3-31-2023

Environmental Issues Instruction: Nourishing our Water and Soil Through Sustainable Agriculture

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Nourishing our Water and Soil:

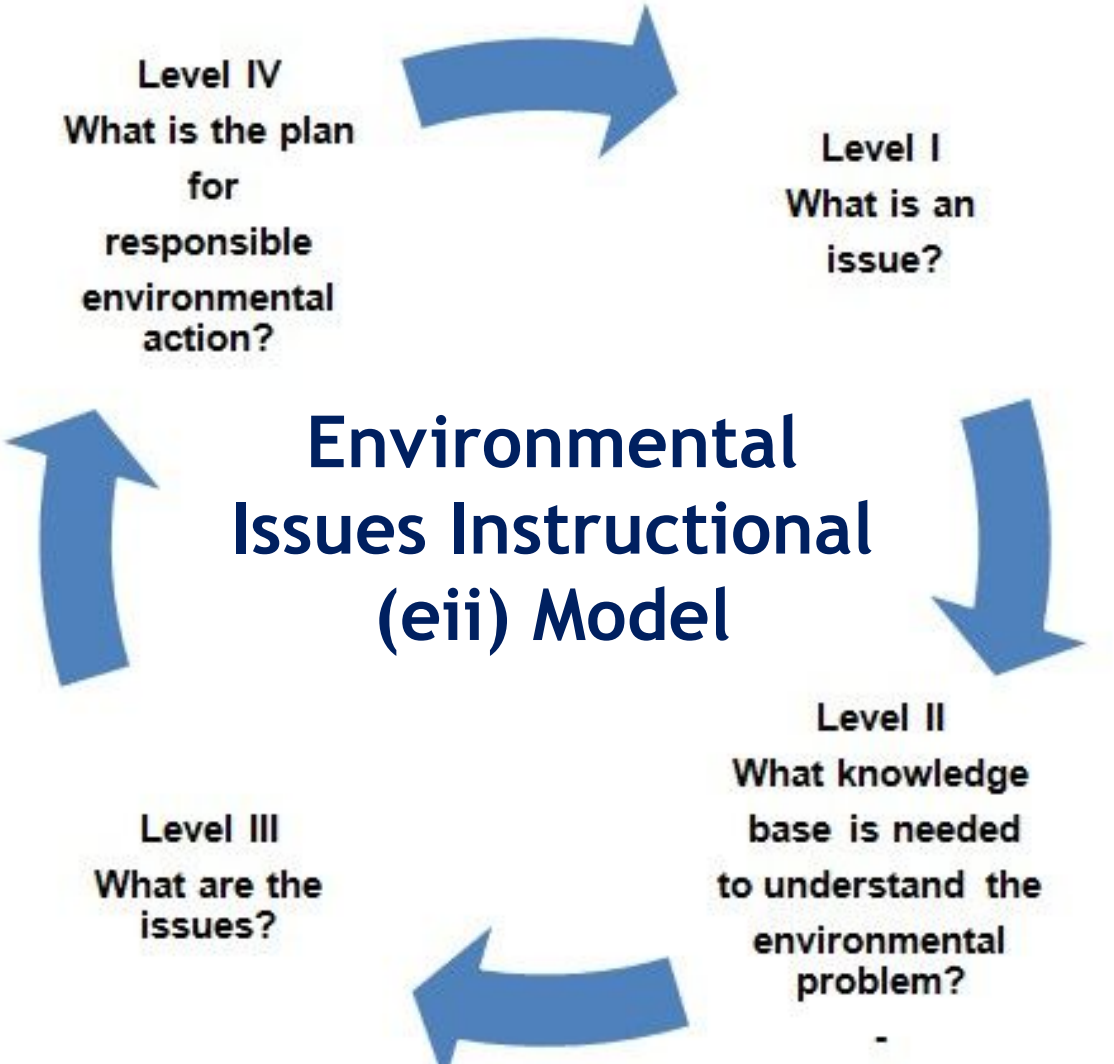
A STEM Approach to Soil Science

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

UPPER IOWA UNIVERSITY

REAP

Environmental Issues Instructional (eii) Model

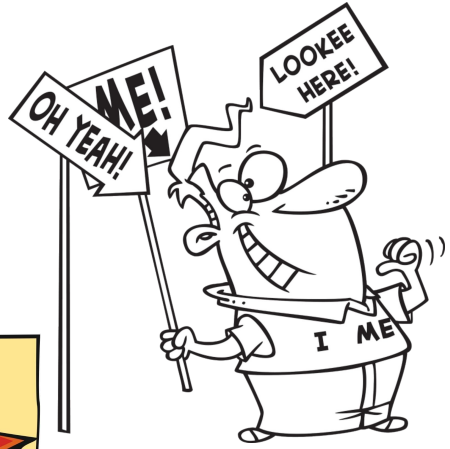


Level I: What is an issue?

