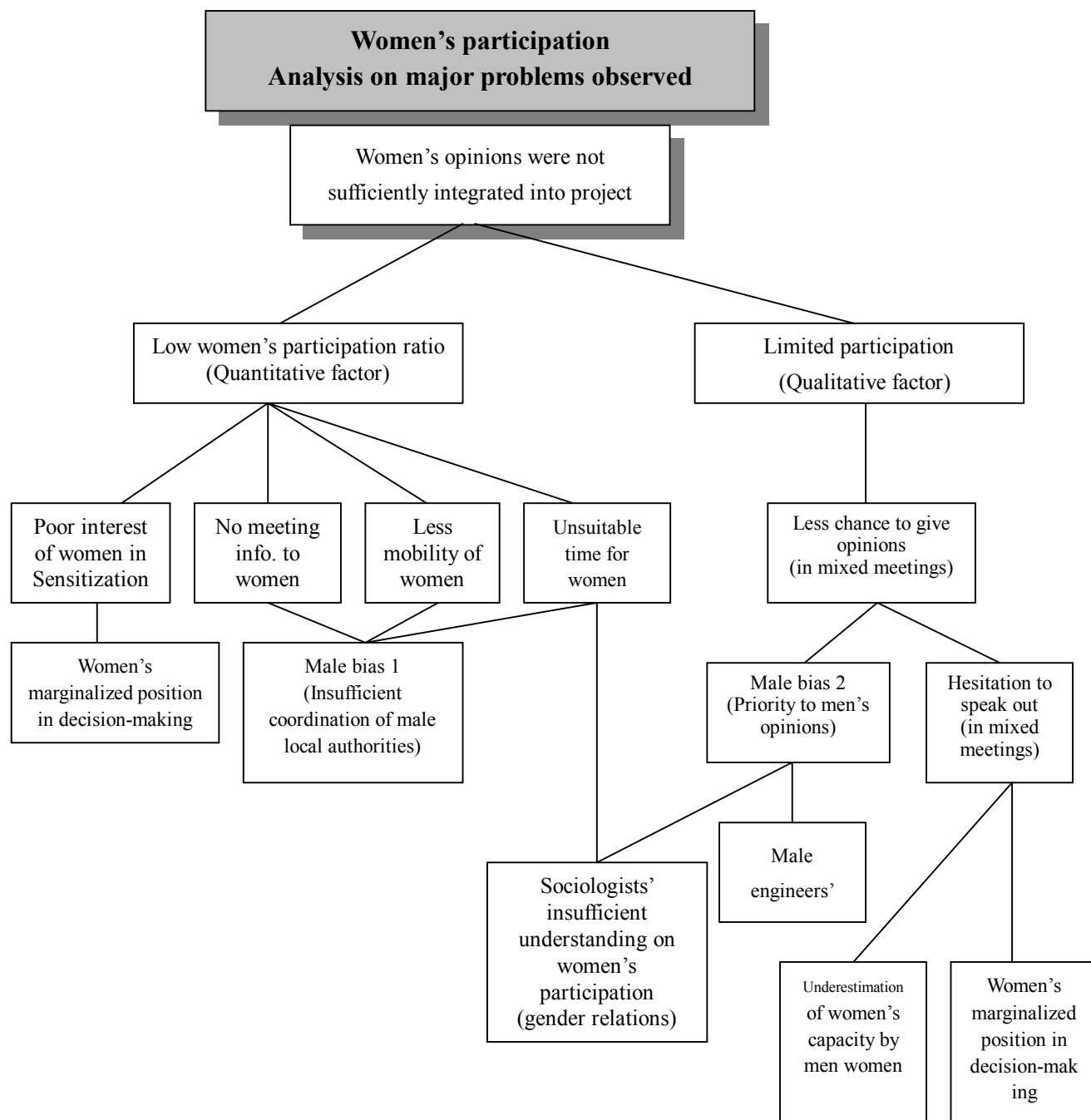
A theme on hygiene around water service points was actively discussed in mixed meeting in Amairia in Sidi Bouzid, which tends to be considered as women's matters only.

There was also a good attempt at a theme on roles of each sex that was dealt with in Sensitization meetings held separately for men and women in the subprojects of Gabes, Gafsa and Medenine. In those meetings, a simple picture showing a woman thinking of water and a man thinking of football was introduced in order

to allow men to be conscious of women's important roles related to water. In the meeting, men discussed each role in a household and sociologists tried to lead them to think of water more. Change in men's consciousness should be monitored continuously, as it demands time to monitor.

4.5 Situation Analysis (Problem Analysis)

In summary, participation in Sensitization meeting was not equal between women and men in qualitative and quantitative way and there remain constraints to reflect all prospective users' opinions into project design. In reality, women's participation was still limited and their needs and opinions were not necessarily sufficiently reflected into the design of the water supply system. Therefore, following problem analysis focuses especially on factors limiting women's participation.



CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE PARTICIPATORY APPROACH

5.1 Overall Community Participation

The participatory approach in this Study succeeded in confirming prospective users' expectations and needs in the water supply system, namely opinions on location, number and nature of water service points to certain degree. Also, as a result of the Sensitization work, one of the expected outcomes of participatory approach was gained: commitment to signing contracts of revolving fund with over 80% of prospective users for most of the projected subprojects. Such results indicate good sign of participatory approach as first step to raise motivation to participate in the operation, maintenance, and management of water supply system.

Yet, much remains to be improved for the future. The extent to which objective of participatory approach was attained cannot be measured for the time being as it is too early to measure enhancement of the target people's awareness on O&M of the water supply system. As mentioned earlier, the result of participatory approach depends much on sociologists' capacity and skills. In this respect, it is proposed to focus on capacity building of sociologists working for community participation, as participatory approach observed during the Study needs to be improved to reach active participation that carries a better opportunity for genuine people's involvement. Frequent passive participation and insufficient use of didactic/ visual tools can be attributed to the fact that participatory approach has not been thoroughly assimilated by sociologists due to a lack of experience.

5.2 Gender Perspectives

Through different approaches taken, positive effects on women (and also on men) were confirmed during the study. However, there remains room for improvement for more active involvement of women to reach more equal and equitable access to benefits they may get from the Project, not only access to improved water supply system, but also their own community development and

their own self-development.

5.3 Recommendations for Overall Participatory Approach

- (1) Training in communication skills and community participation including effective use of didactic/visual tools to raise sociologists' capacity to a high enough level to work with community. Training specific to the water supply project is particularly recommended, because some of the sociologists lack basic technical knowledge, which made their messages less impressive and persuasive to the target population.
- (2) Seminars or trainings for local authorities at community level to disseminate how to organize and support community and what their roles are in terms of facilitation of community participation.
- (3) Cooperation with different donors or development agencies. Lack of experience may be supplemented by exchange of different experiences accumulated in different projects.
- (4) Coordination with other local institutions to find participatory approach appropriate to characteristics of each locality. There are no fixed ways for participatory approach and it should be always improved in accordance with conditions of each locality to make community participation more suitable for target population itself.

5.4 Recommendations from Gender Perspectives

- (1) Continuous efforts to mobilize women in Sensitization meeting so that at least information may regularly and directly reach sufficient number of women.
- (2) Encouragement of local authorities and members of GIC to disseminate importance of gender perspectives. Seminars or training on gender consideration is one of the useful measures to be taken.

- (3) Association with other local institutions promoting enhancement of women's social status such as literacy center (the Daayssia subproject in Kasserine) and dispensary (the El Garrag subproject in Beja). Such institutions may facilitate organizing women and provide useful knowledge on women's participation from their own experience.

CHAPTER 6 BASELINE DATA COLLECTION

6.1 Introduction

Baseline data needs to be collected before the project implementation for Monitoring and Evaluation (M & E) to be conducted at a later stage. Monitoring is defined as work to examine the degree of project progress and to modify the project contents as necessary and Evaluation is defined as a work to review the project in line with evaluation criteria such as the “Efficiency”, “Effectiveness”, “Impact”, “Relevance”, and “Sustainability” near completion of the project or several years later.

Before starting the socio-economic study, the DGGR, the JICA Study Team and sociologists of the local consultant firms had a discussion to select baseline data to be collected by the local consultant firms.

Following items were considered in line with criteria such as possibility of objective qualitative and quantitative verification, validity of survey and accessibility to information source.

- (1) Daily life of women and men,
- (2) Needs and priority order of these needs for the community,
- (3) Productive activity,
- (4) Outbreak of diseases,
- (5) Household income,
- (6) Water uses,
- (7) Present water sources and person in charge of their management,
- (8) Person in charge of fetching water,
- (9) Distance, time spent and means used to fetch water,
- (10) Time devoted to fetch water in a day,
- (11) Waiting time to draw water,
- (12) Whether water-fetching places have function of communication places,
- (13) Shortage of water,
- (14) Role of women and men on hygiene,

- (15) Consideration paid for hygiene,
- (16) Sewerage, and
- (17) Organization in charge of sanitary aspects.

6.2 Items Selected

As a result of the discussion among the parties concerned, the following items are determined.

- (1) All items directly related to water based on the questionnaire of the Sensitization manual (No.6-11, 13 of above items), with addition of an item not included in the questionnaire: time spent to fetch water in a day
- (2) Productive activity (qualitative description): type of activity
- (3) Outbreak of diseases (qualitative description): water-related (or water borne) diseases to be declared to the dispensary or regional health center as well as household interview

The JICA Study Team requested presentation of data in a qualitative and quantitative way as well as by gender.

Table C.6.1.shows baseline data collected by the local consultant firms during the Study in line with socio-economic study.

6.3 Observations

6.3.1 Items Related to Water Supply

For most of the subprojects surveyed, prospective beneficiary users spend much time to fetch water over a long distance, therefore it can be obviously expected that the project implementation will contribute to the reduction of distance and time actually spared.

6.3.2 Productive Activity

For the present Study, data on productive activity is referred to as that for the production of goods and services, which is paid or generates incomes, though it includes non-remunerable activities, often less visible and less valued work often taken by women. The survey showed a general tendency that large proportion of agricultural, arboriculture activities and cattle breeding along with an increase in migration for jobs in coastal areas.

6.3.3 Outbreak of Diseases

Data collection was mainly made through household survey, because of the unavailability of recent statistical data at regional or local level or absence of dispensaries in many of the subprojects. Among the diseases reported, diarrhea was most often reported as major disease caused by use of unsanitary or non-potable water.

Apart from water related diseases, many of the surveys reported unfavorable physical aspects such as fatigue or back pain due to water transport over a long distance in unpaved difficult access. Negative effects on eyes or skins were also reported, but it is not sure whether they are caused by non-reliable quality of water or they are just impressions the target people hold.

6.4 Recommendations

6.4.1 Items Related to Water Supply

In Monitoring and Evaluation, it will not be enough to monitor only quantitative change in distance and time, but it will be also required to monitor qualitative change, in other words, change in time allocation for overall life of the target population.

From gender perspectives, it will be also important to monitor and evaluate change, which may be differently brought to women and men respectively. In subprojects where women are main persons in charge of fetching water, M & E

should be made on the extent to which the time reduced contribute for promotion of their participation in other economic and social activities, or whether the time reduced lead merely to increase in other domestic activities, as Clause 4.3 reported different effects on women's activities.

6.4.2 Productive Activity

It will be important to monitor change in income as well as change in type of activities to grasp the real impact on the economic life of the prospective users.

From gender perspectives, it will be also important to monitor persons involved in certain activity (who does what), because it will be also changeable thanks to the availability of safe and sufficient water. For the present Study, data on productive activity is not presented in gender desegregation; therefore, it is preferable to disaggregate data by gender whenever possible during M & E stage.

6.4.3 Outbreak of Diseases

As mentioned above, the survey on outbreak of diseases centered on household survey and statistical data was not collected during the Study. In M & E, therefore, statistical data will need to be collected as much as possible.

