Cooking with the Sun

By Suzette Bienvenue

Image 1:
A solar Cook-It.

A photon released from the sun takes about eight minutes to reach the Earth. When the photon reaches Earth, it can be converted to stored energy or used to perform work. In the case of solar cooking, the focus is on the conversion of light energy to heat. The sunlight bounces off of a reflective material and is absorbed by a dark pot. The light energy is converted to heat that is trapped by a transparent covering. The simple physical principles applied in solar cooking can help bring desperately needed nourishment and clean drinking water to millions of impoverished people. Though not the first to use solar energy in this way, Barbara Kerr, in 1980, designed a cardboard box cooker kit that could be easily assembled at home. Her work inspired the creation of Solar Cookers International, which is one of the main non-profit organizations promoting solar cooking. This organization pioneered the introduction of a new type of cooking device, the panel cooker called the Cook-It. The simplicity and low cost of this invention made it a breakthrough. All one needed was cardboard, foil and heat resistant plastic. The Cook-It enabled solar cooking to spread through many poor countries where sunlight is plentiful, but natural resources are limited (Image 1).

More than half of the world's population relies on wood or coal to meet their most basic energy needs. Extensive wood gathering contributes to rapid deforestation of entire countries. The loss of forests causes flooding and soil erosion, resulting in further environmental degradation and thus increased poverty and hunger. In poor countries, the cost of cooking fuels can consume up to 30% of a families' daily budget. Solar cooking is a free alternative that allows families to spend money on food instead of fuel (Image 2).

Eliminating the need to gather wood for fuel is another valuable aspect of solar cooking. It is common for women to walk long distances searching for firewood and leaving them vulnerable. In the Iridimi Refugee Camp in Chad, solar cooking reduced firewood needs by 75% and kept women safer from the perils of the war-torn countryside (Images 3 and 4). To date, more than 90,000 refugees in this camp alone have benefited from solar cooking.

Solar cooking provides another set of health benefits for women. Without cooking fires, the dangers of burns, smoke inhalation and structural fires are minimized. And because it does not produce pollutants, solar cooking is an environmentally-friendly cooking method. In the third world, the most important use for solar cooking is water pasteurization. In places where preventable waterborne diseases like cholera and dysentery claim more than 3.4 million lives each year, this simple method of producing clean drinking water is a life-saver (Images 5 and 6).

Besides enjoying the health, safety and environmental benefits of solar cooking, women in developing countries have used it as an economic tool. Women have organized into cooperatives to teach the technique of solar cooking and have even used solar cooking as the cornerstone to build small businesses like bakeries (Images 7 and 8). It is only a matter of time until women worldwide recognize the benefit of solar cooking and advocacy for the spread of its use increases.

Even in a developed country like the United States, I have used solar cooking. First, it was a novelty, an interesting hobby for this food and cooking lover. Eventually, I began to use it as a teaching tool for young science students. As a classroom science teacher, I often sought practical examples of scientific principles I taught to engage my students. Knowing that all energy ultimately comes from the sun, I began to use solar cooking to help review physics. Solar cooking has proven to be a valuable hands-on activity that I use to demonstrate energy

*Image 2: **Groupings of food, each costing the same as the pile of charcoal in the middle.***

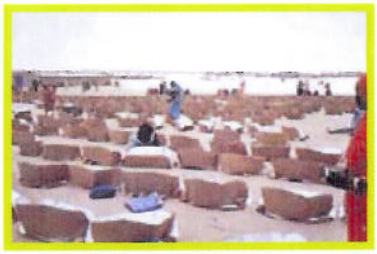

*Image 3 (top): **A refugee camp in Chad.***

*Image 4 (bottom): **Darfur.***

conversion, the greenhouse effect, conduction, convection and radiation to my sixth grade students. Each year, this project expands exponentially as students design and test their own cookers, vying for the bragging rights over creating the cooker design that achieves the highest temperature.

The inquiry and experimentation of the students leads to a marvelous learning experience about physics, engineering and materials. Capturing photons for heat transfer is the goal, but students unexpectedly find that they are also learning about other topics: geography, astronomy, nutrition, geometry and, at least once a year, the ignition temperature of cardboard (425 degrees F, for your reference).