Level I: What are your motivators?

What motivated you to come to this session?

Religion



Egocentric

Education

Ecological

What motivates you to care about soil and water?

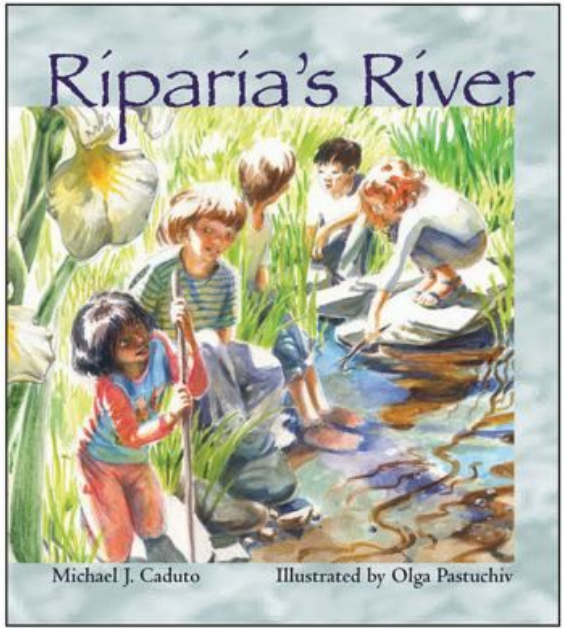
Economic

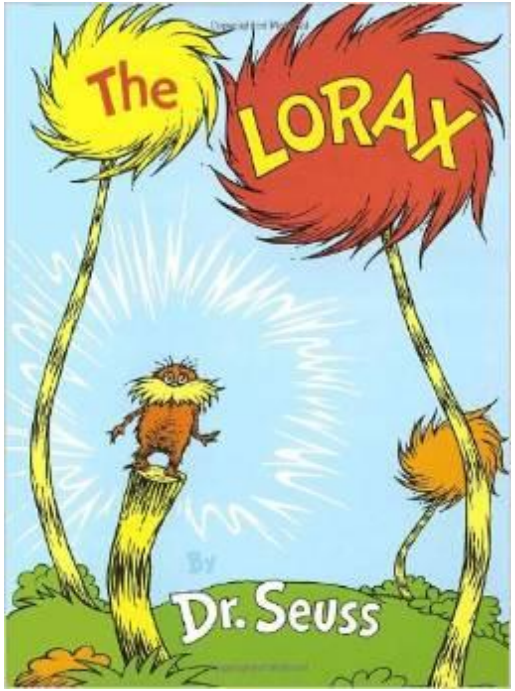
Political

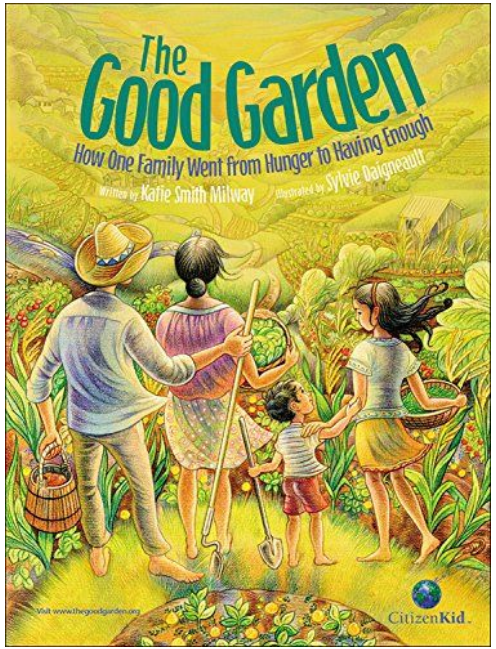
Recreational

Level I: What is an environmental issue?

What is the difference between a problem and an issue?







What are the problems related to soil and water?

Our Focus Issue

- **Should water and soil quality be considered when making decisions regarding land usage?**

Level II: What knowledge base is needed to understand the environmental problems?