It is also important to monitor prospective users' general ideas on their health in relation to water to know how they consider their relationship, given that diseases declared by them are not always categorized as "water related" or "water borne" diseases. Therefore, household survey should be continuously conducted to monitor the change in hygienic notion.

In addition to diseases caused by non-reliable quality of water, change in physical conditions such as fatigue, back pain also need to be monitored, since such a change may be expected through the implementation of the project.

Tables

Table C.4.1 Study Phases Already Executed as Related to Sensitization

GOVERNORAT	SUB-PROJECT	# House Hold	#People Touched 1st Visit				#People Touched 2nd Visit				Average	
			Men	%	Wom.	%		%	Wom.	%	%Men	%Wom
ARIANA	FAIDH EL AMRINE-SIDI GHRIB	138	59	43%	16	12%	86	62%	100	72%	53%	42%
ARIANA	HMAIEM ESSOUFLA	43	43	100%	23	53%	43	100%	39	91%	100%	72%
ARIANA	TYAYRA	48	41	85%	18	38%	44	92%	18	38%	89%	38%
BEN AROUS	OULED BEN MILED and OULED SAAD	215	102	47%	120	56%	184	86%	185	86%	67%	71%
BEN AROUS	SIDI FREDJ	96	96	100%	78	81%	44	46%	37	39%	73%	60%
NABEUL	SIDI HAMMED	309	215	70%	148	48%	187	61%	95	31%	65%	39%
ZAGHOUAN	JIMLA	53	36	68%	25	47%	53	100%	42	79%	84%	63%
ZAGHOUAN	ROUISSAT BOUGARMINE	230	22	10%	32	14%	203	88%	70	30%	49%	22%
BIZERTE	SMADAH	205	193	94%	135	66%	151	74%	96	47%	84%	56%
BIZERTE	TERGULECH	225	198	88%	83	37%	225	100%	68	30%	94%	34%
BEJA	EL GARIA	94	45	48%	0	0%	94	100%	29	31%	74%	15%
BEJA	EL GARRAG	278	60	22%	0	0%	240	86%	147	53%	54%	26%
BEJA	FATNASSA	185	40	22%	0	0%	185	100%	101	55%	61%	27%
JENDOUBA	CHOUAOUA	390	40	10%	0	0%	347	89%	55	14%	50%	7%
JENDOUBA	JOUAOUA 1 / BATTAHA	1268	40	3%	0	0%	385	30%	128	10%	17%	5%
JENDOUBA	MAALIM	469	45	10%	10	2%	264	56%	90	19%	33%	11%
JENDOUBA	OULED DHIFALLAH	531	47	9%	5	1%	163	31%	58	11%	20%	6%
JENDOUBA	SIDI SALAH (cancelled)	-	-	-	-	-	-	-	-	-	-	-
LE KEF	CHAAMBA-O.EI ASSEL-HMAIDIA	127	45	35%	0	0%	85	67%	35	28%	51%	14%
LE KEF	M'HAFDHIA - GHRAISSIA	90	90	100%	9	10%	90	100%	89	99%	100%	54%
KAIROUAN	CHELALGA	171	109	64%	38	22%	171	100%	41	24%	82%	23%
KAIROUAN	GUDIFETT	216	81	38%	19	9%	153	71%	45	21%	54%	15%
KAIROUAN	HMIDET	248	146	59%	52	21%	192	77%	101	41%	68%	31%
KAIROUAN	ZGAINIA	91	65	71%	0	0%	83	91%	52	57%	81%	29%
KASSERINE	DAAYSIA	61	29	48%	49	80%	35	57%	21	34%	52%	57%
KASSERINE	HENCHIR TOUNSI (New Project)	179	74	41%	45	25%	115	64%	48	27%	53%	26%
KASSERINE	OUEG LAGSAB	83	38	46%	41	49%	28	34%	31	37%	40%	43%
KASSERINE	SIDI HARRATH - GOUASSEM	164	110	67%	102	62%	20	12%	75	46%	40%	54%
SIDI BOUZID	AMAIRIA	68	68	100%	68	100%	68	100%	44	65%	100%	82%
SIDI BOUZID	BLAHDIA	157	87	55%	78	50%	27	17%	72	46%	36%	48%
SIDI BOUZID	BOUCHIHA	265	173	65%	78	29%	135	51%	75	28%	58%	29%
SIDI BOUZID	MAHROUGA	98	98	100%	92	94%	73	74%	55	56%	87%	75%
MAHDIA	COMPLEXE BOUSSLIM	923	698	76%	233	25%	820	89%	270	29%	82%	27%
MAHDIA	COMPLEXE EL AITHA	296	169	57%	69	23%	114	39%	120	41%	48%	32%
GAFSA	HENCHIR EDHOUAHER	46	15	33%	0	0%	33	72%	32	70%	52%	35%
GAFSA	KHANGUET ZAMMOUR	260	89	34%	52	20%	137	53%	33	13%	43%	16%
GAFSA	THLEIJA	273	76	28%	0	0%	66	24%	7	3%	26%	1%
GABES	BATEN TRAJMA	403	107	27%	33	8%	10	2%	65	16%	15%	12%
GABES	CHAABET EJAYER	45	23	51%	32	71%	18	40%	0	0%	46%	36%
GABES	EZZAHRA	37	37	100%	37	100%	10	27%	37	100%	64%	100%
MEDENINE	BOUGUEDDIMA	54	49	91%	28	52%	49	91%	51	94%	91%	73%
MEDENINE	CHOUAMEKH - R. ENNAGUEB	355	152	43%	0	0%	132	37%	55	15%	40%	8%
MEDENINE	ECHGIUIGUIA	94	70	74%	0	0%	36	38%	30	32%	56%	16%
MEDENINE	TARF ELLIL	77	14	18%	52	68%	25	32%	35	45%	25%	56%

Table C.6.1 Baseline Data Collected (1/15)

Governorate:ARIANA		Subproject: FAIDH EL AMRINE	
Item	Before WSS operation (2000)		
Population	681		
No. of households	138		
Water related items			
Type of water source	1. Private shallow well 2. Water sellers		
Distance	3km		
Time spent for water transport	1.5 hours		
Means of transport	Hauling tank, Partiqly hauling tank with mechanical traction		
Time spent for water transport in a	3 - 4.5 hours		
Waiting time to draw water	-		
Person in charge of fetching water	men, children		
Water use	-		
Other water related information	-		
Productive activities (source of Annual or monthly income	cereal growing, vegetable growing, cattle breeding, 1800 DT/year or 150 DT/month		
Outbreak of diseases			
Diseases	kidney diseases, hives, diarrhea		
Other health aspects	skin diseases due to insufficient quantity of water		

Governorate:ARIANA		Subproject: HMAIEM ESSOUFLA	
Item	Before WSS operation (2000)		
Population	175		
No. of households	43		
Water related items			
Type of water source	1. BF SONEDE	2. Mornaguia City	
Distance	1. (2km)	2. (8 km)	
Time spent for water transport	0.5 - 1 hour		
Means of transport	Hauling tank, Partiqly hauling tank with mechanical traction		
Time spent for water transport in a	0.5 - 1 hour		
Waiting time to draw water			
Person in charge of fetching water	men, children		
Water use			
Other water related information	shower/15days or once a month		
Productive activities (source of Annual or monthly income	cereal growing, cattle breeding, arboriculture		
Outbreak of diseases	2300 DT/year or 192 DT/month		
Diseases	kidney diseases, hives		
Other health aspects	skin diseases due to insufficient quantity of water		

Governorate:ARIANA		Subproject: TYAYRA	
Item	Before WSS operation (2000)		
Population	218		
No. of households	48		
Water related items			
Type of water source	1. BF SONEDE		
Distance	1.5 km (Ain Garci); 2.5 km (Hattab); 1.0 km (Achour)		
Time spent for water transport	45minutes (Ain Garci), 75 minutes (Hattab), 30 minutes (Achour)		
Means of transport	2.25 hours (Ain Garci), 3.75 hours (Hattab), 1.5 hours (Achour)		
Time spent for water transport in a	45minutes (Ain Garci), 75 minutes (Hattab), 30 minutes (Achour)		
Waiting time to draw water	-		
Person in charge of fetching water	men, children		
Water use	-		
Other water related information	shower/15days or once a month		
Productive activities (source of Annual or monthly income	part timers, cattle breeding, arboriculture, cereal growing		
Outbreak of diseases	1440 DT/year or 120 DT/month		
Diseases	-		
Other health aspects	skin diseases due to insufficient quantity of water		

Table C.6.1 Baseline Data Collected (2/15)

Governorate: BEN AROUS Subproject:OULED BEN MILED	
Item	Before WSS operation (2000)
Population	1002
No. of households	215
Water related items	
Type of water source	1. Well 2. Cistern
Distance	3 km
Time spent for water transport	1.5 hours
Means of transport	Partially hauling tank with mechanical traction
Time spent for water transport in a	1.5 hours
Waiting time to draw water	1 hour or more
Person in charge of fetching water	men, children
Water use	-
Other water related information	-
Productive activities (source of income)	arboriculture(almond, plum, apple, fig, olive, grape), cattle breeding, small vegetable and cereal growing
Annual or monthly income	2160 DT/year or 180 DT/month
Outbreak of diseases	
Diseases	kidney diseases, diarrhea (children)
Other health aspects	skin diseases due to insufficient quantity of water

Governorate:BEN AROUS Subproject:SIDI FREDJ	
Item	Before WSS operation (2000)
Population	507
No. of households	96
Water related items	
Type of water source	1. Natural spring 2. Private surface well
Distance	4km
Time spent for water transport	3 hours
Means of transport	-
Time spent for water transport in a	3 hours
Waiting time to draw water	-
Person in charge of fetching water	women, men
Water use	-
Other water related information	shower/15days or once a month
Productive activities (source of income)	arboriculture(olive, plum, fig, citrus, grape), cattle breeding, vegetable growing, cereal growing, part timers in agriculture
Annual or monthly income	2000 DT/year or 166 DT/month
Outbreak of diseases	
Diseases	kidney diseases, diarrhea (children)
Other health aspects	skin diseases due to insufficient quantity of water

Governorate: NABEUL Subproject: SIDI HAMMED	
Item	Before WSS operation (2000)
Population	1310
No. of households	309
Water related items	
Type of water source	1. Private surface well 2. Water sellers
Distance	3 km
Time spent for water transport	1.5 hours
Means of transport	Partially hauling tank with mechanical traction
Time spent for water transport in a	1.5 - 7.5 hours
Waiting time to draw water	1 hour or more
Person in charge of fetching water	men, women, children
Water use	drinking, livestock
Other water related information	-
Productive activities (source of income)	arboriculture(olive, plum, fig, citrus, grape), vegetable growing, cattle breeding, services and profession, part timers, tourism
Annual or monthly income	3000 DT/year or 250 DT/month
Outbreak of diseases	
Diseases	kidney diseases, diarrhea (children)
Other health aspects	skin diseases due to insufficient quantity of water

Table C.6.1 Baseline Data Collected (3/15)

Governorate: ZAGHOUAN Subproject:JIMLA	
Item	Before WSS operation (2000)
Population	239
No. of households	53
Water related items	
Type of water source	1. Surface well 2. Water sellers (from El M'rayeh) 3. Individuals connected to SONEDE network 4. Rainwater
Distance	1. (5km) 2. (3km)
Time spent for water transport	3 hours
Means of transport	1.Hauling tank of 3000l with mechanical traction, 2. Portable tank by donkey or on women back Price: 10 DT/3 m3 from water sellers; 0.500 DT/20l from individuals connected to SONEDE
Time spent for water transport in a	3 hours
Waiting time to draw water	-
Person in charge of fetching water	men,women, children
Water use	-
Other water related information	-
Productive activities (source of	cereal growing, cattle breeding (sheep), small arboriculture, seasonal job in building construction
Annual or monthly income	200 DT/month
Outbreak of diseases	
Diseases	Diarrhoea (children)
Other health aspects	-

