

50. Sanitary surveying

When visiting water-supply schemes, it is usually possible to spot any faults and deficiencies that could lead to the pollution of potable water. Sanitary surveying is an inspection technique that records such visible problems, enabling fieldworkers to assess the likely quality of the water, relative to other sources. Figure 1 shows a woman collecting water from a stream which could be polluted by human excreta and urine, animal and domestic wastes, soaps and detergents, pesticides and fertilisers.

Sanitary surveying formally identifies possible pollution problems which may threaten drinking-water quality at the source, point of abstraction, treatment works, or distribution system. It relies on the inspection of physical installations by an inspector or a team of inspectors.

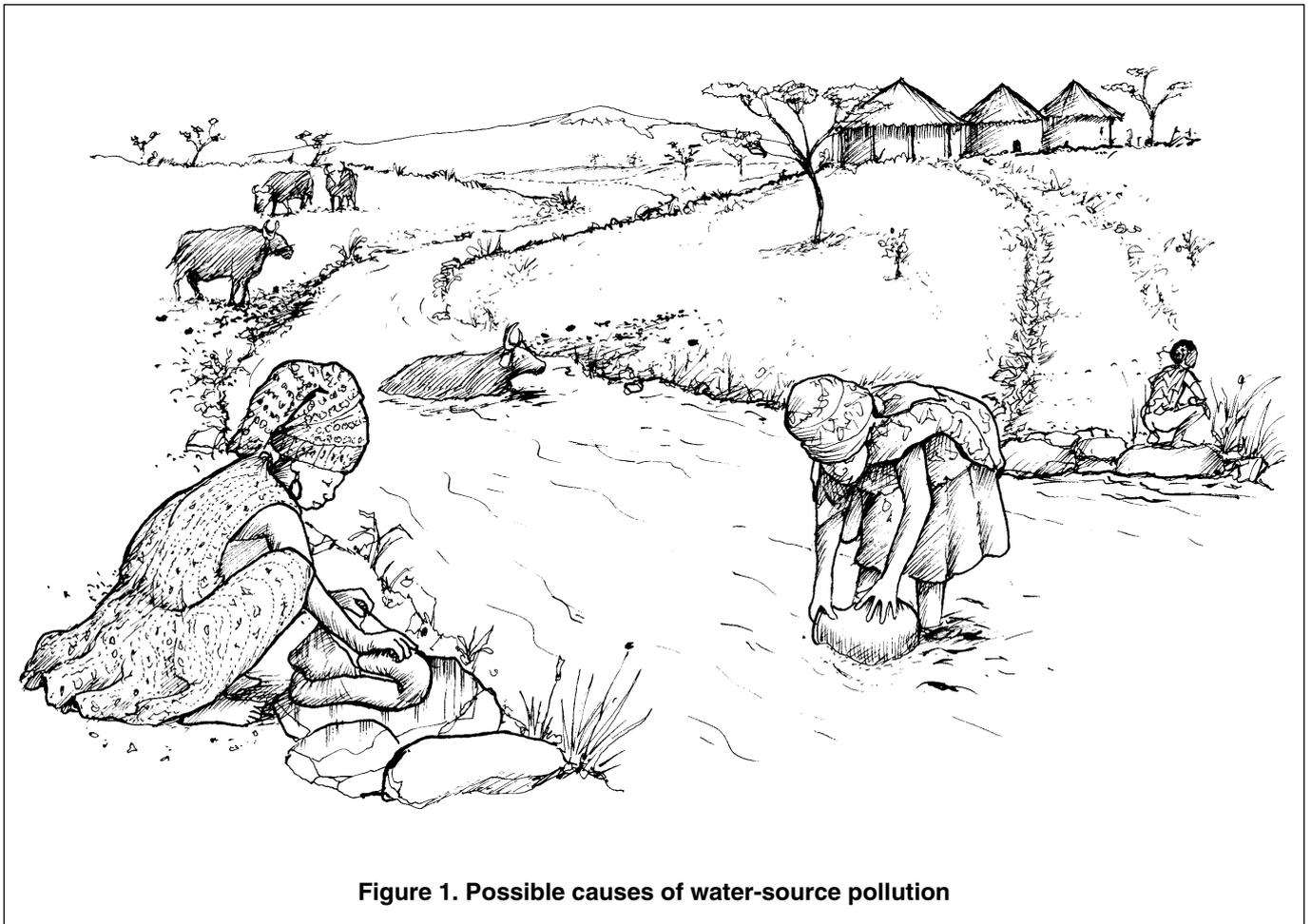


Figure 1. Possible causes of water-source pollution

Sanitary surveys can be carried out at any one of the three points of a water-supply scheme (Figure 2):

1. at the source and intake (to assess whether the quality of the raw water is at risk, and whether the abstraction method is satisfactory);
2. at the treatment works (to assess whether suitable treatment processes are being used, and whether correct procedures are being followed); and/or
3. at the distribution system (to assess whether the quality of the water is put at risk during distribution).