My solar cooking experience has even redirected my career toward becoming an energy educator. At community events, I use solar cooking to represent the greenhouse effect as a means of engaging the public in conversations about greenhouse gas emissions and climate change. I was surprised by how many people were truly amazed that the sun could actually cook delicious food. I knew that I had them hooked, not only with the tantalizing smell of apple cobbler, but with the idea that everyone could cheaply harness the power of the sun to cook a meal. Solar cooking saves a small amount of money (anywhere from 20 to 60 cents per hour) by avoiding the consumption of fossil fuels and reducing the cooling costs associated with indoor cooking. By solar cooking, customers can save money and reduce carbon emissions. With adults, as with my sixth grade students, these demonstrations always lead to further discussions of social responsibility, energy conservation and sustainable living.

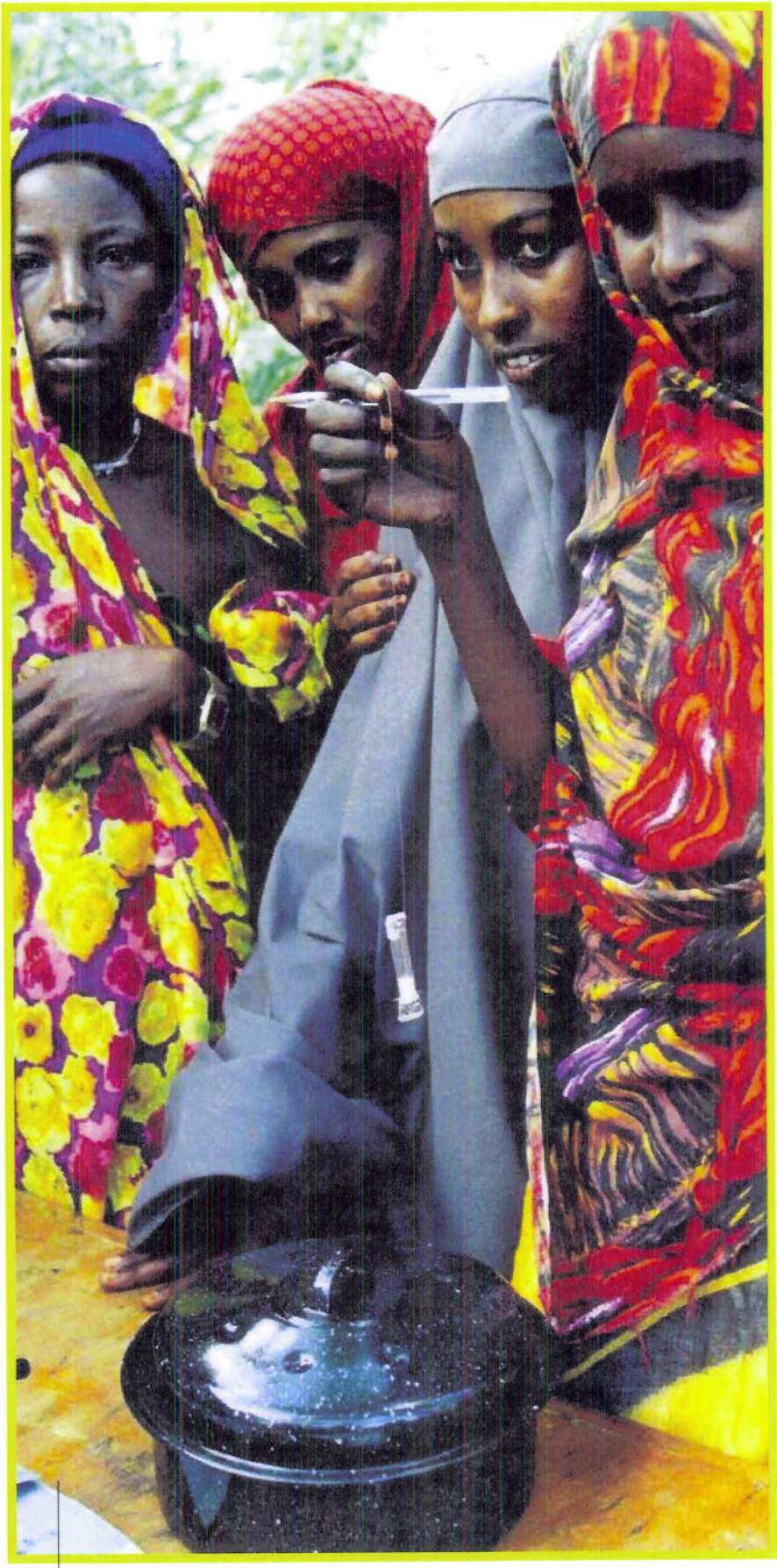

*Image 5: **Women using a WAPI (water pasteurization indicator) to test their water.***

Image 6: WAPI

Image 7: Faustine Odaba in Kenya who runs a solar cooker cooperative.

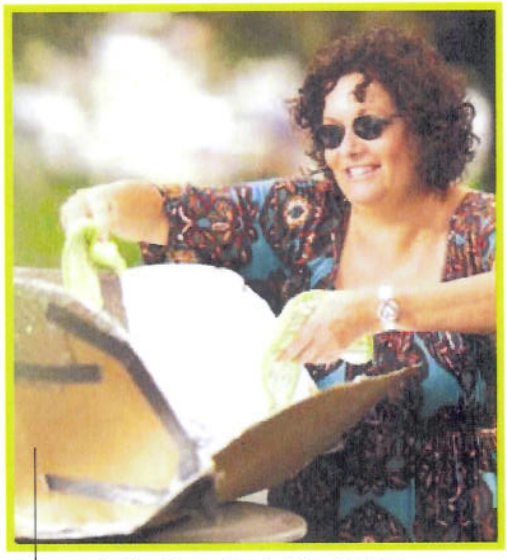

Image 9: *Suzette cooking for Thanksgiving.*

At public outreach events, I eagerly address the misconceptions associated with solar cooking: that it is unsafe or that one needs to live in a hot region. I solar cook for my family all year long (Images 9 and 10). All one needs is two to four hours of clear, blue skies and access to direct sunlight. Of course the time required does vary with the type of cooker, the season and the cooker's latitude. Depending on the type of solar cooker used, cooking time is generally longer than conventional cooking, but it is nearly impossible to burn your food! Solar cookers come in many forms and varieties. Some expensive models can be purchased commercially, others can be made with recycled materials very cheaply, but what is common to all forms is that once purchased or assembled, there is no additional expense since the fuel, sunlight, is free. For information on food safety and general solar cooking information, visit: www.solarcookers.org.

