



What do a dung beetle, a free fall and monkey waste all have in common?

Listen to Billy B's rendition of "Free Falling" to find out!

Rhythm and Roots

The Approach

Billy utilizes comprehensive sensory integration through song, dance, audience participation and a multi-dimensional backdrop to convey scientifically sound information related to biological indicators, water quality, global warming and other relevant ecological concepts.

Show participants will thrill to parodied popular songs such as "The Men in Black" as they hear "The Flies in Black" and learn about water quality, macroinvertebrates, and the Clean Water Act. Each parodied song in the show presents important scientific standards in a stimulating and accurate manner.

The Objective

Middle School students will gain a clear awareness and explicit knowledge of concepts related to; the ozone layer, molecular structure of CFC's and life on earth, interaction between major industrial countries and the environment, symbiotic relationships in the soil, mycorrhizae and root systems, biological diversity and more.



The Result

Middle school students can be a tough audience; however, Billy B was able to hold their attention and get them on their feet and singing along. The staff enjoyed him and his contact information was requested by two teachers. Great show - important message!

Principal

Suggested Pre-Performance Activities

Discuss the following topics with students:

1. Corrective actions that have been implemented by the government and/or specific organizations on behalf of the environment.
2. Ask students: What "rays" from the sun are dangerous to life on earth? What protects life on earth from these rays?

Rhythm and Roots In the Classroom

Vocabulary Words

biological indicators – The status of living organisms as a reflection of the health of the environment.

biological diversity – The number of different plant and animal species in a given area.

Chlorofluorocarbons – any of a class of nontoxic, nonflammable organic compounds containing carbon, fluorine, chlorine and hydrogen. Most commonly used as a refrigerant.

Clean Water Act - the primary federal law in the United States governing water pollution. The act established the goals of eliminating releases of high amounts of toxic substances into water and ensuring that surface waters would meet standards necessary for human sports and recreation.

global warming - an increase in the world's temperatures.

ozone layer - the layer of the upper atmosphere, from 15 to 50 km/10 to 30 mi above the Earth's surface, where most atmospheric ozone collects, absorbing harmful ultraviolet radiation from the Sun.

macroinvertebrates - organisms having no spinal column such as the larval and nymph stages of insects.

Montreal Protocol - an international treaty designed to protect the ozone layer from depletion by phasing out the production of a number of substances believed to be responsible for ozone depletion.

mycorrhizae - a mutually beneficial association of a fungus and the roots of a plant such as a conifer or an orchid, in which the plant's mineral absorption is enhanced and the fungus obtains nutrients.

radiation - energy emitted in the form of particles by substances such as uranium and plutonium, whose atoms are not stable and are spontaneously decaying.

symbiotic - a close association of animals or plants of different species that is often, but not always, of mutual benefit.

UV rays - invisible solar radiation that lies just beyond the violet end of the visible spectrum in the wavelength range from 10 to 400 nanometers (just below the x-ray range) and can harm living tissue.

water quality - a technical term that is based upon the characteristics of water in relation to guideline values of what is suitable for human consumption and for all usual domestic purposes. Components of water quality include microbial, biological, chemical, and physical aspects.



Post Performance Activities

Discuss the following concepts:

1. What did middle school students from Minnesota discover about the frogs in their area?
2. What actions are currently being taken and what actions can be taken in the future to protect the planet and quality of life?

Teacher Resources

CLASSROOM READING

1. Whose Trees? John Bruce, University of California, Berkeley
2. The Enchanted Canopy–Andrew Mitchell, Macmillan
3. Rainforest Secrets – Arthur Dorrus, Scholastic, Inc.
4. CO2. Diet for a Greenhouse Planet– National Audubon Society

National Science Education Standards

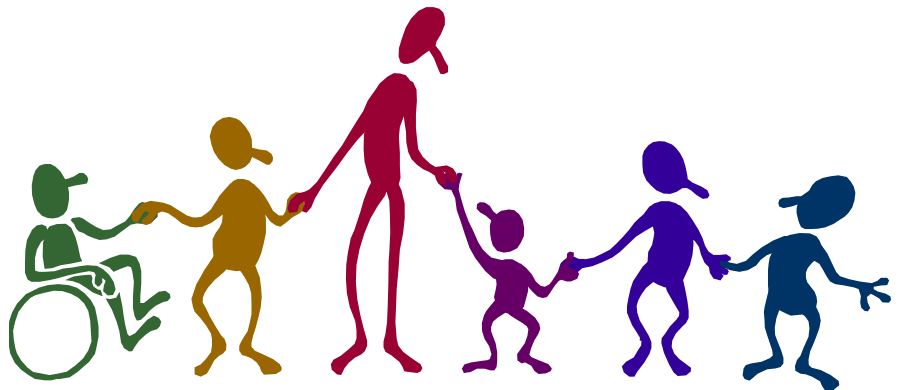
Rhythm and Roots conveys connections to the following standards:

Physical Sciences

- _ Properties of objects and materials
- _ Position and motion of objects
- _ Transfer of energy

Life Sciences

- _ Characteristics of organisms
- _ Life cycles of organisms
- _ Populations and ecosystems
- _ Organisms and environments
- _ Structure and function in living systems
- _ Diversity and adaptations of organisms



Earth and Space Science Standards

- _ Properties of earth materials
- _ Changes in earth and sky
- _ Earth in the solar system

Science and Technology Standards

- _ Abilities to distinguish between natural objects and objects made by humans
- _ Abilities of technological design

Personal and Social Perspectives

- _ Personal health
- _ Risks and benefits
- _ Science and technology in local challenges
- _ Types of resources
- _ Changes in environments
- _ Populations, resources, and environments
- _ Characteristics and changes in populations

National Research Council. *National Science Education Standards*. Washington, D.C.: National Academy Press, 1996.