Level II: Ecological Foundations

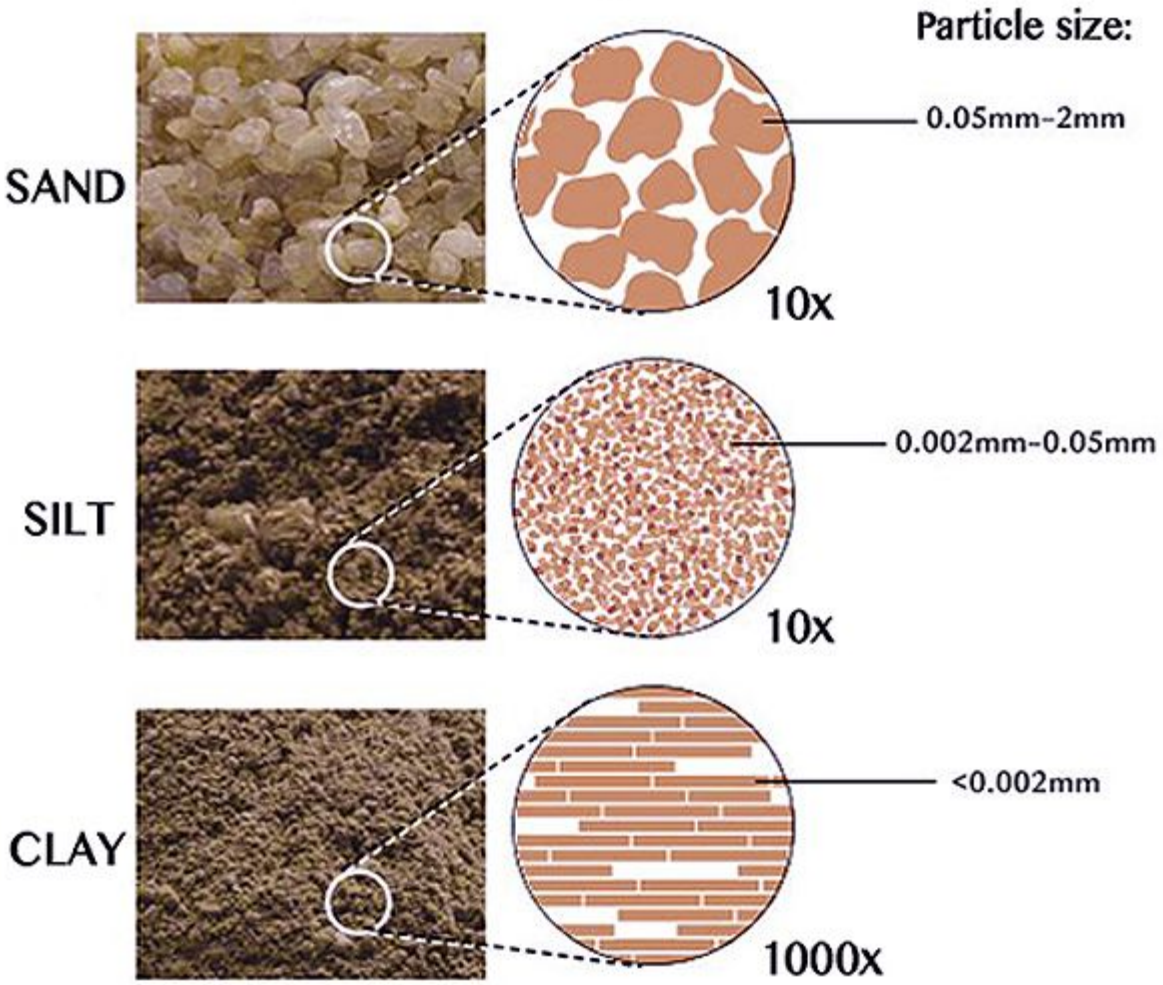
- Why are soil and water important?
- How are water and soil connected?
- What problems and issues are associated with water and soil?
- How are growers protecting soil and water?
- What is the difference between conventional farming and urban farming?

Focus Questions

- What are properties of soil?

