

## Understanding Global and Local Albedo

Introductory Activity: Local Urban Heat Island Activity / Global Albedo Exploration

Field Activity: Tools Explanation / GPS Site Mapping, Outdoor Field Study

**Description:** Albedo is the measurement of the amount of solar radiation that is reflected off of a surface. Ice and snow reflect a large amount of solar radiation causing a high albedo measurement, while the open ocean and soil reflect less solar radiation causing a low albedo measurement. Solar energy that is absorbed is later emitted as heat. Students will study albedo as it relates to the earth, the local urban heat island effect and the likely results of reduced snow and ice cover on global temperatures. Students will use Vernier LabQuest handhelds and sensors to measure the temperature and reflected light of different land surfaces on their school grounds. Using data measurements and observational accounts of weather, students will draw conclusions about the local albedo effect in their area.

**Objectives:** By the end of the program, the students will be able to:

- Define the terms albedo, solar radiation, reflection, permeable, impermeable, and sea ice
- Explain the urban heat island effect
- Identify different surfaces that either absorb or reflect solar radiation
- Explain how the permeability of surfaces plays a role in local temperature
- Differentiate between areas of high and low albedo both locally and globally
- Explain how human actions can influence the urban heat island effect
- Use scientific investigation tools and observational skills to record characteristics of surfaces, current weather, temperature, and reflected light

### Indiana Academic Standards for Science:

**Fourth:** 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 2.1, 2.3, 2.4, 2.5, 2.7, 3.11, 3.13, 4.7, 6.1, 6.2

**Fifth:** 1.1, 1.2, 1.3, 1.4, 1.5, 2.1, 2.2, 2.4, 2.7, 2.8, 3.8, 3.9, 3.10, 3.12, 5.1, 5.7, 5.8, 5.10, 6.2

**Sixth:** 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 2.1, 2.2, 2.3, 2.8, 3.13, 5.2, 5.6, 7.2, 7.3

**Seventh:** 1.1, 1.2, 1.3, 1.4, 1.7, 1.10, 2.3, 2.6, 2.8, 3.11, 5.4, 7.1

**Eighth:** 1.1, 1.2, 1.3, 1.6, 1.8, 2.2, 2.4, 2.5, 2.7, 2.9, 3.14, 3.15, 5.1, 5.8, 5.9, 7.1, 7.2, 7.3, 7.7

**High School:** Env.1.4, Env.1.6, Env.1.8, Env.1.10, ES.1.10, ES. 1.13

### Indiana Academic Standards for Math:

**Fourth:** 1.1, 1.2, 1.3, 1.9, 7.1, 7.3, 7.4, 7.5, 7.6, 7.8, 7.9

**Fifth:** 1.2, 2.5, 5.6, 6.2, 7.1, 7.3, 7.4, 7.5, 7.7, 7.8

**Sixth:** 5.1, 5.6, 6.3, 7.1, 7.4, 7.5, 7.6, 7.9, 7.10

**Seventh:** 5.1, 7.1, 7.4, 7.6, 7.7, 7.10, 7.11

**Eighth:** 3.7, 7.1, 7.4, 7.6, 7.7, 7.10, 7.11

### Excellence in Environmental Education – Guidelines for Learning (Pre K – 12):

Fourth Grade	Fifth – Eighth Grade	Ninth Grade
Strand 1 A, C, D, E, G	Strand 1 C, D, E, G	Strand 1 C, D, E, G
Strand 2.1 B, C	Strand 2.1 B, C	Strand 2.4 A, D
Strand 2.4 A, B, D	Strand 2.4 A, B, D	Strand 3.1 C
Strand 3.1 C	Strand 3.1 C	Strand 4 D
Strand 4 D	Strand 4 D	

Please note specific learning objectives and academic standards will vary based on timeframe, location, availability of resources, and tailored content of programming.