

SODIS - WATER QUALITY IMPROVEMENT AT HOUSEHOLD LEVEL

WORLDWIDE PROMOTION OF A WATER DISINFECTION METHOD

SUMMARY

The supply of drinking water requires new strategies and technologies if the ambitious Millennium Development Goals (MDG) are to be reached. Since SODIS (Solar Water Disinfection) is applied at household level and makes use of locally available resources, it can be regarded as a new strategy and new technology and, thus, contributes to reaching the formulated goal. Scientific evidence of SODIS efficiency has been obtained through comprehensive research. This method, now promoted worldwide, has currently reached one million users. SODIS presupposes extensive training of the target population until water-handling practices are changed. Health benefits are significant especially if combined with other interventions such as hand washing. Therefore, SODIS is recommended as a potential water disinfection option to be further promoted worldwide.



THE CONTEXT

The lack of clean drinking water for some 1.1 billion people has dramatic consequences: about 4 billion cases of diarrhoea are reported annually, of which 2.5 million end in death. Every day about 6000 children die for lack of clean drinking water. Improved water supply criteria only consider water availability (more than 20 litres per person and day) and its accessibility (within 1000 metres distance). However, since they do not take into account the drinking water quality, the situation is far more dramatic as more than 1.1 billion people are exposed to unsafe drinking water.

Water quality might be safe at the point of distribution but often not at the point of use. Secondary contamination is frequently introduced by inadequate water handling. The groundwater collected from a hand pump is generally of good quality but it is exposed to pollution during transport and storage. The same also applies to piped water collected from public taps. Even the water distributed by a piped system may be of uncertain quality, especially if breakdowns and intermitted operation affect reliability of the supply system.

Inhabitants in developing countries consider the distributed water unsafe for consumption and therefore boil or filter their water, disinfect it with chlorine or UV radiation or purchase either bottled or mineral water. However, these methods are affordable by the wealthy people; the majority of the world's population cannot afford such treatment and remains exposed to unsafe drinking water.

To improve the living standard of the underprivileged, the United Nations have formulated Millennium Development

Goals (MDG), which aim at reducing by half the number of people without access to safe water by the year 2015. This ambitious task presupposes that for the next 10 years, a million people per week will benefit from an improved water supply if the formulated goals are reached. This target can only be met if case strategies, approaches and methods of drinking water supply are changed. Household-centred approaches involving as much of the target population as possible is such a strategy, and the promotion of low-cost and replicable methods a potential option to face the challenge of the MDG - and SODIS (Solar Water Disinfection) an answer to this challenge.



Fig. 1: A large portion of the population in developing countries is exposed to unsafe drinking water

THE PROJECT

Project Phases

EAWAG (Swiss Federal Institute for Environmental Science and Technology) and specifically its Department, SANDEC (Water Supply and Sanitation in Developing Countries), aimed at developing a water disinfection method which only makes use of locally available resources, and at promoting it worldwide once the efficiency of the method is established.

The project started in 1991 with extensive laboratory and field tests carried out at EAWAG in Switzerland. Sunlight and its UV-A (radiation effect) and infrared light (thermal effect) proved to be efficient in the inactivation of bacteria and viruses, and plastic bottles proved to be adequate containers for the treatment. A novel water disinfection method was born: SODIS (Solar Water Disinfection).

Between 1994 and 1998, the Swiss research results were verified by field tests in Colombia, Jordan and Thailand. Although application of the SODIS technology is rather simple, its use by the target population is more complex. Therefore, demonstration projects were conducted in seven different countries in Asia, Africa and Latin America to determine the interest, acceptance and application of SODIS by the inhabitants. The demonstration projects revealed a high interest and acceptance of SODIS by the target population: 80 % declared that they would continue to use the simple method after being trained, guided and supervised for one year.

SODIS is almost a zero cost technology as sunlight is free of charge and plastic bottles are often a waste product of our consumer society. As no business can be made with the method, new strategies for the promotion and dissemination had to be developed. Since 1999, SODIS is introduced and applied by local NGOs in developing countries, and its worldwide promotion is coordinated by EAWAG / SANDEC. SODIS is now formally used in more than 20 countries, and several local governments have recognised the method as an efficient water disinfection option. The attached case examples illustrate its worldwide promotion and use.

Promotion Strategy

SODIS is one option to disinfect drinking water. The method is presented to the target population together with other alternatives, such as boiling of water, chlorination and filtration in ceramic filters. The addressed population has to be involved in the planning stage and decide which method it will use to disinfect its drinking water.

Improvement of the drinking water quality is but one intervention to upgrade the health situation. Correct water



Fig. 2: Members of different NGOs and government institutions participating in a SODIS workshop

handling at household level, improvement of personal hygiene and provision of adequate sanitation facilities should form part of the interventions to attain a significant improvement of the health situation. Hence, SODIS promotion should be combined with other intervention measures.

SODIS may be used as initiator of a health awareness project. The bottle, a carrier of messages to a community, can initiate discussions on how drinking water should be transported, stored and treated, and the links between water quality, personal hygiene, sanitation and diarrhoeal control thus established. Therefore, SODIS can be used as an entry point in a health campaign programme or integrated as an additional component in a variety of other types of interventions in ongoing projects. SODIS promotion should use existing structures, as the creation of new ones is often a waste of time and resources.

