



*Every 20 seconds, a person in the developing world – usually a child – dies from diseases caused by polluted drinking water. But this heart-breaking issue extends even to rich countries like Canada, where water contaminated by animal waste has been a problem.*

*Through basic information and challenging activities, these junior high (grade 7-9) science resources are intended to teach students principles around water stewardship and water treatment, while adhering to government education guidelines. Learn about Samaritan's Purse's work helping families get safe water and involve your students in thinking about world water issues and how to solve them.*

### TREATMENT OPTIONS:

## 2. SODIS

Solar disinfection (SODIS) was developed in the 1980s to inexpensively disinfect water used for oral rehydration solutions used to treat diarrhea. In 1991, the Swiss Federal Institute for Environmental Science and Technology began to investigate and implement SODIS as a household water treatment option, to prevent diarrhea in developing countries.

SODIS users fill one-liter or two-liter plastic soda bottles with low-turbidity water, shake them to oxygenate, and place the bottles on a roof or rack for six hours (if sunny) or two days (if cloudy). The combined effects of UV-induced DNA alteration, thermal inactivation, and photo-oxidative destruction wipe out disease-causing organisms.

In the laboratory, SODIS has been proven to inactivate the viruses, bacteria, and protozoa that cause diarrheal diseases. Field data have also shown reductions of bacteria in developing countries' waters treated with SODIS. In four trials, SODIS reduced the amount of diarrhea in users between 9 and 86 per cent.

### **Where is it used?**

More than 2 million people in 28 developing countries use SODIS for daily drinking water treatment.

Important partners are community-based organizations such as women's clubs, youth associations or self-help groups, well-established non-governmental organizations working on community development projects, institutional organizations such as health posts, hospitals, and teacher training centers, and government programs.

### **Benefits, Drawbacks, and Appropriateness**

The benefits of SODIS are:

- Proven reduction of viruses, bacteria, and protozoa in water.
- Proven reduction of diarrheal disease incidence in users.
- Easy to use, so little resistance by potential beneficiaries.
- No cost to the user after obtaining the plastic bottles.
- Minimal change in water taste.
- Recontamination can easily be kept to a minimum by serving the water directly from the small, narrow-necked bottles (with caps) in which it is treated.



The drawbacks of SODIS are:

- The need for pre-treatment (filtration or flocculation) of silty, muddy waters.
- User acceptability concerns because of the limited amount of water that can be treated at once and the length of time required to treat it.
- The large supply of intact, clean, clear, colorless plastic bottles required.
- It does not change the chemical quality of water, so it's ineffective against chemical pollutants.
- Extensive education is needed to help beneficiaries understand how and why the system works.
- Bottles can crack and even if they don't, they will still need replacing eventually.

**Suggested activities:**

- Have students go through the SODIS treatment method – getting bottles, filling them with clear water (river water is a good example), leaving them outside for the prescribed amount of time, then bringing the results to class.

*Sources: Centers for Disease Control  
Swiss Federal Institute of Aquatic Science and Technology*