

## Groundwater Analysis

**Introductory Activity:** Water Cycle Relay, Model Aquifer Building

**Field Activity:** Tools Explanation / Watershed Mapping, Outdoor Field Study

**Description:** Students explore the water cycle and investigate unseen characteristics of groundwater. Acting as scientists, they use CHEMetrics multi-analyte photometers and Vernier LabQuest handhelds and sensors to measure pH, temperature, chloride, hardness, iron, and nitrate. Students conduct simple percolation tests to measure soil infiltration rates, observe soil cores near the well, make qualitative observations, and use collected data to draw conclusions about area groundwater quality.

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

- Define the terms watershed, groundwater, aquifer, water table, saturated zone, unsaturated zone, and percolation/infiltration
- Identify local watershed by name and number
- Label the different components of the water cycle
- Describe a well – what it is, how it functions, and its uses
- Construct a small model aquifer to apply and demonstrate groundwater terms and concepts
- Use scientific investigation tools and mathematics to collect groundwater quality data
- Determine the relationship between groundwater and water storage in aquifers
- Examine their role and formulate ways they can aid in maintaining healthy groundwater

### 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, 3.3, 4.7, 6.1, 6.2, 6.3

**Fifth:** 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 2.1, 2.2, 2.4, 2.7, 2.8, 3.4, 3.5, 5.1, 5.7, 5.8, 5.10, 6.1, 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, 3.8, 3.9, 4.8, 5.2, 7.2

**Seventh:** 1.1, 1.2, 1.3, 1.4, 1.7, 1.8, 1.9, 1.10, 2.3, 2.6, 2.8, 3.12, 3.13, 4.10, 4.14, 5.4, 7.1, 7.2

**Eighth:** 1.1, 1.2, 1.3, 1.8, 2.2, 2.4, 2.5, 2.7, 2.9, 3.6, 5.1, 5.8, 5.9, 7.1, 7.2, 7.3, 7.7

**High School:** Env.1.4, Env.1.6, Env.1.9, Env.1.10, Env.1.20, Env.1.25, Env.1.26, Env.1.29, Env.1.34, Env.1.35, ES.1.10, ES.1.20, ES.1.21, ES.1.25, B.1.40, B.1.41, B.1.45

### Indiana Academic Standards for Mathematics:

**Fourth:** 1.1, 1.2, 1.3, 1.9, 5.1, 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:** 2.1, 2.2, 5.1, 5.6, 6.3, 7.1, 7.4, 7.5, 7.6, 7.9, 7.10

**Seventh:** 2.1, 5.1, 5.2, 5.3, 7.1, 7.4, 7.6, 7.7, 7.10, 7.11

**Eighth:** 2.1, 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, B, C, D, F, G	Strand 1 A, B, C, D, F, G	Strand 1 B, C, F, G
Strand 2.1 B	Strand 2.1 B	Strand 2.1 A
Strand 2.2 C	Strand 2.4 A, B, D, E	Strand 2.4 A, D
Strand 2.3 A	Strand 3.1 B, C	Strand 3.1 C
Strand 2.4 A, D	Strand 4 D	Strand 4 D
Strand 3.1 C		
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.