

A Model-Based Tool to Quantify and Characterise Wastewater in Small Nile Delta Settlements

STEP-BY-STEP PROCEDURE

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1. Field work	
a. Meeting at the Village Council	(1 hour)
b. Interviews with village authorities and person responsible for the sewer maintenance	(1 hour)
c. Household surveys and first water meter readings	(4 hours)
d. Personal observations	(1 hour)
e. Second reading of water meters	(2 hours)
2. Computer work	
a. Entering data in the model	(3 hours)
b. Crosschecking the sensitive parameters	(1 hour)
3. Results	
⇒ Wastewater quantity and characteristics	
⇒ Village characteristics	

1 Field work

The field work allows to get first-hand information about the village and get support from influent people. It consists of: meeting at the Village Council, interviews of the village authorities (Omda or Sheikh el Balad) and the person responsible of sewer maintenance (if existing) and surveys with a representative number of households. Personal observations are also needed for crosschecking purposes.

The field work has to be done in two steps: the first step lasts about a full day and the second one (second reading of water meters) about one hour and has to be carried out at least a week after the first step.

- a. Meeting at the Village Council (1 hour)**
- Meet the Village Council of the selected village
 - Explain the project
 - Ask for the official number of inhabitants (census data) in the village and the date of the last census.
 - Take the contact information of the village authority (Sheikh el Balad or Omda). It is recommended to ask someone from the Village Council to come along, which eases the first contact in the village.
- b. Interview with village authorities and the person responsible for sewer maintenance (1 hour)**
- Meet the local authority (Sheikh el Balad, Omda). If the village does not have any of them, find an influent and helpful villager.
 - Interview him using the semi-structured interview guidelines for Village Authorities and Representatives (in the Appendix of the Manual and at www.sandec.ch/esriss).
 - In case of a village already served by a sewer network and if existing, meet the person responsible for sewer maintenance, who can provide more precise information about the sewer network.
- c. Household surveys (4 hours)**
- The household survey questionnaire is provided in the Appendix of the Manual and at www.sandec.ch/esriss.
 - Ask the local authority (Sheikh el Balad, Omda or influent villager) to identify and propose a set of households where to start the survey. These households should represent different main occupations, levels of income and social status. After 5 to 10 surveys, when villagers are more familiar with the procedure and the members of the study team, select houses randomly, making sure that the buildings are located in different parts of the village. Try to have someone from the village to accompany you during the surveys; this will be helpful to gain the trust of villagers.
 - At least 25 interviews are needed to have a representative overview of the situation. A questionnaire should take less than 10 minutes, which allows to realise all of them in about 4 hours.
 - Advice to carry out the surveys:
 - o Always ask the question without giving a possible answer in the question.
 - o Take only the answer from the man/woman you are interviewing. The answers from other villagers have to be ignored.
 - o No answer is better than a wrong answer; when there is a doubt concerning the accuracy or honesty of the interviewee, leave the case blank and go to another question.

- Do not hesitate to ask a question again in other words and sentence structure in order to confirm the answer.
 - In case that a family lives in several buildings (e.g., courtyard), make sure to consider the data for one building only.
 - Identify each house on a satellite map (e.g. on Google Earth) in order to be able to locate them during the second visit, when the second water meter readings are taken.
- d. Personal observations (1 hour)**
- Personal observations are to be made while walking in the village, during the household surveys. It consists in observing:
 - The existing infrastructure and practices.
 - Hotspots and problems related to wastewater management.
 - Sewer outlets and septage discharge points
 - Confirmation of the information collected during the interviews, surveys and localisation on the map.
- e. Second reading of water meters (1 hours)**
- At least one week after the household surveys, the village has to be visited a second time in order to read the water meters again. This is necessary for computing the drinking water consumption.
 - This field trip is also the opportunity to get clarifications, if needed, about incoherent information and/or do complementary household surveys.