Governorate:ZAGHOUAN Subproject:ROUISSAT BOUGARMINE	
Item	Before WSS operation (2000)
Population	1147
No. of households	230
Water related items	
Type of water source	1.Public and private surface wells (free of charge) 2.Individuals connected to SONEDE at Fahs
Distance	1. (4-6km) 3. (16km)
Time spent for water transport	-
Means of transport	1.Hauling tank of 3000l with mechanical traction, 2. Hauling tank of 500l with animal traction 3. Portable tank by donkey or human Price: 3 - 5 DT/tank (transportation)
Time spent for water transport in a	3 hours
Waiting time to draw water	-
Person in charge of fetching water	women, children
Water use	-
Other water related information	-
Productive activities (source of	arboriculture(olive), cereal growing, cattle breeding, seasonal job in building construction (Tunis,
Annual or monthly income	300 DT/month
Outbreak of diseases	
Diseases	Diarrhoea (children)
Other health aspects	

Governorate:BIZERTE Subproject:SMADAH	
Item	Before WSS operation (2000)
Population	1045
No. of households	205
Water related items	
Type of water source	1. Natural spring 2. Surface well
Distance	3 km
Time spent for water transport	1.5 hours
Means of transport	Partially hauling tank with mechanical traction
Time spent for water transport in a	3 - 4 hours
Waiting time to draw water	1 hour or more
Person in charge of fetching water	women, men
Water use	-
Other water related information	shower/15days or once a month
Productive activities (source of	cereal growing, arboriculture, small beekeeping, cattle breeding, public services , agricultural seasonal workers
Annual or monthly income	2040 DT/year or 170 DT/month
Outbreak of diseases	
Diseases	kidney diseases, diarrhea (children)
Other health aspects	skin diseases due to insufficient quantity of water

Table C.6.1 Baseline Data Collected (4/15)

Governorate: BIZERTE		Subproject: TELGULECH	
Item	Before WSS operation (2000)		
Population	1151		
No. of households	224		
Water related items			
Type of water source	1. Surface well	2. Cistern	
Distance	3 km		
Time spent for water transport	1.5 hours		
Means of transport	Partially hauling tank with mechanical traction		
Time spent for water transport in a	1.5 hours		
Waiting time to draw water	1 hour or more		
Person in charge of fetching water	men, children		
Water use	-		
Other water related information	shower/15days or once a month		
Productive activities (source of income)	cereal growing, arboriculture, viticulture, cattle breeding, public services , agricultural seasonal workers		
Annual or monthly income	3000 DT/year or		250 DT/month
Outbreak of diseases			
Diseases	kidney diseases, diarrhea (children)		
Other health aspects	skin diseases due to insufficient quantity of water		

Governorate: BEJA		Subproject:EL GARIA	
Item	Before WSS operation (2000)		
Population	458		
No. of households	94		
Water related items			
Type of water source	1. Natural spring + Private surface well (Hassan, El Garia), 2. GIC		
Distance	500m-1km (for HassanI-II-III), 4-8km(for inhabitants of El Garia)		
Time spent for water transport	2 hours		
Means of transport	Partially hauling tank with mechanical traction		
Time spent for water transport in a	2 hours		
Waiting time to draw water	1 hour or more		
Person in charge of fetching water	women, men		
Water use	-		
Other water related information	-		
Productive activities (source of	cereal growing, vegetable growing (tomato, melon), sunflower culture, cattle breeding,		
Annual or monthly income			
Outbreak of diseases			
Diseases	kidney diseases, diarrhoea (children and babies)		
Other health aspects	-		

Governorate:BEJA		Subproject:EL GARRAG	
Item	Before WSS operation (2000)		
Population	1412		
No. of households	278		
Water related items			
Type of water source	1. Natural spring		
Distance	2-5 km		
Time spent for water transport	1.5 hours		
Means of transport	1. Portable tank on women back or donkey		
Time spent for water transport in a	1.5 hours		
Waiting time to draw water	-		
Person in charge of fetching water	women, men		
Water use	-		
Other water related information	-		
Productive activities (source of	cereal growing (wheat, barley), bean, sunflower, cattle breeding, exodus		
Annual or monthly income	-		
Outbreak of diseases			
Diseases	hepatitis (children)		
Other health aspects			

Table C.6.1 Baseline Data Collected (5/15)

Governorate:BEJA Subproject:FATNASSA	
Item	Before WSS operation (2000)
Population	933
No. of households	185
Water related items	
Type of water source	1. Natural spring, 2. Oued, 3. GIC Rmila (Water sellers)
Distance	5 km
Time spent for water transport	3 hours
Means of transport	1.Hauling tank of 3000l with mechanical traction, 2. Portable tank by donkey or on women back Price: 5 DT/3 m3 from water
Time spent for water transport in a	3 hours
Waiting time to draw water	-
Person in charge of fetching water	women, men
Water use	-
Other water related information	-
Productive activities (source of income)	cereal growing (wheat, barley) bean production, vegetable growing (tomato, piment , potato)
Annual or monthly income	-
Outbreak of diseases	
Diseases	-
Other health aspects	-

Governorate:JENDOUBA Subproject:CHOUAOUA	
Item	Before WSS operation (2000)
Population	2247
No. of households	390
Water related items	
Type of water source	1. Natural spring 2. Oued
Distance	0.5 - 3 km
Time spent for water transport	1- 3 hours (winter) 2-5 hours (summer)
Means of transport	1. Portable tank by donkey or on human's back
Time spent for water transport in a	1- 3 hours (winter) 2-5 hours (summer)
Waiting time to draw water	-
Person in charge of fetching water	women, men
Water use	-
Other water related information	-
Productive activities (source of income)	cereal growing (wheat, barley) bean production (animal feed), arboriculture (olive), cattle breeding, exodus (Tunis, northern cities)
Annual or monthly income	-
Outbreak of diseases	
Diseases	Kidney diseases, intestinal infections, skin diseases,
Other health aspects	Teratogenic diseases resulting from frequent transport of heavy water

Governorate:JENDOUBA Subproject:JOUAOUA 1/BATTAHA	
Item	Before WSS operation (2000)
Population	7388
No. of households	1268
Water related items	
Type of water source	1. Surface well, 2. Natural spring, 3. Oued Barbara
Distance	2 - 7 km
Time spent for water transport	2- 4 hours (winter) 2-6 hours (summer)
Means of transport	1. Portable tank by donkey or on human's back
Time spent for water transport in a	2- 4 hours (winter) 2-6 hours (summer)
Waiting time to draw water	-
Person in charge of fetching water	women, children, men
Water use	-
Other water related information	Domestic use and animal drinking
Productive activities (source of income)	cereal growing (wheat, barley), bean production, cattle breeding, exodus (Tunis, northern cities),
Annual or monthly income	-
Outbreak of diseases	
Diseases	Kidney diseases,diarrhoea (children), skin diseases,
Other health aspects	-

Table C.6.1 Baseline Data Collected (6/15)

Governorate:JENDOUBA Subproject:MAALIM	
Item	Before WSS operation (2000)
Population	2180
No. of households	469
Water related items	
Type of water source	1. Surface well, 2. Natural spring, 3. Oued Barbara
Distance	2 - 7 km
Time spent for water transport	2- 4 hours (winter) 2-6 hours (summer)
Means of transport	1. Portable tank by donkey or on human's back
Time spent for water transport in a	2- 4 hours (winter) 2-6 hours (summer)
Waiting time to draw water	-
Person in charge of fetching water	women, children, men
Water use	-
Other water related information	Domestic use and animal drinking
Productive activities (source of	cereal growing (wheat, barley), bean production, cattle breeding, exodus (Tunis, northern cities),
Annual or monthly income	-
Outbreak of diseases	
Diseases	Kidney diseases,diarrhoea (children), skin diseases,
Other health aspects	-

Governorate:JENDOUBA Subproject:OULED DHIFALLAH	
Item	Before WSS operation (2000)
Population	2924
No. of households	531
Water related items	
Type of water source	1. Surface well, 2. Natural spring, 3. Oued Barbara
Distance	2 - 7 km
Time spent for water transport	2- 4 hours (winter) 2-6 hours (summer)
Means of transport	1. Portable tank by donkey or on human's back
Time spent for water transport in a	2- 4 hours (winter) 2-6 hours (summer)
Waiting time to draw water	-
Person in charge of fetching water	women, children, men
Water use	-
Other water related information	Domestic use and animal drinking
Productive activities (source of income)	cereal growing (wheat, barley), bean production, small industrial crop (tobacco), cattle breeding, exodus (Tunis, northern cities), trade with Algeria
Annual or monthly income	-
Outbreak of diseases	
Diseases	Kidney diseases,diarrhoea (children), skin diseases,
Other health aspects	-

Governorate:LE KEF Subproject:CHAAMBA-O.EL ASSEL - HMAIDIA	
Item	Before WSS operation (2000)
Population	661
No. of households	127
Water related items	
Type of water source	1. GIC Sidi Abdelkader, 2. Private shallow well, 3. Natural spring, 4. SONEDE
Distance	1. (2-5km), 3. (3-4km)
Time spent for water transport	30min.-4hrs.
Means of transport	1. Hauling tank of 3000l with mechanical traction, 2. Hauling tank of 500l with animal traction 3. Portable tank of 25l by donkey or on back (women)Price: 2 DT/m3 from water sellers; 0.500 DT/m3 to
Time spent for water transport in a	-
Waiting time to draw water	15min.-1hour
Person in charge of fetching water	men and women
Water use	23lpcd (including cattle drinking)
Other water related information	-
Productive activities (source of	cereal growing, cattle breeding, irrigated culture, exodus (city job)
Annual or monthly income	250 DT/month
Outbreak of diseases	
Diseases	Diarrhoea (children), effect on children's eyes or skin
Other health aspects	-

Table C.6.1 Baseline Data Collected (7/15)

Governorate:LE KEF		Subproject:M'HAFEHIA - GHRAISSIA	
Item	Before WSS operation (2000)		
Population	474		
No. of households	90		
Water related items			
Type of water source	1. Natural springs		
Distance	1km		
Time spent for water transport	1 hour		
Means of transport	1. Hauling tank 300l with animal traction 2. Portable tank on women back or donkey		
Time spent for water transport in a	1 hour		
Waiting time to draw water	-		
Person in charge of fetching water	men, women		
Water use	-		
Other water related information	domestic use, animal drinking, supplemental irrigation (arboriculture)		
Productive activities (source of	cereal growing (wheat, barley), cattle breeding (sheep, goat), exodus		
Annual or monthly income	-		
Outbreak of diseases			
Diseases	Intestinal infections		
Other health aspects	-		

Governorate:KAIROUAN		Subproject:CHELALGA	
Item	Before WSS operation (2000)		
Population	981		
No. of households	171		
Water related items			
Type of water source	1. Private and public tanks, 2. Surface well Mousrata, 3. BF El Khobna, 4. Rainwater		
Distance	4- 5 km		
Time spent for water transport	3 - 4 hours		
Means of transport	Hauling tank of 3500 - 4000 l with mechanical traction; Hauling tank 500 l with animal traction Price: 20 DT (3500-4000 l hauling tank)		
Time spent for water transport in a	3 - 4 hours		
Waiting time to draw water	-		
Person in charge of fetching water	women, children		
Water use	-		
Other water related information	-		
Productive activities (source of	exodus (city), cereal growing, cattle breeding		
Annual or monthly income	1800 DT/year or 150 DT/month		
Outbreak of diseases			
Diseases	Diarrhoea (children)		
Other health aspects	-		

Governorate:KAIROUAN		Subproject:GUDIFETT		
Item	Before WSS operation (2000)			
Population	1138			
No. of households	216			
Water related items				
Type of water source	1. GIC Ain Sayada	2. Natural spring Ain Bhire	3. Oued	
Distance	4- 5 km			
Time spent for water transport	3 - 4 hours			
Means of transport	1. Portable tank	2. Hauling tanks with animal traction		
Time spent for water transport in a	3 - 4 hours			
Waiting time to draw water	-			
Person in charge of fetching water	women, children			
Water use	-			
Other water related information	-			
Productive activities (source of	exodus (city), cereal growing, cattle breeding			
Annual or monthly income	3000 DT/year or 250 DT/month			
Outbreak of diseases				
Diseases	Diarrhoea (children)			
Other health aspects	-			