While solar cooking may not be practical for everyday use in the United States, I have encouraged many groups to become passionate about solar cooking. For local foodies, solar cooking resounds well with the slow cooking technique. Solar cooking helps retain vitamins and keeps food moist. It is my desire to see solar cooking move beyond a hobby so that everyone who owns a barbeque will also have a solar cooker nearby, keeping their kitchen cool while they save energy. Outdoor enthusiasts also enjoy the benefits of portable solar cookers. They are perfect for camping, hiking and boating, bringing gourmet cooking and energy savings to the wilderness. The only caution is to never leave your food unattended, bears do love a good casserole.

Another practical situation for solar cooking is in natural disasters. Every family's emergency preparedness kits should have simple solar cookers stocked so that families can have access to clean water and the ability to cook food. I will continue to use solar cooking to teach that all energy comes from the sun, and we should do our best to harness it directly. This direct energy provides a free way to become less reliant on the "old" solar energy stored in oil, gas and biomass. Besides allowing humans to become less dependent on fossil fuels, solar cooking can also help save millions of lives and improve the well-being of women and children in at risk countries. It is my desire that people everywhere become more knowledgeable of solar cooking and the broad-reaching the benefits of this free energy. ■

References

Solar Cookers International: 1919 21st Street, Suite # 101, Sacramento, California, 95811, USA

