Technology innovation

Solar-heated showers at the Bolivian highlands

School children; many with skin problems related to harsh and unhygienic conditions
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The challenge

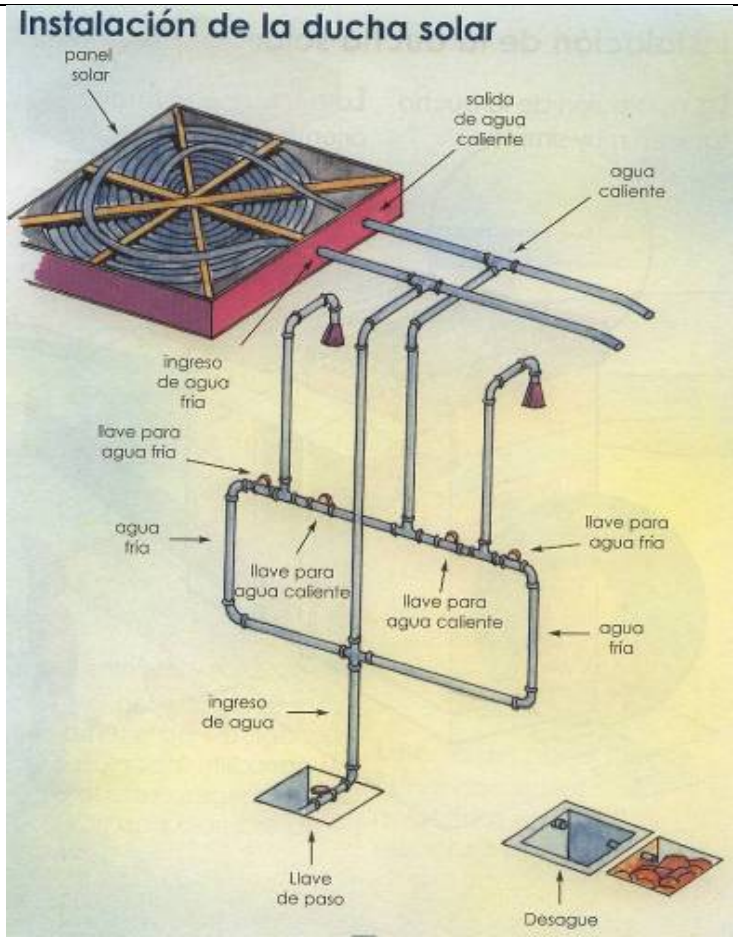
How low-cost technology can work to solve a special environmental problem is the subject of this case study. The Bolivian highlands are chilly for most of the time. The temperature averages 7 degrees Celsius and ranges from 18 degrees during daytime in summer to minus 18 degrees at night in winter. Bouts of icy rain are common with snow fall during winter.

Under these conditions, water in gravity-fed systems and streams has a very low temperature. In the winter, people and particularly children, prefer not to wash themselves in the very cold water. However, fuel is expensive and fire wood scarce so that water is normally not heated for bathing.

Background Information on Bolivia:
Population: 8,989,046
Per capita income: $2,587 (2003)
Access to safe water: 85% (68% among rural population) (2002)
Adequate sanitation facilities: 45% (23% of the rural population) (2002)
Net primary school enrolment rate 95% (2002-2003)
Under five mortality rate: 66/1,000 live births (2003)

Infrequent bathing in combination with unhygienic conditions, cold weather and harsh winds cause many children in the Bolivian highlands to suffer from skin diseases, upper respiratory infections and regular episodes of severe diarrhea. Official statistics show that in the highlands, about one quarter (27.2 %) of the children under five years suffer from diarrhea while scabies is prevalent among about one-fifth (19%) of the school children.

Under these circumstances, UNICEF Bolivia decided in the late 1990s to develop some pilot models of solar-heated showers for highland populations. These showers are usually constructed in school compounds to allow school children to bath in warm water during school hours, under supervision of the school teachers.



Solar-heated showers © A. Mooijman

Installation schedule shower © UNICEF Bolivia

The design

The solar-heated showers are designed with a view to easy construction, use of low-cost materials and easy maintenance. Water is heated by the sun: 100 meters of one-inch diameter polyethylene pipe is filled with water and exposed to the sun. In some designs, the polyethylene pipe is protected by windows covered with meshing. Because Bolivia is located in the southern hemisphere, all showers are oriented towards the north to catch the rays of the sun.

The capacity of each solar panel is 46 liters. Since most of the schools in the highlands are small, rural schools, this capacity is sufficient. Only in the bigger schools, more than one double shower unit is built. The costs of construction of one double, solar-heated shower is US$ 1,700.

Implementation

The solar heated showers have been developed within the water, sanitation and hygiene component of the Andean Programme of Basic Services against Poverty, called PROANDES. PROANDES arose from a sub-regional initiative promoted by the UNICEF Regional Office for Latin America and the Caribbean. Its objective is to support Andean countries to reduce the principal manifestations of poverty amongst priority groups of their population. The program is being implemented in five countries: Colombia, Ecuador, Venezuela, Peru and Bolivia. PROANDES began implementing actions in Bolivia in 1989.