Table C.6.1 Baseline Data Collected (8/15)

Governorate:KAIROUAN Subproject:HMIDET	
Item	Before WSS operation (2000)
Population	1609
No. of households	248
Water related items	
Type of water source	1. BF of existing project
Distance	-
Time spent for water transport	-
Means of transport	1. Portable tank, 2. 200 l hauling tank Price: fixed cost of 2 DT/month/household
Time spent for water transport in a	-
Waiting time to draw water	-
Person in charge of fetching water	women
Water use	29lpcd (including cattle drinking)
Other water related information	domestic use, animal drinking, supplemental irrigation (arboriculture)
Productive activities (source of	arboriculture(olive), cereal growing, cattle breeding, vegetable growing, exodus (Sousse)
Annual or monthly income	280 DT/month
Outbreak of diseases	
Diseases	Intestinal infections, skin diseases, kidney diseases
Other health aspects	-

Governorate:KAIROUAN Subproject:ZGANIA	
Item	Before WSS operation (2000)
Population	693
No. of households	91
Water related items	
Type of water source	1. Temporary connection on Rmadhnia network, 2. Private surface well, 3. GIC
Distance	1-4km
Time spent for water transport	1~2 hours
Means of transport	1. 10 and 25l portable tanks on the back, 2. 500l hauling tanks with animal traction Price: 13.5 DT/month for temporary connection
Time spent for water transport in a	1~2 hours
Waiting time to draw water	-
Person in charge of fetching water	women
Water use	-
Other water related information	-
Productive activities (source of income)	arboriculture (olive, almond), cereal growing (wheat, barley, sorghum), irrigation barley,
Annual or monthly income	300 DT/month
Outbreak of diseases	
Diseases	Intestinal infections, skin diseases
Other health aspects	Dehydration (children)

Governorate:KASSERINE Subproject:DAAYSIA	
Item	Before WSS operation (2000)
Population	336
No. of households	61
Water related items	
Type of water source	1. Private surface well, 2.GIC Ain Selsla, 3. GIC Tanout (water sellers), 4. Rainwater
Distance	1. and 2. (5km) 3. (7km)
Time spent for water transport	2~3 hours
Means of transport	1. Hauling tank of 3000l with mechanical traction, 2. Hauling tanks 500l with animal traction 3. Portable tank Price: 0.600 DT/m3 from surface well; 1DT/m3 from GIC Ain Selsla; 4 DT/m3
Time spent for water transport in a	2~3 hours
Waiting time to draw water	-
Person in charge of fetching water	men, women
Water use	-
Other water related information	-
Productive activities (source of	cereal growing, cattle breeding (sheep, goat), small arboriculture (olive, almond), exodus (Kasserine),
Annual or monthly income	180 DT/month
Outbreak of diseases	
Diseases	Intestinal infections, high blood pressure, skin diseases
Other health aspects	-

Table C.6.1 Baseline Data Collected (9/15)

Governorate:KASSERINE Subproject:HENCHIR TOUNSI	
Item	Before WSS operation (2000)
Population	1041
No. of households	179
Water related items	
Type of water source	1. Private surface well, 2. GIC Aouidet, 3. Collection rainwater, 4. Deep well Henchir Tounsi
Distance	1. (3-4 km) 2. (6-10 km)
Time spent for water transport	3 hours
Means of transport	Portable tanks on humans or donkeys' back Price: 2 DT/m3 at private surface well, 5 DT/m3 with water sellers buying from the
Time spent for water transport in a	3 hours
Waiting time to draw water	-
Person in charge of fetching water	women, men
Water use	-
Other water related information	domestic use
Productive activities (source of	cereal growing, cattle breeding(sheep), small arboriculture(olive, almond), exodus(city job), weaving and carpet
Annual or monthly income	180 DT/month
Outbreak of diseases	
Diseases	High blood pressure, skin diseases
Other health aspects	Back pains, headaches and osteoarthritis related to water transport

Governorate:KASSERINE Subproject:OUED LAGSAB	
Item	Before WSS operation (2000)
Population	516
No. of households	83
Water related items	
Type of water source	1. GIC Soula, 2. GIC Kef Lahjar, 3. Collection rainwater
Distance	1.and 2. (5-10 km)
Time spent for water transport	2~3 hours
Means of transport	Hauling tank of 3500l with mechanical traction; Hauling tanks 500-3000l with animal
Time spent for water transport in a	2~3 hours
Waiting time to draw water	-
Person in charge of fetching water	men
Water use	-
Other water related information	-
Productive activities (source of	cattle breeding (sheep), arboriculture (olive, almond), cereal growing, small trade,
income)	exodus (city job), weaving (carpet, bed sheet)
Annual or monthly income	260 DT/month
Outbreak of diseases	
Diseases	Intestinal infections, high blood pressure, skin diseases, kidney diseases
Other health aspects	

Governorate:KASSERINE Subproject:SIDI HARRATH - GOUASSEM	
Item	Before WSS operation (2000)
Population	838
No. of households	164
Water related items	
Type of water source	1. GIC Bouzgueme(water sellers), 2. Private shallow well, 3. Oued, 4. Irrigation deep well
Distance	1. (3-5km) 2. (1-3km)
Time spent for water transport	-
Means of transport	1.Hauling tank of 3500l with mechanical traction, 2. Hauling tank of 500l with animal traction
Time spent for water transport in a	-
Waiting time to draw water	-
Person in charge of fetching water	men
Water use	20-30lpcd (including cattle drinking)
Other water related information	-
Productive activities (source of	cattle breeding(sheep),arboriculture(olive, almond), small trade(sheep, handcraft), exodus(Kasserine,
Annual or monthly income	300 DT/month
Outbreak of diseases	
Diseases	Diarrhoea (children), eye diseases
Other health aspects	-

Table C.6.1 Baseline Data Collected (10/15)

Governorate:SIDI BOUZID Subproject: AMAIRIA	
Item	Before WSS operation (2000)
Population	363
No. of households	68
Water related items	
Type of water source	1. GIC Essalama, 2. Water sellers, 3. Private shallow well, 4. Rainwater (in autumn)
Distance	1.4km, 2.4-5km
Time spent for water transport	3-4 hours
Means of transport	1.Hauling tank of 3000l with mechanical traction, 2. Hauling tank of 500l with animal traction
Time spent for water transport in a	3-4 hours
Waiting time to draw water	15min.-1 hour
Person in charge of fetching water	men
Water use	29lpcd (including cattle drinking)
Other water related information	domestic use, animal drinking, supplemental irrigation
Productive activities (source of	arboriculture (olive, almond), cereal growing, cattle breeding, exodus (city job)
Annual or monthly income	200 DT/month
Outbreak of diseases	
Diseases	Diarrhoea (children), high blood pressure, skin diseases
Other health aspects	-

Governorate:SIDI BOUZID Subproject: BLAHDIA	
Item	Before WSS operation (2000)
Population	825
No. of households	157
Water related items	
Type of water source	1. Water sellers, 2. Well Bir Bouhliba, 3. Oued (les Hassi), 4. Lac (animal watering and
Distance	3-8.5km
Time spent for water transport	2-4.5 hours
Means of transport	1. Transport by donkey, 2. Portable tank on women's back Price: 4 DT/m3 to water
Time spent for water transport in a	-
Waiting time to draw water	-
Person in charge of fetching water	women
Water use	15lpcd (including cattle drinking)
Other water related information	-
Productive activities (source of	cereal growing, cattle breeding, others (exodus)
Annual or monthly income	180 DT/month
Outbreak of diseases	
Diseases	Diarrhoea, kidney diseases, high blood pressure, skin diseases
Other health aspects	-

Governorate:SIDI BOUZID Subproject: BOUCHIHA	
Item	Before WSS operation (2000)
Population	1516
No. of households	265
Water related items	
Type of water source	1. GIC Akerma, 2. Water sellers, 3. Oued (Hassi Boucheg and Kef Chih), 4. Rainwater
Distance	3 - 8 km
Time spent for water transport	3 hours
Means of transport	1.Hauling tank of 3000l with mechanical traction, 2. Hauling tank of 500l with animal traction, 3. Portable tank on women back or donkey Price: 3 DT/m3 to water sellers; 0.600 DT/m3 to GIC
Time spent for water transport in a	3-4 hours
Waiting time to draw water	15min-1 hour
Person in charge of fetching water	women, men
Water use	20lpcd (including cattle drinking)
Other water related information	domestic use, animal drinking, supplemental irrigation
Productive activities (source of income)	arboriculture(olive, almond), cattle breeding (sheep, goat), small cereal growing exodus (Sidi Bouzid, Sfax, Gafsa, Sousse)
Annual or monthly income	200 DT/month
Outbreak of diseases	
Diseases	-
Other health aspects	-

Table C.6.1 Baseline Data Collected (11/15)

Governorate: SIDI BOUZID**Subproject: MAHROUGA**

Item	Before WSS operation (2000)
Population	635
No. of households	98
Water related items	
Type of water source	1. Surface well Bir Nadhour and Mahrouga, 2. Potence Foufi Sened, 3. Private Surface well, 4.
Distance	3 - 6 km
Time spent for water transport	2~3 hours
Means of transport	1. Portable tank 2. Hauling tank with mechanical traction Price: 2 DT/m3 or 6 DT/3000 l from potence; 0.400 DT/m3 from private surface well
Time spent for water transport in a	2~3 hours
Waiting time to draw water	-
Person in charge of fetching water	women
Water use	20 lpcd (including cattle drinking)
Other water related information	domestic use, animal drinking, supplemental irrigation
Productive activities (source of	cereal growing, cattle breeding (sheep, goat), small arboriculture (olive, almond), exodus (Sfax, Gafsa, Sidi Bouzid)
Annual or monthly income	200 DT/month
Outbreak of diseases	
Diseases	Intestinal infections, kidney diseases, high blood pressure, skin
Other health aspects	-

Governorate: MAHDIA**Subproject: COMPLEXE BOUSSLIM**

Item	Before WSS operation (2000)
Population	5245
No. of households	923
Water related items	
Type of water source	1. Individuals with SONEDE connection 2. Water sellers 3. Private surface well 4. Rainwater from
Distance	1. (5-25km) 3. (1-3 km)
Time spent for water transport	1~3 hours
Means of transport	1. Hauling tank with mechanical traction 2. Hauling tank with animal traction 3. Portable tank on women back or donkeys Price: 1.7 DT/m3 from individuals with SONEDE connection; 5 DT/m3
Time spent for water transport in a	1~3 hours
Waiting time to draw water	-
Person in charge of fetching water	women
Water use	20-30 lpcd (including cattle drinking)
Other water related information	domestic use, animal drinking, supplemental irrigation
Productive activities (source of income)	arboriculture (olive, almond), cattle breeding (sheep, goat), small cereal growing, exodus (Mahdia, Sousse, overseas), weaving, carpet and bed sheet making
Annual or monthly income	240 DT/month
Outbreak of diseases	
Diseases	Intestinal infections, skin diseases
Other health aspects	Dehydration (children)

Governorate: MAHDIA**Subproject: COMPLEXE EL AITHA**

Item	Before WSS operation (2000)
Population	1214
No. of households	296
Water related items	
Type of water source	1. Potence SONEDE Naffatia 2. Private surface well 3. Rainwater (cattle drinking,
Distance	1. (1-6 km) 2. (2-3 km)
Time spent for water transport	1~2 hours
Means of transport	1. Hauling tank with mechanical traction 2. Hauling tank with animal traction 3. Portable tank
Time spent for water transport in a	1~2 hours
Waiting time to draw water	-
Person in charge of fetching water	women
Water use	31 lpcd (including cattle drinking)
Other water related information	domestic use, animal drinking, supplemental irrigation (arboriculture)
Productive activities (source of	arboriculture (olive, almond), cattle breeding, cereal growing, exodus (city and overseas)
Annual or monthly income	220 DT/month
Outbreak of diseases	
Diseases	-
Other health aspects	-