2 Computer work

An Excel-based model is provided, in which the collected data can be easily entered. The model helps to crosscheck the data collected and estimate the future situation. The model is sequenced in three steps, corresponding to three sheets to be successively filled in, as shown below; the yellow cells signal where data should be entered.

The model is based both on the existing data baseline and on the *Material Flow Analysis* model (MFA) developed by the ESRISS Project (cf. *MFA Report*). It is described further in the *User Manual*, to be downloaded at www.sandec.ch/esriss.

The procedure is the following:

Step1-General info.

- a. Entering data in the model (3 hours)**
- **Sheet STEP 1 – General information:** Enter the information collected from:
 - The meeting at the Village Council

- The interview with the village authority (Omda, Sheikh el Balad or influential villager) and the person responsible for sewer maintenance
- The personal observations
- The planned system

Step2-Household Survey

- **Sheet STEP 2 – Household survey:** Enter the results of the household survey while taking care of the following:
 - Pay attention to units (e.g. frequency needs to be given in #/week)
 - Put the results in the requested formats. (e.g. Y/N means that you should put a “Y” or “N” in the case, # means that you have to put a number)
 - If there is no answer in a question (e.g. people did not know the answer, did not want to answer) leave the case empty.
 - Do not leave the case blank when an answer is zero, instead put 0 (e.g. no children, no cattle)
 - If the answer is approximate then write the average value (e.g. “10-12 cows” becomes “11 cows”)
 - When a house has more than one water meter put the sum of both readings; the details can be written in a comment.

b. Crosschecking the sensitive parameters (1 hour)

Step3-Crosscheck+Estimation

- **Sheet STEP 3 – Crosscheck and Estimation:** look at each box (one for each sensitive parameter) and compare the different data displayed in order to determine the most realistic value for the future situation:
 - Instructions are given below each box in order to help checking the consistency of the different data and estimate the most suitable value for each parameter
 - For each parameter a default value is given, which consists of an estimation after construction of a sewer network. In case a village is already served by a sewer network, most of the values can be derived from the household survey results.
 - If the information is not sufficient to choose consistent values, clarifications may be requested or additional household survey can be done during the second reading of water meters.
 - It is possible to estimate a future situation by changing the "selected values", e.g. by entering the future population number or the future water consumption.

3 Results

3.1 Wastewater quantity and characteristics

Once that all values are selected in Step 3, the model calculates the wastewater quantity and characteristics, including the precision range of the estimations.

RESULT-WW characteristics

Sheet **RESULT - Wastewater characteristics** provides:

- a) The estimation of the *daily average concentrations*.
- b) The precision of these estimations, i.e. a *realistic range* in which the real values will be comprised
- c) An estimation of the wastewater characteristics during the daily peak (in the morning). This peak flow is caused by a higher domestic water consumption in the morning.

These concentrations are calculated through the MFA model (**Compsheet2**) which take the parameters computed in **Compsheet1** and crosschecked in **Sheet STEP 3**.

3.2 Village factsheet and non-sewered flow characteristics

The model provides extra information in two separate sheets: (a) a factsheet about the village and (b) an estimation of the sanitation-related flows (septage, greywater and liquid manure) which do not end up into the sewer network.

Non-sewered Flows FACTSHEET-Village

- a) **Sheet FACTSHEET – Village:** synthesises all the information about the village which has been computed from the field work results; the factsheet consists of four different categories: i) General characteristics, ii) Inhabitants, iii) Water supply and iv) Sanitation system. This sheet mainly features the results from the calculations in **Compsheet1**.
- b) **Sheet Non-sewered Flows:** provides information about:
 - Septage: the quantity is roughly estimated based on the frequency of emptying of bayaras and the number of trips per emptying event.
 - Greywater which is not discharged in sanitation system: consists of the greywater still ending in a drain/canal and on the streets.
 - Liquid animal manure not discharged in sanitation system: consists of the liquid manure discharged on fields, in a drain/canal and on the streets.

The characteristics of the septage and liquid manure are taken from the baseline data, whereas the characteristics of the greywater are calculated through the MFA model.