

## GLOSSARY:

**Biome:** A community of plants and animals that occupies a distinct region. Terrestrial biomes, typically defined by their climate and dominant vegetation, include grassland, tundra, desert, tropical rainforest, and deciduous and coniferous forests.

**Ecosystem:** A community of organisms in their physical environment, viewed as a system of interdependent relationships, including the flow of energy through trophic levels and the cycling of chemical elements and compounds through living and nonliving components of the system.

**Greenhouse:** A building, room, or area, usually of transparent material, in which the temperature is maintained within a desired range, used for cultivating tender plants or growing plants out of season.

**Meteorologist:** The science dealing with the atmosphere and its phenomena, including weather and climate.

**Radiation:** Streams of photons, electrons, small nuclei, or other particles. Radiation is given off by a wide variety of processes, such as thermal activity, nuclear reactions (as in fission), and by radioactive decay.

**Telemetry:** The use of radio waves, telephone lines, or other means, to transmit the readings of measuring instruments to a device on which the readings can be indicated or recorded. 2. The measurement of linear distance using a tellurometer.

**Topics:** Either of the two parallels of latitude representing the points farthest north and south at which the Sun can shine directly overhead. The northern tropic is the Tropic of Cancer and the southern is the Tropic of Capricorn. The tropics are generally the warmest and most humid region of the Earth.



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# Show Me Science Technology, Genetic Engineering, Biotechnology

## Electronics

## Benefitting the Environment

K4612DVD

*Advanced Teachers Guide*

## SYNOPSIS:

Natural disasters affect people all over the world. In this issue, electronic river management systems are being put in place to identify and possibly control floods. This program shows how we are utilizing electronics to understand environmental conditions and help to avoid disasters.

The Eden Project in England uses a series of electronics to successfully recreate an ecosystem similar to one found in the Caribbean or the Amazon. To do this, scientists and engineers designed a biodome to serve as a greenhouse with a series of electronic sensors that help to govern the temperature, humidity, and soil composition.

Weather stations on the outside of the dome detect temperature, solar energy levels, wind speed, as well as rainfall, and make necessary adjustment of these factors to help the biodome flourish. As more regions across the planet experience extremes in weather, and as more natural disasters such as hurricanes and tsunamis affect densely populated areas, this technology will be all the more important.

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## CURRICULUM UNITS:

- Computer science
  - Ecology
  - Engineering
  - Environmental science
  - Physical science
  - Physics
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## CAREER OPPORTUNITIES:

- Chemist
- Engineer
- Computer aided design

## PROGRAM OVERVIEW:

Scientists created the Eden Project, a hot and humid tropical environment, by building an enormous greenhouse made of a special plastic foil. The material is transparent, allowing for sunlight to reach the plants. With advancements in science and engineering, not only can we predict and limit the impact of environmental disasters, but we can imitate nature itself.

Scientists and engineers have developed systems to monitor potential flood areas to help mitigate natural disasters. Areas along rivers that have a propensity to flood are equipped with systems that include key elements: inputs, processing, outputs, and feedback. Inputs are the means by which the system gathers information.

Eight hundred and fifty outstations along the river are equipped with sensors that record the height of the river and rain gauges to keep track of rising waters. If it rises too fast, there is a warning system to people nearby; otherwise it can usually be controlled by a series of dams or sluice gates. Local weather forecasts are part of the processing. These factors combined create a system that has eliminated dangerous floods by controlling the river at different points through electronics.

## ISSUES & CRITICAL THINKING:

1. Discuss with students how technology has helped to prevent damage and loss of life due to natural disasters. Ask them to offer ideas for future technologies regarding flooding, hurricanes, tornados, etc.
2. Even though technology solves practical problems and serves human needs, give some examples of how it also creates new problems and needs.
3. Research the history of miniaturization of information processing hardware. Is there a limit to which this miniaturization can occur?
4. Despite technological and engineering advances, flooding still occurs. Discuss with students the pros and cons of using land “reclaimed” from rivers for recreational, building, or farming.