Overview:
Youth show what they know about rainwater harvesting by developing educational signs to explain systems to the public.

**Signs can educate the public by explaining processes and encouraging people to develop their own rainwater harvesting systems.**

Materials:

- “Sign Design Elements” handout (included)
- Pencils for participants to take notes on the site and system
- Photographs of educational signs (included)
- Paper and art materials for sketches of sign designs
- Computer with software capable of creating design files (may be a basic program such as Microsoft Word or PowerPoint or more complex design oriented programs such as Microsoft Publisher or Adobe Illustrator or InDesign) (optional)
- Computer projector and screen for PowerPoint demonstration (optional)

Activity Duration:

This is a longer-term activity which could take place over the course of weeks or months. It is also a culmination activity best conducted after participants have a substantial knowledge base and practical experience with rainwater harvesting systems.

- Tour and review of a rainwater system – 30 minutes to one hour
- Design process workshop with PowerPoint or “Sign Design Elements” handout – 45 minutes to one hour
- Youth sign design process, production, and installation – timeframe varies widely

Preparation:

- Investigate rainwater harvesting sites with access to the public that could be potential locations for educational signs.
- Gain approval from appropriate entities to develop signage for a specific location.
- Have or develop in-depth knowledge about the size, capacity, material, design, construction method, components, flow rate, and use of the rainwater harvesting system.
- Research municipal or county codes on installing signs at the desired location.
- Investigate sign company options to determine printing costs.
- Secure funding to print and install a sign.
- Based on costs and funds available, determine the sign size and building materials to use.
- Determine youth transportation needs to a rainwater harvesting site.
- Photocopy the “Sign Design Elements” handout for participants, pairs, or small groups.
- Photocopy or bookmark the educational sign examples.
Activity Steps:

The process will take place over time rather than in one session.

1. Explain to participants that a rainwater harvesting site has been chosen to become a demonstration model for the community, school, etc. (based on its location) and that they will participate in creating an educational sign to share information about rainwater harvesting principles and practices.

2. Tour the rainwater harvesting site with youth. Participants take notes while discussing the system’s size, capacity, material, design, construction method, components, flow rate, and use.

3. Show participants the photograph of rainwater harvesting tanks at Biosphere 2, north of Tucson, Arizona. Explain that the sign highlights the system’s purpose and processes in order to teach visitors. Explain that demonstration sites, museums, historic and community sites, nature trails, and other locations use educational signs to share information so that people can enhance their knowledge and appreciation.

4. In a classroom setting, participants work in groups to research rainwater harvesting processes, components, and uses to determine the information to include on their sign layouts. Signs may also include specific information about the site location and the specific rainwater harvesting system’s processes and purpose.

5. Discuss design elements with participants. There are six elements of design that make up what people see visually. They are tools that can be used in limitless ways to create meaning and impact. They are:
   - Line
   - Shape
   - Forms
   - Space
   - Color
   - Texture

There are also principles of design which organize the design elements. There are limitless ways to combine them to enhance a message. They are:
   - Balance
   - Emphasis
   - Movement
   - Pattern
   - Repetition
   - Proportion
   - Rhythm, variety, and unity

6. Distribute the “Sign Design Elements” handout and discuss the elements. Using the photos of the educational signs, point out different elements that are evident on the examples.

7. If there is a computer and projector available, create an interactive PowerPoint presentation with slides like those on the “Sign Design Elements” handout. Participants contribute to the presentation as a way to explore the meaning of different elements and principles of design. (For example, display a blank slide and explain that one design element is a line. As participants describe different kinds of lines, use the “AutoShapes” tool in PowerPoint to draw a variety of lines on the slide. Label the slide with the word, “Line,” and open another blank slide. This slide might address the element, “shape.” Participants suggest different shapes and they are inserted and labeled on the slide.) The PowerPoint presentation can be an interactive brainstorming and learning tool. The examples of educational signs can be scanned into the PowerPoint presentation ahead of time and the different elements and principles of design can be addressed in the examples by toggling back and forth between the examples and the element descriptions.
8. Participants use their “Sign Design Elements” handouts as a guide as they experiment with layout ideas and create sign design drafts, aiming to incorporate design elements and principles in their signs.