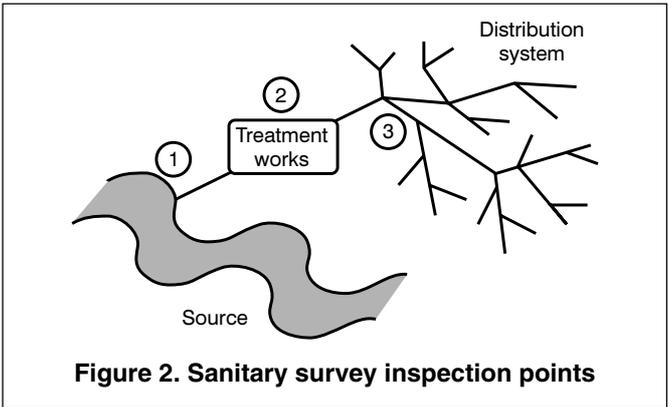


Figure 2. Sanitary survey inspection points

Sanitary surveying

What is the purpose of a sanitary survey?

In carrying out a sanitary survey, an inspector is identifying potential risks to the quality of the water — but she or he should also take the opportunity to make constructive criticism, leading to positive improvements. *It should not be an opportunity to indulge in destructive criticism.*

Undertaking a sanitary survey should also be considered:

- when new water sources are being developed, to assess the water quality and any treatment needs;
- when comparing water sources for potential development;
- when contamination is suspected, to identify the likely cause;
- when there is an epidemic of a water-borne illness, to identify the likely cause;
- to interpret results from water-quality analysis, to establish how the water became contaminated;
- as a routine exercise, to monitor sanitary conditions; or
- when there are significant changes (such as heavy rain or construction activity) which could affect water sources.

Sanitary surveying and water-quality analysis (either in a laboratory or in the field) are complementary activities; they are both important, and both have limitations (see Table 1).

What data is needed for a sanitary survey?

Certain basic data is needed to identify where sanitary surveys are required:

- population data for each town, village, and community;
- information on water sources;
- summaries, from past studies, of data for water quality;
- identification of sources for which no water-quality data is available;
- summaries of health records on the incidence of illnesses associated with water quality and sanitary conditions;
- correlation between outbreaks of illnesses, and water source and quality; and
- any water-treatment methods being used.

Sanitary-risk factors

During a sanitary survey, every insanitary situation that could increase the risk of illness is termed a 'Sanitary-risk factor'. The importance of each risk cannot always be quantified — some risks may be more important than others; some may combine unfavourably — but each risk needs to be eliminated if at all possible.

- Identified sanitary-risk factors are not ranked in order of priority; each risk receives equal weighting.

Table1. Water-quality analysis and sanitary surveying

Water-quality analysis

- Water-quality analysis is expensive, requires equipment and competent staff and, therefore, is not always easy to perform regularly or routinely.
- Water-quality analysis provides only a snapshot — a record of the water quality at the time of sampling.
- Water-quality analysis will indicate whether a water supply is contaminated; but, usually, will not identify the source of contamination.

Sanitary surveying

- Sanitary surveying is cheap, requires neither equipment nor highly-skilled staff, and may easily be performed regularly or routinely.
- Sanitary surveying can reveal conditions or practices that may cause isolated pollution incidents or longer-term pollution.
- Sanitary surveying reveals the most obvious possible sources of contamination, but may not reveal all sources of contamination, for example, remote contamination of ground-water.

Sanitary surveying

- Important, potential sanitary-risk factors — there are usually about ten — should be identified. Equal ranking enables a sanitary-risk score (from 0 (no risk), to 10 (very high risk)) to be established, based on a sanitary survey. The use of 10 sanitary-risk factors (a standard number) makes comparing different sources easy. By using 10 sanitary-risk factors for each source, some risks may be omitted from lists. Some risks may be on-site (local); others may be off-site (remote/distant).

The following categories of sanitary-risk score are frequently used:

<i>Sanitary risk score</i>	<i>Assessment of risk</i>
> 9	Very high
6, 7, 8	High
3, 4, 5	Moderate
0, 1, 2	Low

The reasons for the presence of sanitary-risk factors at water-supply schemes may be attributed to any of the following:

- poor site selection;
- poor protection of the water-supply scheme against pollution;
- inappropriate construction;
- structural deterioration or damage; and/or
- lack of hygiene knowledge/education of users or local inhabitants.

Who should undertake sanitary surveys?

The training and experience that inspectors require to be able to undertake sanitary surveys depends on the size of the population, but all inspectors should have a basic knowledge and understanding of water-supply technology, public-health principles, water-supply operations, and management. A shortage of experienced staff should not prevent sanitary surveys being undertaken, although simple training programmes may be needed.

Personal qualities are very important. Inspectors should be thorough, professional, conscientious, honest, and constructive; what is learned will depend on how thorough and perceptive the inspector is.