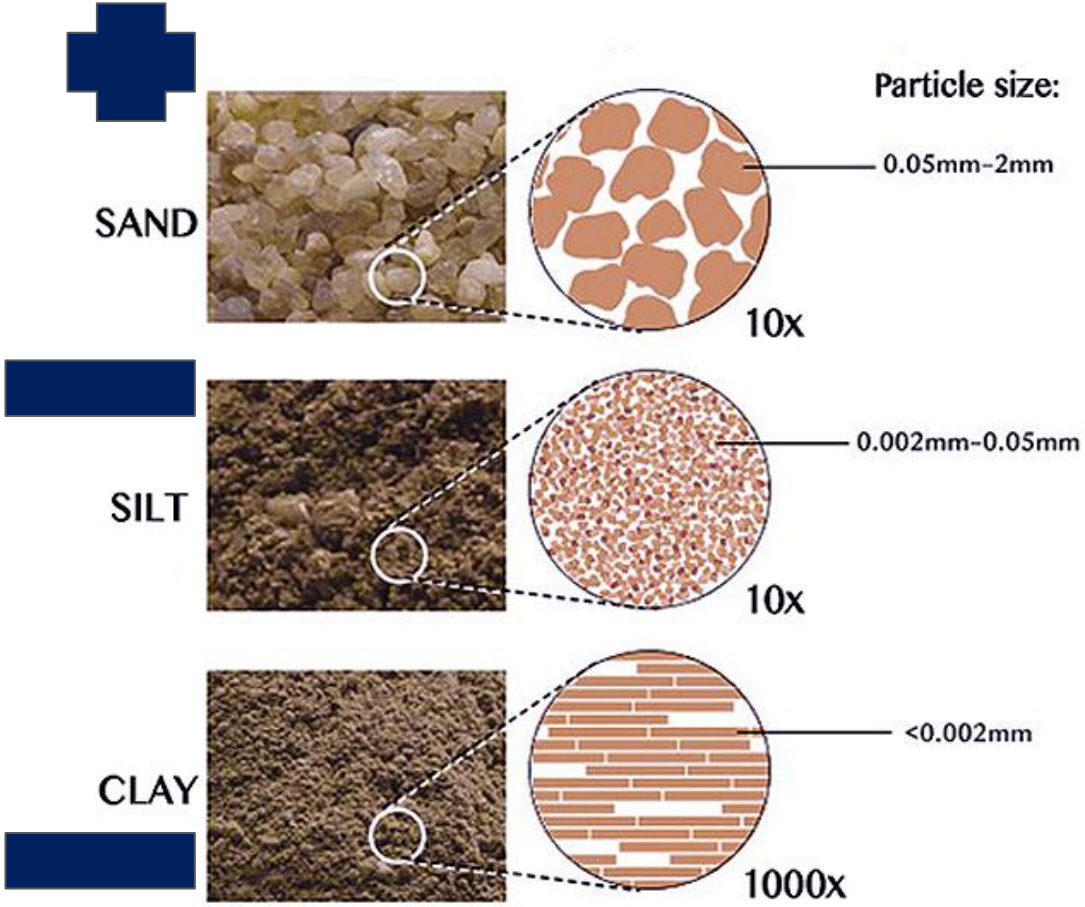
- How can we engineer a type of soil that can filter water and grow a crop?

What are the properties of soil?



What are the properties of soil?

What are the properties of soil?