Table C.6.1 Baseline Data Collected (12/15)

Governorate:GAFSA		Subproject:HENCHIR EDHOUAHER	
Item	Before WSS operation (2000)		
Population	271		
No. of households	46		
Water related items			
Type of water source	1. GIC Dhahraouiet Majoura, 2. Rainwater (in autumn), 3. Natural spring, 4. Water		
Distance	2-3 km		
Time spent for water transport	1.5~2 hours		
Means of transport	1.Hauling tank with animal traction, 2. Portable tank 3. Hauling tank of 3500l with mechanical traction Price: 10-15 DT/3.5m3 to water		
Time spent for water transport in a	1.5~2 hours		
Waiting time to draw water	-		
Person in charge of fetching water	men, boys		
Water use	-		
Other water related information	domestic use, animal drinking, supplemental irrigation		
Productive activities (source of	cattle breeding, arboriculture (olive, amande, fig), exodus (Sfax, Gabes), small cereal		
Annual or monthly income	-		
Outbreak of diseases			
Diseases	-		
Other health aspects	-		

Governorate:GAFFSA		Subproject:KHANGUET ZAMMOUR	
Item	Before WSS operation (2000)		
Population	1636		
No. of households	260		
Water related items			
Type of water source	1. Rain water 2. Potence Haoued el Oued		
Distance	2-5 km		
Time spent for water transport	2 hours		
Means of transport	2. Hauling tank with animal traction (donkey)		
Time spent for water transport in a	2 hours		
Waiting time to draw water	-		
Person in charge of fetching water	men, women, children		
Water use	-		
Other water related information	domestic use, animal drinking (sheep, iquidae), supplemental irrigation (arboriculture)		
Productive activities (source of	cattle breeding, argiculture (olive, amande, fig),irrigated agriculture, exodus (Sfax,		
Annual or monthly income	-		
Outbreak of diseases			
Diseases	-		
Other health aspects	-		

Governorate: GAFSA		Subproject:THLEIJIA	
Item	Before WSS operation (2000)		
Population	1492		
No. of households	273		
Water related items			
Type of water source	1. Potence (Abdessadok), 2. Private surface water well		
Distance	1. (2-3km)		
Time spent for water transport	1.5~2 hours		
Means of transport	1. Hauling tank with animal traction		Price: 1.5-2 DT/ 500l
Time spent for water transport in a	1.5~2 hours		
Waiting time to draw water	-		
Person in charge of fetching water	men, women, children		
Water use	-		
Other water related information	domestic use, animal drinking (sheep, iquidae), supplemental irrigation (arboriculture)		
Productive activities (source of	cattle breeding, arboriculture (olive, amande, fig), irrigated		
Annual or monthly income	-		
Outbreak of diseases			
Diseases	-		
Other health aspects	-		

Table C.6.1 Baseline Data Collected (13/15)

Governorate: GABES	Subproject:BATEN TRAJMA
Item	Before WSS operation (2000)
Population	2747
No. of households	403
Water related items	
Type of water source	1. SONEDE (El Hamma city), 2. Water sellers
Distance	8 - 15 km
Time spent for water transport	2~3 hours
Means of transport	1.Hauling tank with animal traction, 2. Hauling tank of 3500l with mechanical traction, 3. Portable tank (rarely) Price: 15-25 DT/3.5m3 to water sellers;
Time spent for water transport in a	2~3 hours
Waiting time to draw water	-
Person in charge of fetching water	men, women, children
Water use	-
Other water related information	domestic use, animal drinking, supplemental irrigation (arboriculture)
Productive activities (source of income)	irrigated agriculture in oasis and greenhouse, arboriculture(olive, almond, fig, cactus), cattle breeding(sheep, goat), small cereal cropping, exodus (cities)
Annual or monthly income	-
Outbreak of diseases	
Diseases	-
Other health aspects	-

Governorate: GABES		Subproject:CHAABET EJJAYER	
Item	Before WSS operation (2000)		
Population	284		
No. of households	45		
Water related items			
Type of water source	1. Rainwater, 2. SONEDE Matmata Nouvelle, 3. GIC (irrigation) Matmata Nouvelle, 4. Water sellers		
Distance	2 - 3 km		
Time spent for water transport	1.5~2 hours		
Means of transport	1. Hauling tank with animal traction		

Governorate: GABES		Subproject:EZZAHRA	
Item	Before WSS operation (2000)		
Population	198		
No. of households	37		
Water related items			
Type of water source	1. Rainwater, 2. Private surface well Mzata, 3. GIC Beni Zelten		
Distance	2 - 3 km		
Time spent for water transport	2 hours		
Means of transport	1.Hauling tank with animal traction,2. Hauling tank of 3000 and 5000 l with mechanical traction		
Time spent for water transport in a	2 hours		
Waiting time to draw water	-		
Person in charge of fetching water	-		
Water use	-		
Other water related information	domestic use, animal drinking, supplemental irrigation		
Productive activities (source of income)	cattle breeding (sheep, goat), arboriculture (olive, almond, fig, pomegranate), small cereal growing,		
Annual or monthly income	-		
Outbreak of diseases			
Diseases	-		
Other health aspects	-		

Table C.6.1 Baseline Data Collected (14/15)

Governorate: MEDENINE Subproject:BOUGUEDDIMA	
Item	Before WSS operation (2000)
Population	319
No. of households	54
Water related items	
Type of water source	1. Rainwater, 2. Potence SONEDE (Boughara), 3. Water sellers
Distance	2 - 5 km
Time spent for water transport	2~3 hours
Means of transport	1. Hauling tank with mechanical traction Price: 13-17 DT/3.5m3 to water sellers
Time spent for water transport in a	2~3 hours
Waiting time to draw water	-
Person in charge of fetching water	men, boys
Water use	-
Other water related information	domestic use, animal drinking, supplemental irrigation
Productive activities (source of income)	fishery, cattle breeding (sheep, goat, camel) , arboriculture (olive, almond, fig), trade with Lybia, exodus (cities, overseas)
Annual or monthly income	-
Outbreak of diseases	
Diseases	-
Other health aspects	-

Governorate: MEDENINE Subproject:CHOUAMEKH - R. ENNAGUEB	
Item	Before WSS operation (2000)
Population	1868
No. of households	355
Water related items	
Type of water source	1. Rainwater stocked in groundwater, 2. SONEDE
Distance	0.5km-5km
Time spent for water transport	1~2 hours
Means of transport	1. Portable small tank transported by animal, 2. tractor
Time spent for water transport in a	1~2 hours
Waiting time to draw water	-
Person in charge of fetching water	men, boys
Water use	-
Other water related information	domestic use, animal drinking (sheep, iquidae), supplemental irrigation (arboriculture)
Productive activities (source of income)	cattle breeding (sheep, goat, camel), arboriculture(olive, almond, fig), cereal growing
Annual or monthly income	-
Outbreak of diseases	
Diseases	-
Other health aspects	-

Governorate: MEDENINE Subproject:ECHGIUGUIA	
Item	Before WSS operation (2000)
Population	478
No. of households	94
Water related items	
Type of water source	1. Rainwater 2. Potence SONEDE (Boughara) 3. Water sellers
Distance	3 - 6 km
Time spent for water transport	2~2.5 hours
Means of transport	1. Hauling tank with mechanical traction Price: 12-15 DT/3.5m3 to water sellers
Time spent for water transport in a	2~2.5 hours
Waiting time to draw water	-
Person in charge of fetching water	men, boys
Water use	-
Other water related information	domestic use, animal drinking, supplemental irrigation (arboriculture)
Productive activities (source of income)	fishery, cattle breeding, arboriculture (olive, almond, fig), irrigation (vegetable, water melon, melon and fodder crop), trade with Lybia, exodus
Annual or monthly income	-
Outbreak of diseases	
Diseases	-
Other health aspects	-

Table C.6.1 Baseline Data Collected (15/15)

Governorate: MEDENINE Subproject: TARF ELLIL	
Item	Before WSS operation (2000)
Population	476
No. of households	77
Water related items	
Type of water source	1. Rain water 2. GIC Naffatia
Distance	0.5-3 km
Time spent for water transport	1~2 hours
Means of transport	2. Hauling tank with animal traction (donkey) or 3500l tank with tractor; Price 10-15 DT or 20-25 DT (irrigation)
Time spent for water transport in a	1~2 hours
Waiting time to draw water	-
Person in charge of fetching water	-
Water use	-
Other water related information	domestic use, animal drinking (sheep, iquidae), supplemental irrigation (arboriculture)
Productive activities (source of income)	cattle breeding (sheep, goat, camel), arboriculture (olive, almond, fig), small cereal cropping, trade with Libya, exodus (Djerba, Zarzis, overseas)
Annual or monthly income	-
Outbreak of diseases	
Diseases	-
Other health aspects	-

APPENDIX-D

ENVIRONMENTAL ASSESSMENT

APPENDIX D
ENVIRONMENTAL ASSESSMENT

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CHAPTER 1 INTRODUCTION

The Initial Environmental Examination (IEE) provide for the subprojects below was carried out by JBIC/JICA guidelines. Field data was compiled for each project in forms for environmental and socio-economic analysis. JBIC screening and scoping was then carried out based on the field data. The IEE conclusions were derived from the results of scoping and field observations and discussions with the counterparts. The complete field data was obtained for 17 of the 44 subprojects.

Based on the individual IEE results there were no serious negative impacts due to the projects. The main serious impact was the storage of provided water by each family in a hygienic and clean container or in-house tank. Awareness to clean water use and better education was recommended for most of the IEE subproject. The negative impacts found in IEE were minor and temporary due to the construction activities. These were increased noise and air pollution. This would be mitigated, by informing the people about the construction schedules of subprojects in advance, so that they could take protective measures against them.

During the four decades of 1960 to 2000, Tunisia has made remarkable efforts for its rapid economic and social development. At present, an infrastructure capable of promoting economic development is firmly in place. The areas have included the industrial sector intended to promote the natural resources extraction and to improve the potential of agricultural production.

In the water resources development, supply of rural drinking water has an important place in the overall socio-economic development programs in Tunisia. The investments in rural water supply projects, has markedly improved the conditions for provision of drinking water both in terms of quantity and of quality.

The entire urban population (100%) is now provided with piped drinking water. On the other hand, the rural population is still served only at 75%, the remaining 25% is faced with the following inconveniences:

- (1) Shortage of water resources;
- (2) Deterioration of chemical quality of shallow groundwater and surface water;
- (3) High investment costs for the provision of drinking water supply;
- (4) The private sector is involved only in the areas closer to the big cities.

The environmental assessment of the detailed design of rural supply project will provide the following:

- (1) An analysis of water resources available for rural water supply, and water demand in Tunisia;
- (2) Description of the institutional and regulatory aspects, and the environmental legal system in Tunisia. The analysis will highlight the important issues and provide recommendations for their improvement;
- (3) An analysis of the overall environment situation in Tunisia and description of the environmental issues in the project area;
- (4) Detailed subproject and site description of 22 rural drinking water projects in easy to follow tables, included in 2001 program, financed by JBIC;
- (5) An analysis on the initial conditions of ecology, socio-economic and human environment of the site in easy to follow tables;
- (6) Screening and scoping of potential environmental impacts and mitigation measures of each project based upon JBIC guidelines;
- (7) Based upon the above and analysis of previous, direct and indirect effects of each project on the environment carry out an Initial Environmental Examination (IEE) and if necessary an Environmental Impact Assessment (EIA);
- (8) Monitoring system for water quality, ecological conditions, and social conditions including public outreach and participation mechanism.