Thus far, more than 350 solar showers have been constructed. The construction is generally being done by community members themselves with technical support and supervision from an NGO and/or municipal technical services. For the period 2006-2009, financing for an additional 225 double cabin solar-heated showers at school compounds has been secured. As a result of this work, other organizations in Bolivia have also started to construct the solar heated showers using a design similar to the one UNICEF developed.

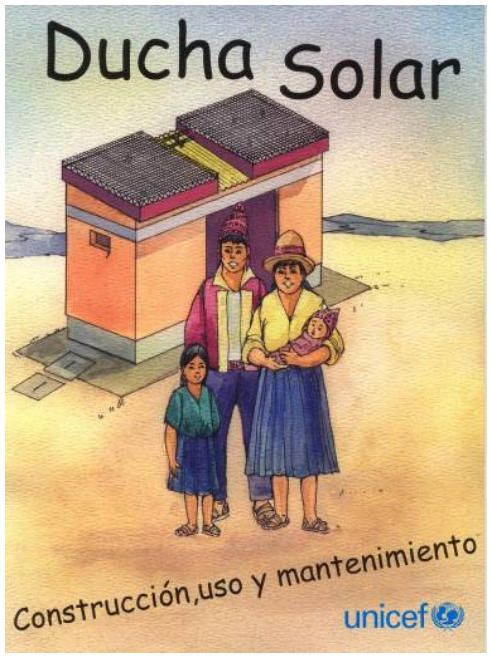
Lessons learned

Evaluation showed that whenever the showers in schools are functioning, **they are being used** by school children and their teachers.

Most children will use the **shower to wash their hair with shampoo.** Where it is difficult to motivate parents to provide soap for hand washing, even the poorest families seem to provide the children with small sachets of shampoo. The result is that at the same time as they wash their hair, children also wash their skin with the (shampoo) soap that drains from their hair.

Visual observation shows that children in schools with functioning showers, suffer **less** from **skin diseases and skin infections** than in schools without showers. However, no study has been done on this or other possible impacts.

Normally school boys take showers at different hours or days than school girls. Generally, showers are being used by two children at the same time so they can help each other. For the younger children, teachers help them while taking a shower.



Front page of manual for users on construction, use and maintenance © UNICEF Bolivia

One real challenge is the quality of construction and flexibility in design, taking into account the local situation. Deficiency in these, and in supervision mean that some of the showers are **not correctly constructed and never have worked properly.** Although **Operation and Maintenance training**, manuals and equipment is being provided, there is still a need to improve this component.

Contact details for more information:
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Annex

About the WASH in schools case studies

Developed by IRC International Water and Sanitation Centre under the SSHE Global Sharing project financed by UNICEF.

Over the decade a rich poor of experience and programming has evolved in school programs for water, sanitation and hygiene education, which we call WASH in schools or SSHE. Hundreds of millions of children are currently attending schools that have, in one way or another, become part of this ambitious effort to enhance the lives and life opportunities of young people around the world.

In the 1980s and early 1990s, these programs focused largely on construction. This usually meant building water points and toilets in schools. Current experience, however, has provided a strong evidence base on the crucial need to combine hardware (facilities) with software, that is, management, organization, capacity development, educational methodologies and promotion of hygiene behaviors. Participation of key stakeholders—teachers and educational staff, local government and community groups, parents and children – is seen as key to the success of these new WASH in school programs.

This collection of case studies examines both hardware and software aspects of WASH in schools and in different settings. The case studies focus in one way or another on four general themes: planning and management; actions in the school and teaching-learning; technology and design; and, scaling up or expanding WASH in schools while retaining its quality. The case studies are drawn from experience in Africa (Burkina Faso, Ghana, Kenya, Malawi, Senegal, Somalia, Zambia), Asia (Bangladesh, India, Nepal, Pakistan, Vietnam) and South America (Bolivia, Colombia, Nicaragua). The case studies provide insights into programs supported by UNICEF and also by other institutions such as the Aga Khan University, Caritas, Plan International and NETWAS International. Despite the breadth of institutional and national experience upon which the case studies draw, it must be noted that these 14 papers only provide a glimpse of the rich and often exciting experience in WASH in schools from around the world. Nonetheless, this is a 'glimpse' which will hopefully provide the reader with worthwhile insights into the current state of the art in school programming. At the end of each case study there is contact information for the reader seeking further information.

The case studies were prepared by the staff of the IRC International Water and Sanitation Centre in collaboration with Annemarieke Mooiman and Sumita Ganguly. The preparation of the case studies was overseen by Therese Dooley and Henk van Norden of UNICEF (New York) whose support is greatly appreciated.

All case studies are available at the WASH in Schools web site: http://www.schools.watsan.net

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