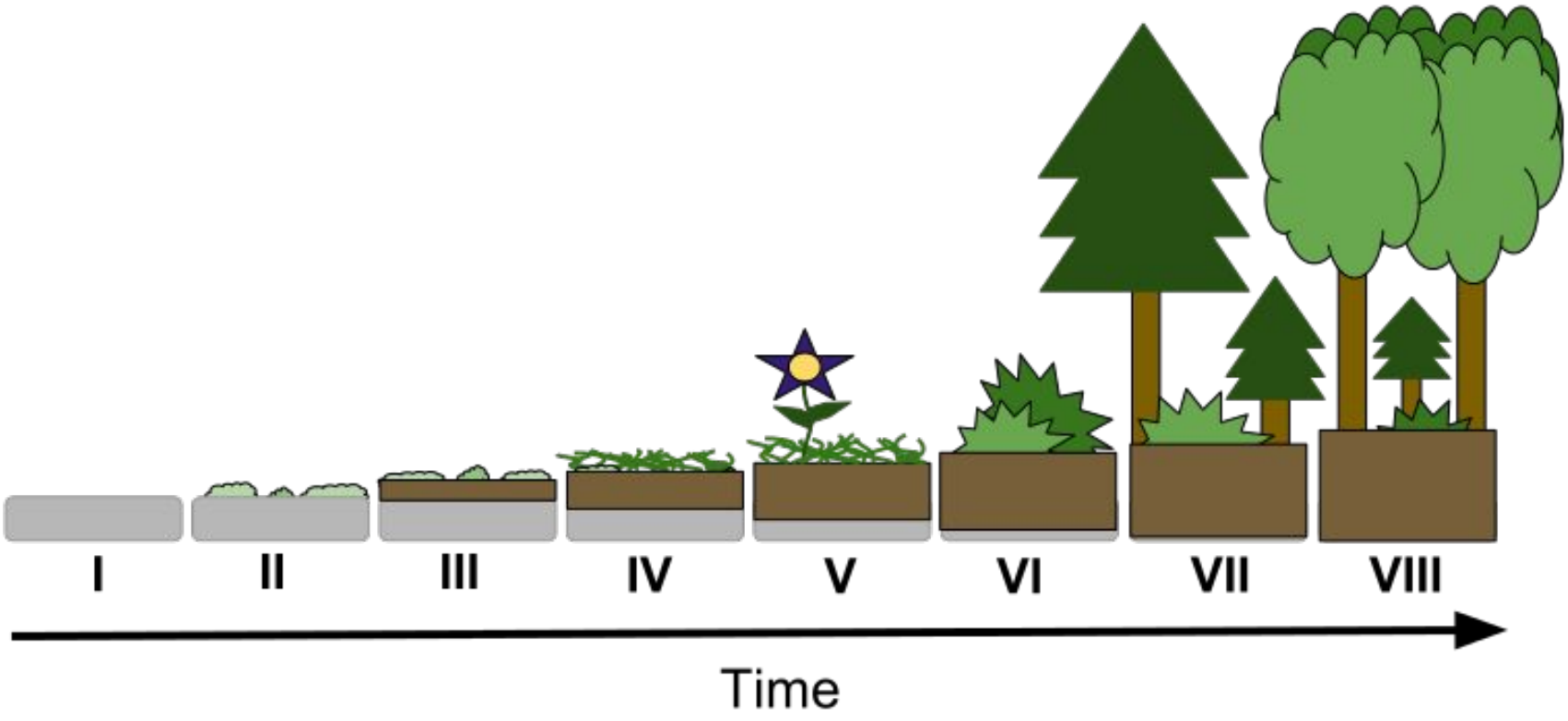
Let’s observe some of these properties we’ve talked about so far...


Sand
Moab Sand
Iowa Clay
Aurora Clay
Silt

What are the properties of soil?

How do people benefit from these soil properties?

How does the environment benefit from these soil properties?


I
II
III
IV
V
VI
VII
VIII
Time

TASK: ENGINEER

- Determine which particle combination will be best for plant growth.
  - **Engineer your soil**
    - What characteristics do you want from your soil?
    - What nutrients do you want in your soil?
    - How will you balance the need for plant growth and filtration?

TASK: TEST YOUR SOIL

- Determine which particle combination will be best for plant growth.
    - Choose and plant a seed