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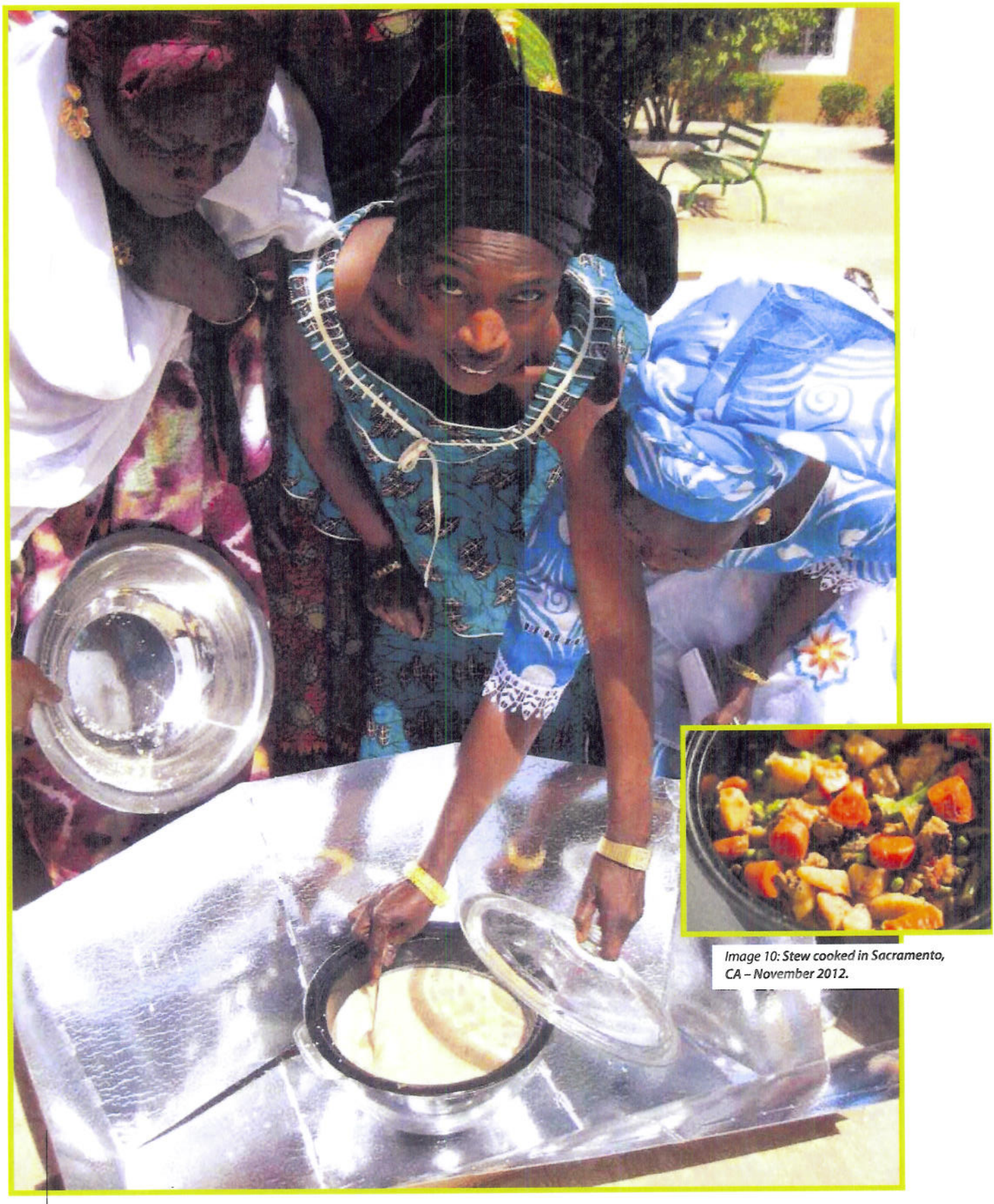

Image 10: Stew cooked in Sacramento, CA – November 2012.

Image 8: Women solar cooking in Kenya.