Predominance of an arid climate, and imperatives of meeting water demand of population as well as negative discharges on natural environment will be the main elements of projects based in at least 12 out of 15 governorates. The richness of cultural patrimony, and biodiversity in Tunisia, requires imperatives for protecting and safeguarding it during the development of water supply projects.

CHAPTER 2 PRESENT ENVIRONMENTAL CONDITIONS

No major negative environmental impacts are expected for Project 2000 and Project 2001. In fact, the projects are expected to result in enhanced environmental benefits through increased efficiency of water use. A detailed analysis of the Tunisian EIA system has been carried out through the aegis of the World Bank and Mediterranean Technical Assistance Programme (METAP) and it has been judged to be amongst the best in the region. Individual subprojects under the Project 2000 and Project 2001 will not require EIAs in accordance with national guidelines, as the impacts will not be negative so an IEE only would be required. In fact, ANPE (National Environment Agency) does not require EIA for rural water supply projects.

The objective of the environmental review is to provide a broad overview of environmental issues in rural water supply (including groundwater) in Tunisia. This overview will take into account the environmental policies and guidelines of the Government of Tunisia (GOT), including the National Environmental Action Plan, as well as those of JICA, JBIC, and the World Bank. Specific issues to be addressed will also include: how far the ANPE guidelines conform with those of JBIC, and the World Bank. In addition, in-house capacity to manage and implement the review and monitoring and reporting requirements. The review and other related environmental assessments will be consistent with the JBIC requirements.

The main issues with potential environmental implications identified at this stage are: water quality (pertaining to pollution, wastewater disposal etc.); groundwater management; and drainage. The small-scale rural water supply development is not expected to have major environmental impacts. The impact on groundwater aquifer management is expected to be minimal since the DGGR & DGRE are capably monitoring irrigation development, and only permits additional tubewell irrigation capacity to be installed where renewable groundwater resources are not overexploited. In order to qualify for financing under the Project, for each tube-well irrigation subproject, the Bank will require documentation (from DGGR) that demonstrates the water requirement of the project in relation to the

current exploitation and renewable resource status of the aquifer involved. Similarly DGGR will be advised to follow lessons learned by its predecessor agency.

Furthermore, the following positive steps have been carried out by GOT:

- (1) Improving the management of scarce water resources, Tunisia has increased the price of irrigation water and removed fertilizer subsidies.
- (2) Tunisia stands out for its strides in wastewater treatment.
- (3) It has established a system for mediating between sectors and user groups for improved water allocation.
- (4) It has accelerated the adoption of proven technologies for the efficient use of water.
- (5) It has increased prices and reduced subsidies for water.

2.1 Water Resources in Tunisia

Because of the geographical location between the Mediterranean and Sahara, Tunisia is characterized by an arid climate in major parts of the country. This aridity depends on the variability of the Mediterranean climate and makes water a rare and unequally distributed resource in time and region.

This variability of precipitation principally is reflected in rainfall frequencies and quantities.

In addition, Tunisia is characterized by a certain complementary relationship between surface and groundwater resources. Such complementary relationship has been observed between the rainy North with a dense hydrographic network and the South with poor surface water flows and some groundwater (aquifers) resources.

The decade (1990-2000) has been marked by a strategy, whose principal purpose is to mobilize the water resources in order to meet different needs in drinking, industrial, and agricultural water supply. This strategy is translated by a rational planning of solid hydrological infrastructure implementation.

2.1.1 Qualitative Aspect

The notion of water quality often is associated with its chemical quality, which corresponds to the amount of dissolved salt content. The quality of natural water is characterized by a high content of dissolved salts. In some subproject areas, underground water is localized in layers of crystallized salt.

The increased salinity seriously limits water usage for many of the important tasks. In addition, the risk of water pollution is also becoming real due to the increased human activities. The WHO and Tunisian health administration have determined the standards for water used for human drinking, cattle drinking, and industrial water supply. These standards are severe and demanding for biological contents (bacteriological and virology), dissolved salt, and radioactive elements.

Table B.4.2 in Appendix-B provides the draft guidelines for drinking water and surface water quality intended for drinking.

2.1.2 Water Consumption

In Tunisia there are many forms and mechanisms for the supply of drinking water in rural areas, including:

- (1) Piped water (tap water)
- (2) Private sources (shallow wells, and rainwater tanks)
- (3) Public sources (public taps and *potences*)
- (4) Others (rivers, springs, and lakes).

The analysis of data, National Statistics Institute (*l'Institut National de la Statistique*) has confirmed that the households as beneficiaries of piped water increased from 49% in 1984 to 69% in 1994. However, the data has also confirmed that the number of households served by the public sources has decreased from 23% to 14%. The number of households being served by rivers and springs has decreased from 11% to 4% during the same period. The data has also confirmed that the households living in rural zones still face difficulties in supplying drinking water. The agreement of SONEDE covers only 25% of the

households in Tunisia.

2.2 Biodiversity

2.2.1 General Guidance

The nature balance conservation improves the quality of life and maintains the biodiversity. This patrimony must be passed to our children with its splendor and complexity as we inherit it too. However, several assessments show that this biological diversity markedly is in regression on a world-wide scale in spite of the efforts done at the national and international level. Ratifying the convention on biodiversity (1993), our guidance is to agree clearly a particular attention to the natural resource and biodiversity conservation on elaborating a consistent, preventive and prudent policy being conciliatory between socio-economic development and rational resource use.

Such a strategy can be realized only after completing an Action Plan which allows answering practical questions such as public institutions and/or association are expected to make the most of their human and material resources including the schedule of due dates for implementing these activities.

This action plan aims at the following principal objectives:

- (1) The fight against the genetic erosion aiming to adequately conserve the species threatened or likely to be threatened;
- (2) The ecosystem protection aiming to maintain the natural balance in these environments by conserving all their elements (soils, water, fauna, flora);
- (3) The rational ecosystem management aiming essentially at a durable biodiversity planning by adopting appropriate and sectoral methods and models bound to the biodiversity;
- (4) The integration of an appropriate institutional and regulatory framework by adapting and adopting the measures particularly as far as the regulatory texts in use are concerned;
- (5) The training, information, development in production and use of biological diversity knowledge;

In this situation, we try to summarize all the actions to be done in this action plan.

This action plan constitutes the first step of a process leading at its appointed end to the durable biodiversity management.

Action Plan for biological diversity:

The action plan elaborated in 1998, financed by the World Fund for Environment and the World Bank, aims to solve the central issues, in this instance, "the degradation of the biological diversity and decrease of its value and reproduction capacity". For this purpose, six action programmes corresponding to six objectives are provided:

2.2.2 Program for Fighting against the Genetic Erosion:

The realization of this objective requires a radical action because of the following:

- (1) Poor management of genetic reserves;
- (2) Non-appropriate anthropomorphic actions;
- (3) Over exploitation of species for industrial and therapeutic use, deforestation and over pasturage;
- (4) Introduction of non-controlled species likely to be intrusive to the detriment of others and loss of interest in relation to certain species;
- (5) Extension of agriculture at the expense of natural plant formation and technologies inappropriate for genetic conservation.

This program is composed of three projects:

- (1) Project for biological conservation in-situ and ex-situ
- (2) Project for improving the acknowledges on genetic erosion
- (3) Project for research development on genetic erosion

Project (2) aims to improve our knowledge on the biological diversity allowing to plan timely all intervening activities in terms of conservation and durable use of the biological resources.

CHAPTER 3 ENVIRONMENTAL LEGAL SYSTEM AND INSTITUTIONAL ASPECTS

3.1 Institutional Aspects

Tunisia takes up a preventive policy towards the sustainable environment issues concerned. It undertakes to improve the quality of citizen's life, when taking protection actions for conserving the natural resources.

Several institutions have been created with a view of protecting the environment and insuring a sustainable natural resources development.

- (1) National Office for Purification - *L'Office National de l'Assainissement* (ONAS)

It was created in 1974. It undertakes the fight against the hydro pollution as well as, the water resource protection. The objective of ONAS is to administrate the whole sector of environmental clean up (purification) in residential, industrial, and tourist areas.

- (2) National Agency for Environment Protection-*L'Agence Nationale de Protection de l'Environnement* (ANPE)

It was created with the aim of promoting environmental protection, and undertaking the fight against the pollution and hazards. It promotes sensitisation and education for all citizens on environmental issues.

- (3) The Ministry of Environment and Land Use Development - *Le Ministère de l'Environnement et de l'Aménagement du Territoire*

It was created in October 1991 for completing the institutional set up taking responsibility of the environment. It strives to give weight and visibility to the political aspects of the government in the field of environment and of co-ordination of the government's activities and of improvement of the quality of life of the population.

In addition to these described institutions, GOT has constituted in October 1993 the National Commission for Sustainable Development - *La Commission Nationale pour le Développement Durable* - by bringing together the different ministries in order to elaborate and give prominence to the national strategy and an action plan for reconciling the socio-economic development by using the natural resources rationally.

The GOT has allocated approximately \$500 million for environmental protection during the 9th Plan. The plan's objectives relevant to the project include:

- (1) The extension of the sanitation network.
- (2) The support of activities related to environmental protection and the conservation and rational use of natural resources.
- (3) The continuation of work in progress on wastewater treatment and an increase in the use of treated liquid waste for irrigation.

In addition, approximately \$200 million have been allocated for supplying rural areas with safe water, research and studies in water resources in the 9th Plan.

3.2 Regulatory Aspects

In Tunisia, the legislator actually arranges legal texts concerning different fields of rural zones (water, forests, soils). These texts are grouped together in three categories:

- (1) Those who concern the natural resources protection and conservation;
- (2) Those who take an interest in the fight against the pollution and diverse nuisances;
- (3) Those who institute a global framework of activities based on the relevant laws.

The following are the relevant laws and regulatory texts related to natural resources conservation in Tunisia at present.

3.2.1 Flora and Fauna

- (1) The Law No.68-4 of the 8th of March 1968 related to the protection of seals in the Tunisian territorial water;
- (2) The Decree-Low No.60-21 of the 10th of September 1960 on the incineration of vegetable plants;
- (3) Decree No.80-261 of the 26th of February 1980 related to the official catalogues and list of species and various agricultural plants;
- (4) Decree No.88-127 of the 1st of July 1988, setting the conditions of grant allocation for shooting associations and flora/fauna protecting associations.

3.2.2 National Parks and Natural Resources

- (1) Article 218 to 223 of the Low No.88-20 of the 13th of April 1988 rewriting the forestry code;
- (2) Decree No.77-340 of the 1st of April 1977 creating the national park in the islands of Zembra and Zembretta ;
- (3) Decree No.80-1606 of the 18th of December 1980 creating the national park of Boukenda.
- (4) Decree No.80-1607 of the 18th of December 1980 creating the national park of Chambi.
- (5) Decree No.80-1608 of 18th of December 1980 creating the national park of l'Ichkeul.
- (6) Decree No.87-282 of 17th of February 1987 creating the national park of Boukornine.
- (7) Decree No.90-907 of the 4th of June 1990 creating the national park of El Feidya in Jendouba.
- (8) Decree No.94-2210 of the 24th of October 1994 creating the national park of Djebil of Douze Delegation in Kebili.

3.2.3 Wooded Species and Green Spaces

- (1) Article 20, 21 and 27 of the Law No.94-122 of the 28th of November 1994 promulgating the code of town planning and territorial development

3.2.4 Management of Rural Spaces

- (1) Law No.83-87 of the 11th of November 1983 related to the protection of agricultural soils, modified by the Law No.90-45 of 23rd of April 1990 and by the Law No.96-104 of the 25th of November 1996.
- (2) Law No.99-30 of the 5th of April 1999 related to the bio-agriculture;
- (3) Decree No.84-560 of May 1984 assigning the agency undertaking to confirm all offences against the clauses of the law related to the protection of agricultural soils;

3.2.5 Laws for Water

The Codes of Water of 1975 institutes a protection and conservation system of the public water source. It institutes a series of prohibitions to prevent any pollution of surface water and groundwater. It elaborates on the general clauses related to the urban wastewater treatments and water purification, and reinforces with a decree for those concerned by the general conditions such as receptor zones for discharge of wastewater (instituted in 1985).

