

STEM PATHWAYS

Watersheds at Work **STEM** Challenge!

The Problem

Heavy seasonal rains are causing multiple sources (point & non-point) contaminants to enter our waterways. Everybody who lives in our watershed has a responsibility to help control where it goes & how fast it gets there.

The Challenge

To create a solution that diverts, reduces and manages the flow of contaminants through your watershed.

Find a Solution

ASK: What are some possible ideas?

PLAN: Test out your ideas

CREATE: Put your ideas to the test

IMPROVE: Review results & make changes

Things to Consider

1. What are some potential engineered or natural solutions to controlling contaminated water in your watershed?
2. How does topography impact flow rate and management solutions?
3. What is the correlation between land use and volume of run-off?

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Design Your Watershed

Select 3 Different Land Uses

One must be agricultural and one urban

- **Agricultural** – corn and soybean cropland, pasture or hay field, livestock, fruit and vegetable production
- **Urban** – Commercial lawn application, waste water treatment, car wash, new construction, water treatment plant, residential housing, golf course, roads.

Select 3 Different Water Management Solutions

One must be engineered and one natural

- **Engineered**– retention pond or catch basin, field tile, storm drain, filter strip, wetlands
- **Natural** – Tree buffer, grass waterways or filter strips, reduce till practice, wetlands

Select 2 Water Sources

One is rain and the other major body of water for the watershed (stream, river, lake)



SAFETY ALERT: You can touch the water polymer crystals, but do not put them in your nose, mouth or eyes!



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Watersheds at Work **STEM** Challenge!**Set-Up & Testing Considerations
For Each Team of 4**

- 4 ft. x 4 ft. Engineer Challenge Area**
- Base Materials:**
 - Two - 30 gallon trash bags – one for challenge mat and one for topography.
 - Disposable bowls, cups, newspaper modeling clay to create topography between the two gallon trash bags and a surface water source.
- Land Use Materials:** Select materials to represent three types of land uses and add to the topography.
- Engineered and Natural Barriers & Diverters:** Select three materials to reduce flow of pollutants through the watershed.
- Point & Non-Point Sources:** Apply appropriate point and non-point sources to appropriate land use areas.

TIME: 30 MINUTES**Materials and Supplies**

- Masking Tape
- Cotton Swabs
- Tissue Paper
- Paper Bowls
- 20-30 gallon Garbage Bags
- Straws
- Gravel
- Cotton Balls
- Water Polymer Crystals
- Cheesecloth
- Activated Charcoal
- Paper Cups
- Sand
- Peat Moss
- Mulch
- Felt Interfacing
- Muslin
- Sponges
- Corn Packing Peanuts
- Powdered Drink (chemicals)
- Cocoa (soil)
- Spray Bottle with Water



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Engage the Learner

- What do you know about water quality in your watershed?**
- What are some realistic management solutions to agricultural land?**
- What natural solutions would work in urban areas?**
- What will accelerate water flow in your watershed? How can you manage it?**

Observations & Conclusions

- Observe the water flow rate in your watershed. How much chemical was absorbed? How much soil was diverted?**
- Which land modifications had the greatest impact?**
- How does the rate of rainfall impact your solutions?**
- Which solutions performed the best engineered or natural and why?**
- Which is more devastating a cup of water poured on or a cup of water sprayed on? How does it impact a single point versus the entire watershed?**
- What recommendations would you make based on your findings?**

STEM Career Path ...**Water Management Specialist**

Who else might be involved? Urban planner, civil and environmental engineers, soil conservationist, meteorologist, hydrologist, biologist, agronomist.

Who benefits? Improved water quality for everyone, economic benefits to farmers, municipalities and taxpayers, environmental protection to ecosystems.

What other issues are water management specialists helping to solve? wetland restoration, groundwater contamination, water quality and quantity issues – dams, flooding, levies, etc.

Refer to Career Focus Card for more details.



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