SODIS is best promoted and disseminated by institutions based in the project areas. Important partners are school children and their teachers supported by parents associations; community-based organisations (CBOs) such as women clubs, youth associations or self-help groups; well-established and accepted non-government organisations (NGOs) working in community development projects; institutional organisations of the health and education sector such as health posts, hospitals and teacher training centres and finally, programmes of the local and central government. Since individuals, such as community and religious leaders as well as politicians and decision-makers, usually play a key role in SODIS promotion and dissemination, they should be involved right from the beginning in a SODIS promotion campaign.

ACHIEVEMENTS AND FACTORS OF SUCCESS

Results

- SODIS is already used in more than 20 countries. The method receives worldwide attention from local organisations, national institutions, multinational agencies, and international organisations.
- Currently, about 1 million people are regular SODIS users and the number is rapidly increasing. SODIS is well accepted by the target population and the percentage of regular users ranges between 40 and 80 % of the trained people.
- The health benefits of SODIS use are significant. The reduction of diarrhoea incidences among SODIS users varies between 20 and 75 %. Further health benefits are achieved by combining SODIS projects with hand washing programmes.
- SODIS is well documented in homepages (www.sodis.ch,



Fig. 3: The application of SODIS is simple and the treated water tastes good

www.fundacionsodis.org); and the local partners have produced a variety of different training and promotion material (leaflets, posters, manuals, videos).

- International aid agencies (e.g. UNICEF, CARE, Red Cross, PCI, ADRA) and local governments (e.g. Bolivia, Ecuador, Nicaragua, Uzbekistan, Pakistan) promote and implement SODIS in their own programmes.
- UN Agencies have recognised the potential of SODIS as an option for drinking water disinfection (WHO, World Water Day 2001) and declared the method a best practice option (HABITAT, 2002).
- Private companies (e.g. IBM Switzerland, Georg Fischer, Migros) and international clubs (e.g. Lions Club International, Rotary Clubs) support the promotion of SODIS to indicate their social commitment.

Reasons for Success

- SODIS is simple to apply, affordable and the target population appreciates the taste of the treated water.
- SODIS bottles are not only used for water treatment, but also to transport and store drinking water. Storing drinking water in plastic bottles also reduces the risk of water recontamination.
- SODIS is a sustainable water treatment method as it is based on locally available resources such as sunlight and plastic bottles, the latter often a waste product of our consumer society.
- SODIS has been developed and perfected in comprehensive laboratory and field research. Various well-established research teams have reported scientific evidence of its efficiency.
- SODIS has no financial value and therefore not subject to elements of corruption. The method is in fact promoted by numerous motivated and dedicated project teams in many countries under the lead of EAWAG / SANDEC.
- SODIS teams work in a continued and longterm approach. Therewith trust and understanding is created among different partners.
- SODIS development was supported by SDC, its current promotion is now financed among others by AVINA Foundation, SOLAQUA Foundation, LED, Michel Comte Foundation, Georg Fischer, Lions Clubs International, Rotary Clubs, etc..

THE CHALLENGES

Constraints

- SODIS is often considered as too simple by outsiders who do not trust its efficiency. Demonstration campaigns are therefore necessary to prove the contrary.
- SODIS only improves the microbiological water quality; it does not change its chemical composition. Hence, the raw water sources have to be protected from chemical pollution.
- SODIS requires adequate climatic conditions, i.e. sufficient sunlight. During cloudy periods, the bottles have to be exposed for two consecutive days, during rainy periods, alternative sources such as rainwater or water treatment (boiling) have to be applied.
- SODIS is not a self-promoting method yet. The target population requires extensive training, guidance and monitoring until it changes its drinking water handling practice.

Potential for Scaling-up

- SODIS should become common practice in water disinfection. The turn around for self-promotion may be achieved on a regional and national basis by the increasing number of SODIS users spreading the idea.
- SODIS still needs to be introduced through demonstration projects in many developing countries. The method should be integrated into health improving programmes implemented by external aid agencies and local governments.
- SODIS is easily replicable and does not require a costly infrastructure. However, promotion of SODIS requires extensive training and education of the target population and costs approx. US \$ 1-2 per SODIS user in demonstration projects. Government institutions, such as the Ministry of Health or the Ministry of Education, who are ideal partners for SODIS promotion, may jointly share the costs with external aid agencies.
- SODIS is a practical water disinfection method for both the underprivileged and the privileged segments of society. The richer often have their own home-based water disinfection systems. SODIS use by high-ranking people could motivate the poor to adopt the method.



Fig. 4: SODIS training at schools are effective entry points for the dissemination

- Some 1.1 billion people lack improved water supply systems, but far more if the water quality criterion is included in the statistics. The MDG aim at supplying safe water to half of the unserved population by 2015. This is an enormous task requiring new strategies and methods. Even if this ambitious goal is reached, the other half of the population also requires access to a better water quality, which SODIS can provide.

REFERENCES & PARTNERS

EAWAG/ SANDEC, M. Wegelin, R. Meierhofer
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