9. Participants analyze the drafts and choose a final design for the actual sign.

10. Participants gain design approval from all necessary entities.

11. Depending on youths’ ages, some may take a leadership role in researching the sign production process and developing fundraising events.

12. Select a sign making company and follow-up with the company throughout the sign making process.

13. Plan a “grand opening” celebration once the sign has been installed. Encourage the media to cover the event so the community can gain awareness about rainwater harvesting and youth community outreach efforts.

Source:

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Rainwater Harvesting Tank
Exhibit at Biosphere 2, Oracle, Arizona

Photograph courtesy of Matt Adamson
Educational Sign at Biosphere 2
Oracle, Arizona

Active rainwater harvesting system
biosphere village

Water harvesting has been practiced by residents throughout the semi-arid Southwest for over 1,400 years. Its advantages are many: precious water is used where it is collected; top water is not wasted on non-potable uses; and runoff is reduced. All you need to become a rainwater harvester is a roof or pavement, a collection system such as a gutter or curb, and a place to store the water, such as a cistern.

University of Arizona students designed a simple rainwater harvesting system for this cistern to obtain enough water for a small drip irrigation system and to flush one of the toilets inside. In all, they estimated a monthly average need for about 875 gallons.

During a one-inch rainfall, around 1,025 gallons of water can be collected from the 1,640 square feet of accessible roof – enough for more than a month. The diagram shows the irrigation system design and how gutters funnel rainwater into two 2,500 gallon fiberglass cisterns – enough to last through several dry months.

Photograph courtesy of Matt Adamson
Educational Sign at Cochise College, Sierra Vista, Arizona

Adaptations
THE KEY TO DESERT SURVIVAL

The signs that line this trail tell the story of how animals and plants live in the High Desert. Adaptation to a dry, hot climate consists of many strategies. Creatures with successful adaptations result in higher rates of survival and reproduction. Adaptations may involve the anatomy of an animal or plant, the way it functions (physiology), or the way it behaves.

Some major issues that a living creature faces in the High Desert are balancing the water budget, the heat budget, and the energy budget. Each of these three interrelated budgets may be considered as a series of gains and losses. For example, water may be used as a coolant, as when a plant undergoes transpiration (the evaporation of water through pores in leaves that provide cooling). The opening of pores in the leaves is required to obtain air needed for plants to photosynthesize food from sunlight (providing energy). In the process of a plant opening its leaf pores, all three budgets may be directly impacted. Animals also encounter interactions with their water, heat, and energy budgets. Doves, for example, fly to water holes daily. This flight produces heat requiring water to help dissipate the heat. If water sources are abundant, then doves may forage in a more widespread manner in search of food.

Challenge of the Water Budget
Balancing the water budget in the High Desert is problematic because of limited opportunities for water gain and frequent conditions limiting water loss. Plants are very sensitive to water loss and must make the most of the water they do receive. In the desert environment, small, sporadic periods of precipitation are vital to providing plants and animals with water resources. Water loss is usually limited during the day and even more during the summer. Many desert organisms, such as cacti, store and use water efficiently to minimize the effects of dry conditions.

Challenge of the Heat Budget
Water and heat budgets are often closely related. Desert plants during summer heat require an organism’s total water loss. The low evaporation of water in the desert allows for an organism’s total heat loss by the evaporation of water in the desert. The lower water content required for survival also means that many dry plants are adapted to tolerate the desert’s high temperatures.

Challenge of the Energy Budget
Energy is derived from food. An animal’s energy balance may be found between energy use and food intake. A similar condition exists for plants; their need to provide energy also requires a balance between energy use and food intake. In the balance to supply the energy budget, plants use the energy budget out of balance.
Sign Design Elements
(Page 2)

Balance

Emphasis
This part of the page has less emphasis than the other part of the page.

This part of the page has greater emphasis because the font size is larger and bolder. It is in the center of the page. Color adds a lot of extra punch.

Movement (how the eye moves)

Repetition
Past Present Future

Proportion

Same proportion Varying proportion

Rhythm, variety, and unity use elements together to keep the viewer’s interest