The principal articles concerning this Project are:

(1) Article 9

The shallow wells below 50m of depth and located outside of prohibited or protected perimeters can be undertaken without government authorization.

(2) Article 10

It is prohibited to perform any disposal, all works, plantation or cultures on the free borders and in the water course beds temporary or permanent, and storage, as well as between the hold limits of water pipeline and channels.

(3) Article 99

Any correcting method of water or resorting method to a treatment mode of this

water with simple or composed chemical additives may previously be authorized by the Ministry of Public Wealth.

(4) Article 118

Any drinking water pick up and supply/treatment works, including pumps, tanks and pipes, must be constructed and maintained in conditions such as to preserve water from all effects detrimental to its quality.

(5) Article 122

It's instituted a protection perimeter around the water treatment and storage works intended for consumption with its limits to be determined by the Ministry of Agriculture.

3.2.6 Laws for Forestry

The Forestry Code, promulgated in 1966 and rewritten in 1988, insures protection of wooded soils belonging to the national fields, and institutes a forestry system to preserve the restrictions on use of wooded soils and grounds of route not belonging to the central government. This code also includes the clauses on damp zones and flora/fauna protection.

3.2.7 Laws Related to Hazardous Materials

The fight against nuisances is managed by several texts particularly concerning waste with certain clauses related to certain particular waste.

Asbestos

Order of the Ministry of National Economy of the 28th of November 1984 promulgating a Tunisian standard related to asbestos pipes and accessories including pressures.

3.2.8 Laws Related to Noises and Other Public Well-being Issues

Order of the Ministry of the Interior of the 10th of April 1999 related to payment

of compromise amends on minor offences against the regulations on hygiene and sanitary police inside of the perimeters raising from the local governments.

3.2.9 Laws Related to Waste

- (1) Law No.96-41 of the 10th of June 1996, related to waste and control, management and elimination of waste
- (2) Decree No.82-1355 of the 16th of October 1982 concerning used oil recovery;
- (3) Order of the Ministry of the Interior of 3rd of April 1997 promulgating the Tunisian standards related to the values limited for emitting pollutants and cements;

3.2.10 Laws Related to Forest Fire

Order of the Ministry of Agriculture of 13th of December 1998 related to the precautions to be taken against forestry fires;

3.2.11 Laws Related to Water Pollution

- (1) Article 107 to 139 of the Law No.75-16 of the 31th of March 1975, promulgating the codes of water;
- (2) Law No.93-41 of the 10th of April 1993, related to the National Office for Purification - *l'Office National de l'Assainissement*;
- (3) Decree No.85-56 of the 2nd of January 1985 related to the regulations on discharge in receptor zones;
- (4) Order of the Ministry of National Economy of 20th of July 1989 promulgating the Tunisian standards concerning discharge in hydro zones;

3.2.12 Laws Related to Wastewater Use for Agricultural Purposes

Decree No.89-1047 of the 28th of July 1989, determining the conditions of treated wastewater use for the agricultural purpose, modified by the decree 93-2447 of 13th of December 1993.

3.2.13 Regulatory Texts Related to the Global Environmental Protection

- (1) The recent evolution of the Tunisian legislation tends to fulfil the lack of global activity approach for protecting the environment. Tunisia began with the law of 1988 creating the National Agency for Protection Environmental. This law constitutes a control system of polluters and of their penalties for attack on environment.
- (2) Compulsory proceedings on environmental impact assessment (EIA) is also regulated by a decree of the 13th of March 1991.
- (3) Law No. 94-35 of the 24th of February 1994 related to the code of archaeological and historical patrimonies and traditional arts;
- (4) Decree No.92-1443 of the 3rd of August 1992, related to the institution on national maps for archaeological sites and historical monuments.

In addition to the above, the attached Reference D-1 and D-2 provides: (1) International Conventions Concerning the Protection of the Nature and Species, and (2) Regulation of Archeological Sites and Historical Monuments.

3.3 Issues and Recommendations for the Above Laws and Regulations

Any project if it aims to make the best of the hydraulic resources faces many obstacles from the point of view of technique, institution, and legalization. The issues and recommendations of the regulatory issues are discussed below:

3.3.1 Issues

- (1) Faithful transposition as an adoption sample of the standards planning and evaluation (from the countries more advanced) could conduct it to a system design too elaborated exceeding far from the country's economic power. The result of this only is that the majority of population can exploit no advantage of this system expensive and centralized (because a high cost for connection with a network stops any extension of public services);
- (2) Lack of coordination: As water and its treatment are important for the economy, several government agencies and ministries are involved, creating

conflicts. This should be streamlined.

- (3) The public administrations tend to favor rather technical considerations (construction of new equipment in terms of structural investment than administrative considerations (management and control);
- (4) The technical approach in agencies dealing with water minimize the role and importance of the legal clauses (flexible legal system allowing to transfer a fraction of the funds allocated to a irrigation project, to a domestic use);
- (5) Political considerations could favor the urban areas likely to be provided with complex central networks to the detriment of rural communities and marginal urban groups. The central government should implement decentralization policy.
- (6) The impact of the deficiencies concerning the monitoring and penalties, makes implementation of the water quality standards difficult. This practice goes contrary to the environmental protection.
- (7) A price setting based on political considerations has led the administrations in charge of water supply services to lean on public subsidies;
- (8) The programs related to water resources are carried out without people's participation (particularly women and children). This generally leads to failures;
- (9) The management of concession of water, sands, ground rental, etc., must be streamlined;
- (10) Lack of a efficient legal system allowing to evaluate different alternatives solutions (non structural measures) such as surveillance and reparation of losses and leaks before resorting to onerous structural solutions;

3.3.2 Recommendations

- (1) Review of the codes of water and concerned texts for problems due to pollution and excessive exploitation of public water resources (formed by the ground and surface water resources);
- (2) Setting up a body of public water resource, field inspectors. At present, it is partially functioning; The following issues need to be addressed:
 - 1) Illicit removals of large quantities of water, sands, from rivers (oueds);
 - 2) Excessive exploitations of groundwater by illicit shallow wells and

- pumping;
- 3) Encroachment on rivers (oueds) by taking over the banks for agricultural use or unauthorized construction;
 - (3) Elaboration of the regulations to be adopted for planning and evaluation: It is recommended to undertake studies to bring out the regulations that most conform to the reality:
 - 1) Regulations for water consumption per habitant, in rural and urban areas as well as quantity of water to be devoted to other users;
 - 2) Regulations of water quality to be adopted to Tunisia (excepted the biological standards to be considered as decisive for eradicating diseases associated with water;
 - (4) Design the programs and projects compatible with the country's economic situation by adopting legislative devices to promote the low cost and multi-client techniques and to restrict or even prohibit any project which is unrealistic and ambitious;
 - (5) Elaboration of legal regulations for training of staff for new management techniques' acquisition;
 - (6) The essential role of ministries of agriculture, of public health, of education and of the environment is to be in charge of the whole administration of water supply and treatment.
 - (7) Coordination in particular of the activities of outside financing organizations so that they go through the administration of country by accepting the responsibility of their sectors;
 - (8) Regional balance of service: The disparity in the resources devoted to urban and rural communities must be corrected. This may improve the production basis of national economy in agriculture by allocating more credits to the rural areas;
 - (9) Active participation of users in sectoral planning and organization of administration by elaborating the texts which regulate the creation of local offices undertaking to maintain the relations with users and to define any problem of rural areas and marginal urban groups;
 - (10) Recovery of entire investment costs for operation and maintenance in the urban areas where the economic situation is well suited;

- (11) In the rural areas: the local government finances a part or all of the needed equipment, while the central government undertakes the operation and maintenance costs;
- (12) The legislation must promote measures to conserve resources:
 - 1) Setting up a system to detect all water losses;
 - 2) Periodical sampling for analysis on the selected distribution points (prevent all current contamination of distribution);
 - 3) Local services of health may watch the cleanliness of the area around the shallow wells;
 - 4) Agree to no preferential treatment to companies even if they claim to contribute to national economy; in the long term, the country benefits from a better environment;
 - 5) Regulations and operation of domestic water storage tanks by means of the concerned rules of the public health laws.

CHAPTER 4 INITIAL ENVIRONMENTAL EXAMINATION (IEE)

4.1 Screening and Scoping of Selected 17 Subprojects

Based on JBIC Guidelines, Screening and Scoping of selected projects is provided.

4.2 Result of IEE

The 17 subprojects were selected on the basis of the completion of field data. Overall IEE results are attached to Table D.4.1.

4.3 Conclusions and Recommendations

- (1) Based on detailed review of the literature related to each project component, field investigation and discussions with counterparts at GR, and MOA, most of the above projects were not even subjected to an environmental review based on Tunisian regulations.
- (2) This Project will have a strongly positive net environmental impact. There are essentially no negative impacts associated with the proposed subprojects.
- (3) Negative impacts are basically temporary construction related. These minor negative impacts can be mitigated by mitigative measures taken at the construction stage.
- (4) Overall there is no sanitation problem related to the subprojects with public taps, adequate drainage designed for each of them.
- (5) The provision of a secure supply of clean water to 43 subprojects area has good influence on health and safety benefits.
- (6) Cumulative savings in costs and manpower related to the reduction of water related diseases will be substantial.
- (7) Mortality reduction caused by infectious diseases will be in addition to the above.
- (8) Finally, the provision of clean water, will increase productivity and support economic development.

CHAPTER 5 MONITORING SYSTEM

JICA and JBIC have considered an appropriate monitoring system necessary:

- (1) When environmental measures devised are implemented, but their effectiveness must be followed up.
- (2) When there are check items whose impacts are not great to justify modification of the project but which are considered to require monitoring.
- (3) The factors to be monitored should include:
 - 1) Rainfall and climate in the subproject area.
 - 2) Groundwater or stored water volume in the reservoir and its condition.
 - 3) Impacts on wild animal species or plant communities, of special ecological significance e.g. foxes, hares and forest preserves.
 - 4) Public health and disease vectors in the project area.
 - 5) Separate chemical quality of water will be monitored.

CHAPTER 6 ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

Based on the subprojects and selected IEE, the EIA was conducted for the negative effects pointed out by the IEE as follows:

(1) Influence by construction works

The scales of construction works carried out in the Project 2000 and Project 2001 are small. Therefore, the influence by the construction works will be small and also the influence can be reduced by informing the people affected of construction schedule and work schedule in advance.

(2) Influence by drainage of water disposed from communal taps

The time to use the communal tap is limited to a few hours in the morning and afternoon and also the amount of water supplied is as small as several cubic meters per day. The communal tap is equipped with drainage facilities to

infiltrate the disposed water into underground. However, no salt damage may be caused as the drainage water amount is small and also no report of salt damage has been submitted on the existing communal taps. Further, no sanitary problem is concerned.