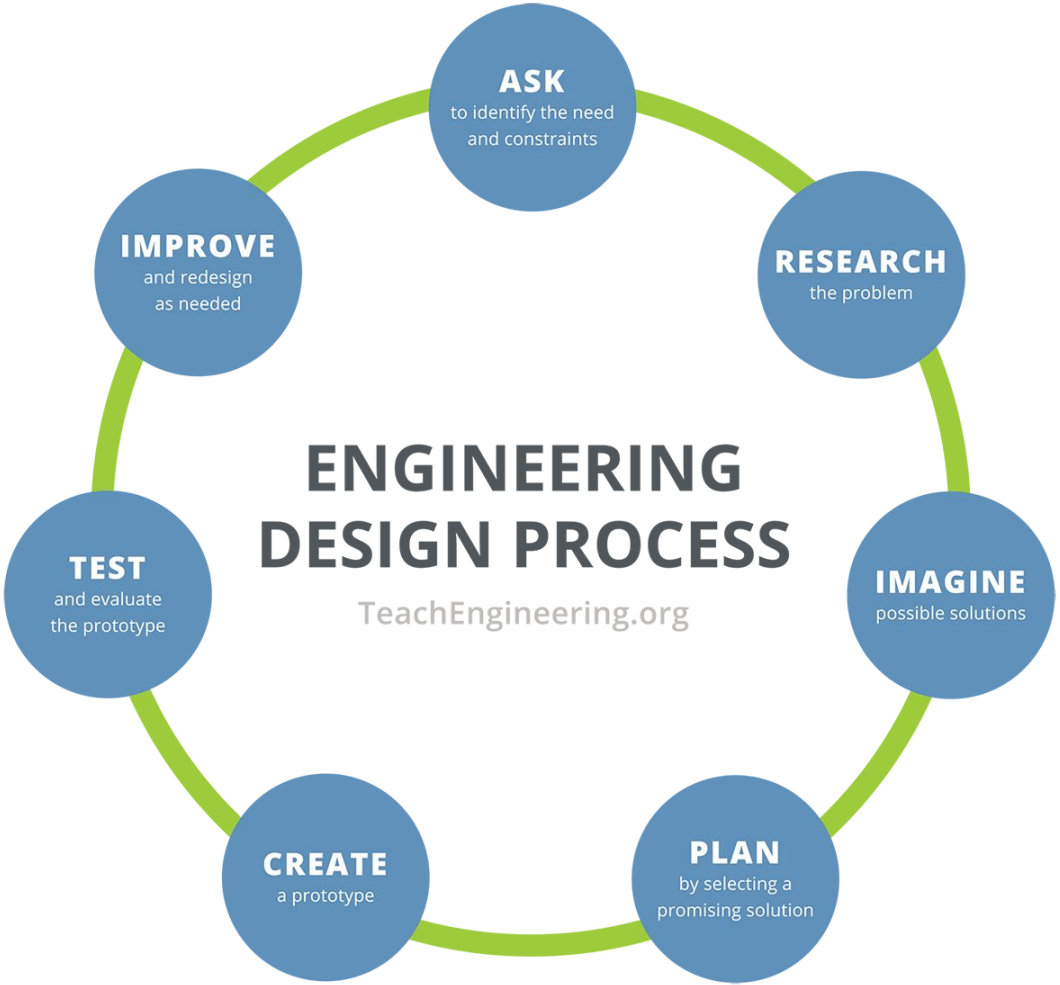
TASK: TEST YOUR SOIL

- Determine which particle combination will be best for water filtration.

  - Test your soil for infiltration

    OR

  - Test your soil for filtration


ASK
to identify the need and constraints
RESEARCH
the problem
IMAGINE
possible solutions
PLAN
by selecting a promising solution
CREATE
a prototype
TEST
and evaluate the prototype
IMPROVE
and redesign as needed
ENGINEERING DESIGN PROCESS
TeachEngineering.org

Level III: What are the issues?

Level III: What are the issues in your area?

INNOVATE

Agriculture Has a Sustainability Problem--and It Affects Your Business. Here's Why The way you connect to other companies and industries is a wel
than you ever imagined.

BY WANDA THIBODEAUX, COPYWRITER, TAKINGDICTATION.COM @WANDATH

My Site Reader AMP

Educating Iowans on the breadth and global significance of agriculture.

Soil and Water Conservation Practices – What are They Doing?

JULY 24, 2019 / IOWAAGLITERACY / EDIT

Agricultural run-off has been a big talking point in recent years. Many people know bits a
pieces of the conversation, but the scope of the issue can be a bit complicated. There are
factors and smaller issues that need attention. So, what is the deal with run-off?

As you may know, Iowa is under national pressure to reduce the amount of nutrients washing off of our land and into the rivers, and ultimately into the Gulf of Mexico. The main issue at the Gulf is *hypoxia*, which basically means there are too many of specific kinds of nutrients, which promotes algae growth, which in turn chokes out other organisms like fish. Clearly this is not ideal.

The main nutrient that gets the press is nitrogen. Nitrates in the water has been one of the bigger issues people talk about. The main concerns are removing nitrates from drinking water

THE CONVERSATION

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Iowa's farmers – and American eaters – need a national discussion on transforming US agriculture

October 16, 2019 7.25am EDT

Level IV: What is the plan for responsible environmental action?

Level IV: Responsible Environmental Action

- Teachers and their students create a plan of action based on their learning
  - Personal Actions
  - Class Actions
  - School Projects
  - Community Projects

Other Resources: Iowa Agriculture Literacy Foundation iowaagliteracy.org

Lessons:

- High-Tech Farming (3-5)
- Caring for the Land (3-5)
- Fertilizers and the Environment (6-8)
- Biology of Soil: Why are soils Important (7-12)
- Biology of Soil: Issues of Soil Degradation (7-12)

Books:

The Good Garden, Kate Smith Milway

Erosion: How Hugh Bennett Saved America's Soil and Ended the Dust Bowl, Darcy Pattison

Contact Information

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Facebook: Environmental Issues Instruction (eii)

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