The elimination of certain sanitary-risk factors might be difficult. Major repairs or improvements or identifying suitable water-treatment processes may require specialist assistance.

Illustrated sanitary report forms

Sanitary-survey reports should be done quickly, and be simple and accurate. This is straightforward if illustrated report forms are used. Figure 3 shows a report form for a hand-dug well — and similar documents can be prepared or adapted for other water sources and situations.

On one side of the form there is a schematic illustration of the water source and abstraction point, the treatment process, or distribution system. Possible sanitary-risk factors are identified by numbers, which correspond to the questions opposite. Each question should be phrased in such a way that a 'Yes' answer indicates a sanitary-risk factor.

By using illustrated report forms, inspection teams can:

- identify possible points of contamination for a water source or supply scheme;
- quantify the level of risk for each water source or supply scheme;
- provide a visual illustration of where there are risks, and why; and
- retain a clear record — providing guidance for the user of the remedial work needed.

How are the sanitary-survey results used?

One copy of the inspection form should be handed to the user, and a second copy filed/stored. Prior to a sanitary survey, the inspector should study the past inspection forms for each water source. A sanitary survey will only be fully effective if action is taken to eliminate the sanitary-risk factors identified. All interested parties (water-quality agencies, water-supply agencies, etc.) should be informed of any necessary improvements.

Sanitary surveys of treatment plants should be conducted regularly (at least once a year) or when evidence suggests that they are necessary.

If water quality is found to be unsatisfactory, take the following action:

- repeat the analysis of water samples from the affected area to check the reliability of the initial unsatisfactory findings;
- carry out a sanitary survey;
- carry out a more detailed investigation of the source, intake, treatment works and distribution system;
- carry out remedial repairs, construction work or improvements to remove the sanitary-risk factors identified; and
- repeat the analysis of water samples from the affected area to check whether remedial work has been successful.

Sanitary surveying

Sanitary-survey form for assessment of risks for contamination of a hand-dug well

A. General information

Location of hand-dug well:
 Village:
 Location within village:
 Identification reference:
 Date of visit:
 Was a water sample taken? Yes / No
 Sample reference:

Total score of risks

...../12

Sanitary risk score: 9, 10, 11, 12 = very high
 6, 7, 8 = high
 3, 4, 5 = moderate
 0, 1, 2 = low

Signatures

Community representative:
 Inspector:

B. Identification of sanitary-risk factors

- | | Yes | No |
|--|--------------------------|--------------------------|
| 1. Is there a latrine within 10m of the well? | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Is the nearest latrine on higher ground than the well? | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Is there any other source of pollution (e.g. animal excreta, rubbish) within 10m of the well? | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Are the rope and bucket exposed to contamination? | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Is the height of the headwall (parapet) around the well inadequate? | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Is the headwall (parapet) around the well cracked or broken? | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Is the concrete apron around the well less than 1m wide? | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Is there poor drainage, allowing stagnant water within 2m of the well? | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Is the concrete apron around the well cracked? | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Are the walls of the well (well-lining) inadequately sealed? | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Is the drainage channel cracked or broken, allowing ponding? | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Is the fencing around the well inadequate to keep animals away? | <input type="checkbox"/> | <input type="checkbox"/> |

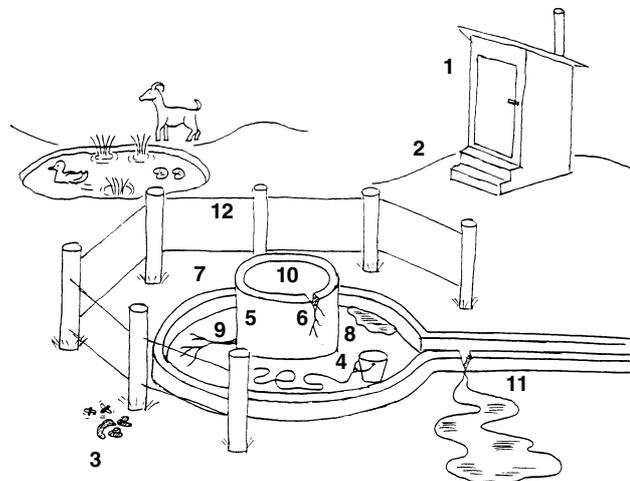


Figure 3. An example of an illustrated sanitary report form

Note: Illustrations may not be comprehensive. They may need adaptation, and should not be a substitute for thinking!

Further reading

Lloyd, B. and Helmer, R., *Surveillance of Drinking-Water Quality in Rural Areas*, Longman, Harlow, 1991.
 McNeill, D., *Manual for the Appraisal of Rural Water Supplies*, ODA, London, 1984.
 Hofkes, E.H., (ed.), *Small Community Water Supplies*, IRC Technical Paper 18, IRC, The Hague, 1986.

Prepared by Michael Smith and Rod Shaw

WEDC Loughborough University Leicestershire LE11 3TU UK
 www.lboro.ac.uk/departments/cv/wedc/ wedc@lboro.ac.uk