Tables

Table D.4.1 Overall IEE Results for 17 Subprojects (1/2)

Impact Areas /Problems		Further Study
1. Hmaiem Essoufla (Ariana)		
Serious	1. Serious issue of some unhygienic 25 l tanks used. 2. Overall the micro water supply project will bring big benefits overall	1. Awareness of hygiene very important for 35 households who will benefit. 2. Preserve the benefits through awareness & education
Mild	1. Change in life-style when water will be available due to improved health especially of children.	1. Study sanitation conditions in the area. Spread awareness about hygiene amongst women.
2. Ouled Miled – Ouled Saad (Ben Arous)		
Serious	1. 101 households will be provided 25 l/day of potable water 2. Storage tank hygiene very important	1. Huge benefits due to the micro project should be institutionalised by public participation 2. Educate people about hygiene good for health especially children
Mild	1. Temporary construction related noise & pollution	1. Provide information about project components
3. Jimla (Zaghouan)		
Serious	1. 53 households to benefit from this micro scale project of 3 public taps & 5 drainages 2. Clean water = better health	1. Awareness & education about hygienic storage of water by families. 2. Children's benefits must be highlighted to women.
Mild	1. Noise & pollution during construction	1. Only temporary, large benefits at the end for 50+households.
4. Rouissat-Bougarnine (Zaghouan)		
Serious	1. Relatively large micro water supply of 40 m3 through 11 public taps & other facilities	1. Study the hygienic storage of water by families 2. Prepare plan for public participation
Mild	1. Minor noise & other pollution during construction	1. Temporary inconvenience
5. Chaamba – Ouled El Assel - Hmaidia (El Kef)		
Serious	1. 140+ household will derive big benefits due to clean water supply in Chaamba 2. Change old practice of unclean water storage	1. Existing unhygienic storage of 25 l/day must be discontinued. 2. Public awareness through participation & education
Mild	1. Noise & other minor pollution during construction.	1. Temporary discomfort only.
6. Ghraissia (El Kef)		
Serious	1. 90 households will get clean Ain Senan spring water 2. Surrounding preserved forest reserve & 1200 m. Jughurta table be safeguarded	1. 20 l/day water must be stored hygienically to derive the benefits. 2. Benefits of forest preservation be highlighted with hygienic water storage practices
Mild	1. 20 m3 semi-buried tank & other construction will generate noise & air pollution	1. Temporary only, benefits of improved health in the end will be very large.
7. Chelalga (Kairouan)		
Serious	1. Dispersed micro project will benefit 63 households with a 15 km pipeline & 14 public taps 2. Big health benefits if better hygiene is adopted.	1. Existing storage unclean to benefit fully better storage be adopted. 2. Women must be informed about benefits to children's health
Mild	1. Temporary noise & air pollution in the Chalalga project area.	1. Post project benefits to compensate construction related minor disruption
8. Guedifet (Kairouan)		
Serious	1. Relatively developed project area has 169 households benefiting; hygienic storage main issue.	1. Clean storage practices should be spread through CRDA, mosque school.
Mild	1. Temporary & minor noise & air pollution during construction	1. Traffic be monitored & people should be informed about digging schedule. Project benefits be highlighted.
9. Hmidet (Kairouan)		
Serious	1. Rather large micro project benefits 248 households of total 1600 population with 17 public taps. 2. Area's dispensary & schools be made use of to spread public hygiene education.	1. Current unhygienic practice of water storage in 25 l cans brought by women. 2. Women & staff of public facilities should be brought together for public hygiene education.
Mild	1. Temporary & minor noise & air pollution for 18 dispersed communities.	1. After project benefits will prepare the people for temporary discomfort

Table D.4.1 Overall IEE Results for 17 Subprojects (2/2)

Impact Areas /Problems		Further Study
10. Zgainia (Kairouan)		
Serious	1. Almost 63 private connections & 6 public taps will replace old system	1. Individual connections will replace unhygienic 200 l family tanks upgrading the health of most of the 600+people
Mild	1. Temporary noise and air pollution due to large distribution pipelines from SONEDE connection.	1. End benefits to be provided by many households with piped water.
11. Amairia (Sidi Bouzid)		
Serious	1. Amaira project will benefit 68 households with reliable clean water supply; new hygiene practices must accompany this	1. Concerted effort for awareness among women for better hygiene
Mild	1. Temporary noise and air pollution due to construction activity.	1. End benefits of the project will compensate for disruption.
12. Blahdia (Sidi Bouzid)		
Serious	1. 800+ people in Blahdia will benefit by 48 m3 /day of clean water from deep well through 9 public taps & 2 potences.	1. Existing hygiene practice will have to be upgraded by the communities benefiting by public awareness program.
Mild	1. Temporary & minor noise & air pollution in the area.	1. End project benefits must be kept in front. Big overall benefits due to health improvement.
13. Bouslim (Mahdia)		
Serious	1. This is a large micro water supply project providing 41 public taps with drainages & 14 private connections,	1. Family level storage will have to be hygienic for the full benefits to be availed.
Mild	1. Minor and temporary construction noise and air pollution.	1. Mitigatory measures will be taken and 17,000 residents will be informed of the construction plans in advance.
14. El Aitha/Bkour (Mahdia)		
Serious	1. No serious impact is anticipated by any of the 296 benefiting households.	1. Need to upgrade existing in-house storage facilities.
Mild	1. Minor and temporary noise & air pollution during construction from SONEDE to public taps with drainages	1. End benefits of the project will be large.
15. Khanet Zammour (Gafsa)		
Serious	1. Micro water supply scheme to 121 households will bring only benefits.	1. Existing in house storage system will have to be kept hygienic.
Mild	1. Minor and temporary construction related noise and air pollution.	1. Temporary.
16. Ezzahra (Gabes)		
Serious	1. This is a micro water supply project for only 65 households.	1. No negative impact, only maintenance of hygienic practices after the project completion.
Mild	1. Minor and temporary noise and air pollution.	1. People to be informed of construction schedule etc.
17. Daasya (Kasserine)		
Serious	1. Micro water supply project for 336 people will have not negative environmental impacts	1. To better benefit people in the project area will have to maintain hygienic storage in their houses.
Mild	1. Minor and temporary noise and air pollution during construction.	1. People of the area must be informed about the construction activities and schedule.

References

REFERENCE 1 INTERNATIONAL CONVENTIONS CONCERNING THE PROTECTION OF THE NATURE AND SPECIES

Many of the international conventions concerning the protection of the nature and species have been ratified by Tunisia in several fields of environment and particularly the natural resources conservation is concerned, including:

- (1) African Convention for Nature and Natural Resource adopted in Algiers on September 15, 1975 (ratified by the law No. 76-91 of the 4th of November 1976).
- (2) Master Agreement Related to the Cooperation of States of North Africa in the Fight Against the Desertification, adopted in Cairo on February, 1977 (ratified by the law No. 79-1 of the 25th of January 1979).
- (3) Convention Related to the Internationally Important Wetlands, adopted February 2, 1971 (membership by the law No. 80-9 of the 3rd of March 1980).
- (4) Convention on the Conservation of the Migratory Species, adopted in Bonn on June 23, 1979 (ratified by the law No. 86-63 of the 16th of July 1986).
- (5) Master Agreement changing the Convention related to the Internationally Important Wetlands as Wild Habitat, adopted in Paris on December 3, 1982 (membership by the law No. 86-64 of the 16th of July 1986).
- (6) Convention of the United Nations on the Bio-diversity, adopted in New York on May 9, 1992 (ratified by the law No. 93-45 of the 3rd of May 1993).
- (7) Convention of the United Nations on the Fight Against the Desertification in the Countries Seriously Affected by Draught and/or Desertification in particular in Africa, adopted on June 17, 1994 (ratified by the law No. 95-52 of the 19th of June 1995).
- (8) Convention of Bern Related to the Conservation of the Wildlife and Natural Zones in Europe, adopted in Bern on September 19, 1979 (membership by the law No. 95-75 of the 7th of August 1995).
- (9) International Convention of 1969 on the Civil Responsibility of the Damages due

to the Hydrocarbon Pollution, adopted in Brussels on November 29, 1969 (membership by the law No. 76-13 of the 21st of January 1976).

- (10) Convention Related to the Prohibition on use of the Techniques to Modify the Environment for the Military Purpose or Whatever other Hostile purpose it may serve, adopted in New York on December 10, 1976 (membership by the law No. 78-21 of the 8th of March 1978).
- (11) Convention of Vienna for the Protection of Ozone Layer, adopted in Vienna on March 22, 1985 (membership by the law No. 89-54 of the 14th of March 1989).
- (12) Convention of Bamako on the Prohibition on Importation in Africa of Hazardous Waste and on the Control of Cross-border Movements as well as the Management of Hazardous Waste and Products in Africa, adopted in Bamako on January 30, 1991 (ratified by the law No. 92-11 of the 3rd of February 1992).
- (13) Convention of the United Nations' Framework on the Climate Change, adopted in New York on May 9, 1992 (ratified by the law No. 93-46 of the 3rd of May 1993).
- (14) Convention of Basel on the Control of Cross-border Movements of Hazardous Waste and its Elimination, adopted in Basel on March 22, 1989 (membership by the law No. 95-63 of 10th of July 1995) and amended during the 3rd meeting organised by the detained parties in Geneva on September 22, 1995 (ratified by the law No. 99-78 of the 2nd of August 1999).

REFERENCE 2 REGULATIONS RELATED TO ARCHEOLOGICAL SITES & HISTORICAL MONUMENTS

1. Archeological Sites & Historical Monuments

Decree No.92-1443 of the 3rd of August 1992, related to national map institution on the archaeological sites and historical monuments.

(1) Art. 1

It is instituted a national map of the archaeological sites and historical monuments on the land and in the sea in the aim of setting up a general inventory of the locations and structures constituting a part of the national cultural patrimony.

(2) Art. 3

The site and monument conservation measures shall be adopted according to the set up inventory data and be taken in consideration in the framework of territorial development as well as urban planning making.

2. Laws of Archeological & Historical Patrimony & of Traditional Arts

Law No. 94-35 of the 24th of February 1994; this law comprises 97 articles. We are interested only in the articles concerning us.

2.1 Cultural sites protection

(1) Art. 9

- 1) The following works to be carried out in the limits of a cultural site perimeter are subjected to the previous authorization of the ministry in charge of patrimony:
- 2) The works related to electric and telephonic networks, to water, gas and purification pipelines, to telecommunications tracks and all works likely to distort any outside of the area or existing constructions. The answer to the application of authorization concerning the aforesaid works is given within two months from the date of receipt of this application.

(2) Art. 11

Any project of construction and restoration inside of the cultural sites are subjected to the regulation in force and this after the conformable notice of the ministry in charge of patrimony.

2.2 Historical and traditional groups

(1) Art. 18

- 1) The following works to be carried out inside of the safeguarded sector are subjected to the previous authorization of the ministry in charge of patrimony
- 2) The works related to electric and telephonic networks, to water and purification pipelines, to telecommunication tracks and all works likely to distort any outside aspect of the area or existing constructions. The answer to the application of authorization concerning the aforesaid works is given within two months from the date of receipt of this application.

(2) Art. 20

Any project of construction and restoration inside of the cultural sites are subjected to the regulation in force and this after the conformable notice of the ministry in charge of patrimony.

2.3 Historical monuments

(1) Art. 26

The historical monuments in the sense of the article 4 of this code are subjected to a order of protection taken by the ministry in charge of patrimony under its own initiative or the initiative of the whole concerned persons and after the notice given by the National Patrimony Commission - *la Commission Nationale du Patrimoine*. The order of protection can spread up to the borders of the historical monuments whatever they are bare or built, public or private and of which the conservation is necessary to protect and safeguard the monuments.

(2) Art. 30

The following works for infrastructure to be projected on the historical monuments or their access are subjected to the previous authorization of the ministry in charge of patrimony:

Installation of electric and telephonic networks, of gas, drinking water and purification pipelines, of telecommunication tracks and all works likely to compromise the outside aspect of the building.

(3) Art. 32

If the administration did not answer to the application of authorization within four months from the date of receipt of this application, the works are considered authorized.

(4) Art. 33

The works shown in article 28, 30 and 31 of this code will be carried out under the responsibility of the concerned services of the ministry in charge of patrimony in case the owner enjoys any subsidy or fiscal exemption, and under their control in other cases.

Around of the historical monuments:

(5) Art. 45

The buildings bare or built, public or private, existing within two hundreds (200) meters radius for getting to a protected or classified monument are subjected to the particular clauses stipulated in articles 26 to 44 of this code.

(6) Art. 46

Any type of works around the historical monuments are carried out only after the previous authorization of the ministry in charge of patrimony and in conformity with the procedures stipulated in articles 28 and 32 of this code.