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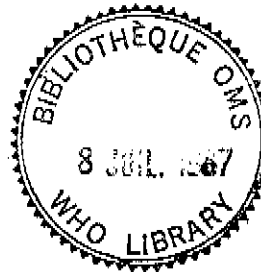
*Water supply,
sanitation
technology, appropriate
Desert climate*

ORGANISATION MONDIALE DE LA SANTÉ
BUREAU RÉGIONAL DE L'EUROPE

ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ
ЕВРОПЕЙСКОЕ РЕГИОНАЛЬНОЕ БЮРО

Workshop on Appropriate Technologies for
Water Supply and Sanitation in Arid Areas

Rabat, 24-28 November 1986



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SUMMARY REPORT

A meeting took place at the Mohammedia School of Engineering, Rabat, Morocco from 24 to 28 November 1986, bringing together 76 public health physicians and sanitary engineers from nine countries of Europe and Africa to discuss appropriate technologies for water supply and sanitation in arid areas, as part of the activities of the International Drinking Water Supply and Sanitation Decade (1981-1990).

The main purpose of the meeting was to review progress in the development of technologies for making optimum use of limited water resources or using conditions of drought and solar radiation to disinfect fermentable wastes and destroy microorganisms contained in them. Installations for this purpose cannot be regarded as appropriate technologies until such time as it is possible to ensure their proper operation, maintenance and repair in the actual conditions obtaining in small communities in arid areas of countries at the middle level of development (according to the World Bank classification).

A further aim of the meeting was to ensure that the use of such technologies does not involve any public health risk.

The participants discussed the following specific points:

- recovery/reuse of wastewater
- health aspects
- replenishment of groundwater
- irrigation
- wastage, leaks and continuity of drinking-water supplies
- a programme for prevention of drinking-water wastage
- leak detection in drinking-water supply systems
- rationing of water at critical times (cuts in supply, drought)
- alternative methods (distribution from tanks)
- dual supply systems (brackish water/drinking-water)
- charges for water
- appropriate technologies for water supply and sanitation
- production of drinking-water

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- demineralization of brackish water: appropriate methods
- disinfection of water by solar radiation
- sanitation
- appropriate sanitation in arid areas (urban and rural)
- treatment of wastewater by sand-dune infiltration
- treatment of sludge, compostable sewage and nightsoil drying beds
- conditions governing the survival of microorganisms in dried sludge subjected to solar radiation.

Conclusions and recommendations

Drinking-water

1. Accurate information on supply systems should be obtained, and all water use in public systems should be accounted for.
2. The parts of the systems where most leaks occur should be identified, followed by effective leak detection and if necessary repairs or renovation in those sectors; this will call for improved training of supervisory staff and upgrading of maintenance operations.
3. Efforts should focus on large users, setting up watch committees to prevent wastage and measuring the night-time consumption of such users.
4. Water use in administrative buildings should be metered and invoiced, and leakage at standpipes and in public institutions kept under control.
5. Maintenance teams within water authorities should be set up, progressive scales of charges established, equipment standardized, and strict regulations on design and maintenance of private and public systems introduced.
6. Information and motivational campaigns should be undertaken.
7. Pilot activities for detection of leaks in systems and losses at the level of the consumer should be envisaged, a feasibility study on normative and regulatory measures undertaken, and the necessary programme of work drawn up.

Sanitation

1. Agricultural reuse of water should be regarded as an integral part of the process of treatment/disposal/reuse of urban wastewater.
2. To reduce their adverse effects on public health, the present arrangements for water reuse should be reviewed and improved, starting with:
 - investigations
 - an inventory of the land parcels and crops involved
 - information and health education campaigns.
3. A national-level committee or interministerial working group should be established, bringing together all the bodies concerned in the reuse of wastewater, mainly for irrigation, such as the department of local communities of the Ministry of the Interior, the department of rural infrastructure of the Ministry of Agriculture and Agrarian Reform, the Ministry of Health, the

Ministry of Water Supply, and various research and university centres (National Sanitary Engineering Centre (CNGS), Hassan II Agronomic and Veterinary Institute, etc.).

4. The setting up of this national committee, given the necessary resources and real powers, should lead to the establishment of local committees which would work out techniques for reuse of water and sludge, types of crops to be grown and methods of application appropriate to the local terrain, as part of a sanitation handbook.
5. Circuits for agricultural reuse of water should be designed within a framework of regulations, which would have to be designed and subsequently monitored, and an information/motivational campaign among consumers.
6. Since the most efficient and economical solutions are generally those that take full advantage of the natural potential of a site, the analysis of data - whether socioeconomic, pedological, geological or hydrological - should be an essential step in project development, and sanitarians should be trained in this analysis.
7. The CNGS would provide an ideal institutional framework for such training at the national and international levels, giving appropriate emphasis to maintenance and repair aspects.
8. A working group on the basic and further training of water treatment plant operators and sanitarians should be set up, and the training itself should be adapted to the technologies used.
9. The different administrations - particularly those for local communities, rural infrastructure, environmental health and water supply - dealing with water and sanitation problems should support the CNGS in developing a simple and appropriate technology in this field through its experimental wastewater treatment plant.
10. In view of recent progress in land treatment and infiltration, such installations should, provided they are designed with the correct capacity, be envisaged for secondary treatment, whenever their use is feasible on the basis of the following criteria:
 - geological and soil characteristics of the site
 - degree of protection of groundwater
 - proximity of drinking-water catchments.
11. With regard to the choice of sanitation systems, the combination of individual and communal sanitation facilities, taking into account the characteristics of the environment, the local housing pattern and foreseen development, should prove a promising approach to treatment of wastewater for small communities in arid areas and to attainment of the objectives of the International Drinking Water Supply and Sanitation Decade.
12. Exchange of sanitation technologies among developing countries should be promoted, and collaboration by Morocco with Spain, Portugal and certain Middle-Eastern countries, which has already proved useful in various economic

sectors, should be extended to the field of water supply and sanitation, particularly as most of those countries, like Morocco, have areas that are partially or wholly arid, or semi-arid.

13. Since it has an experimental wastewater treatment plant, well equipped laboratories and a team of experienced instructors, the CNGS, in its capacity as a reference centre, should be able to make its knowledge of sanitation and appropriate technologies available to African countries and Middle-Eastern countries as part of South-South cooperation.

14. These steps could be of help to water system managers and the population as a whole, both urban and especially rural, in ensuring adequate water resources and a healthy environment.