



Welcome to “From Students to Stewards - Leading Students to Plan and Enact Stewardship Action Projects”

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Great Lakes Watershed field course

- National Oceanic and Atmospheric Administration (NOAA) B-WET grant





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**Workshop June 2017 and July 2018
(another workshop will be offered
again this summer! Applications
have been extended to April 15th -
Click [HERE](#) to apply)**



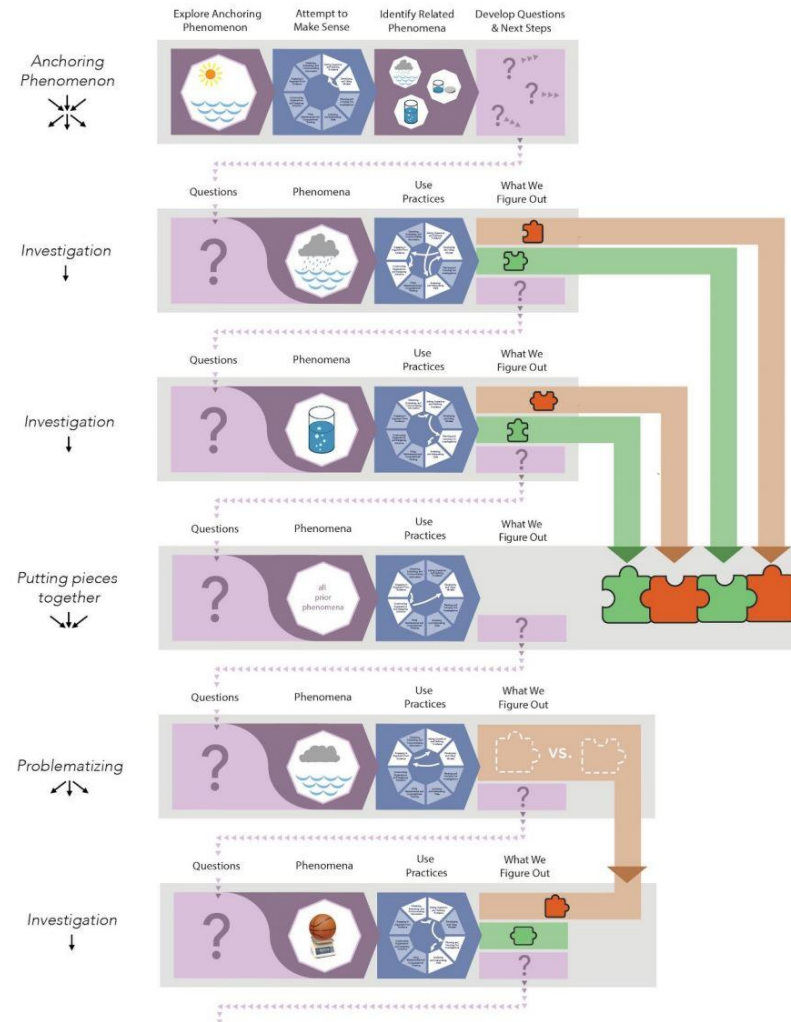
Earth Force Framework



Next Generation Science Storylines

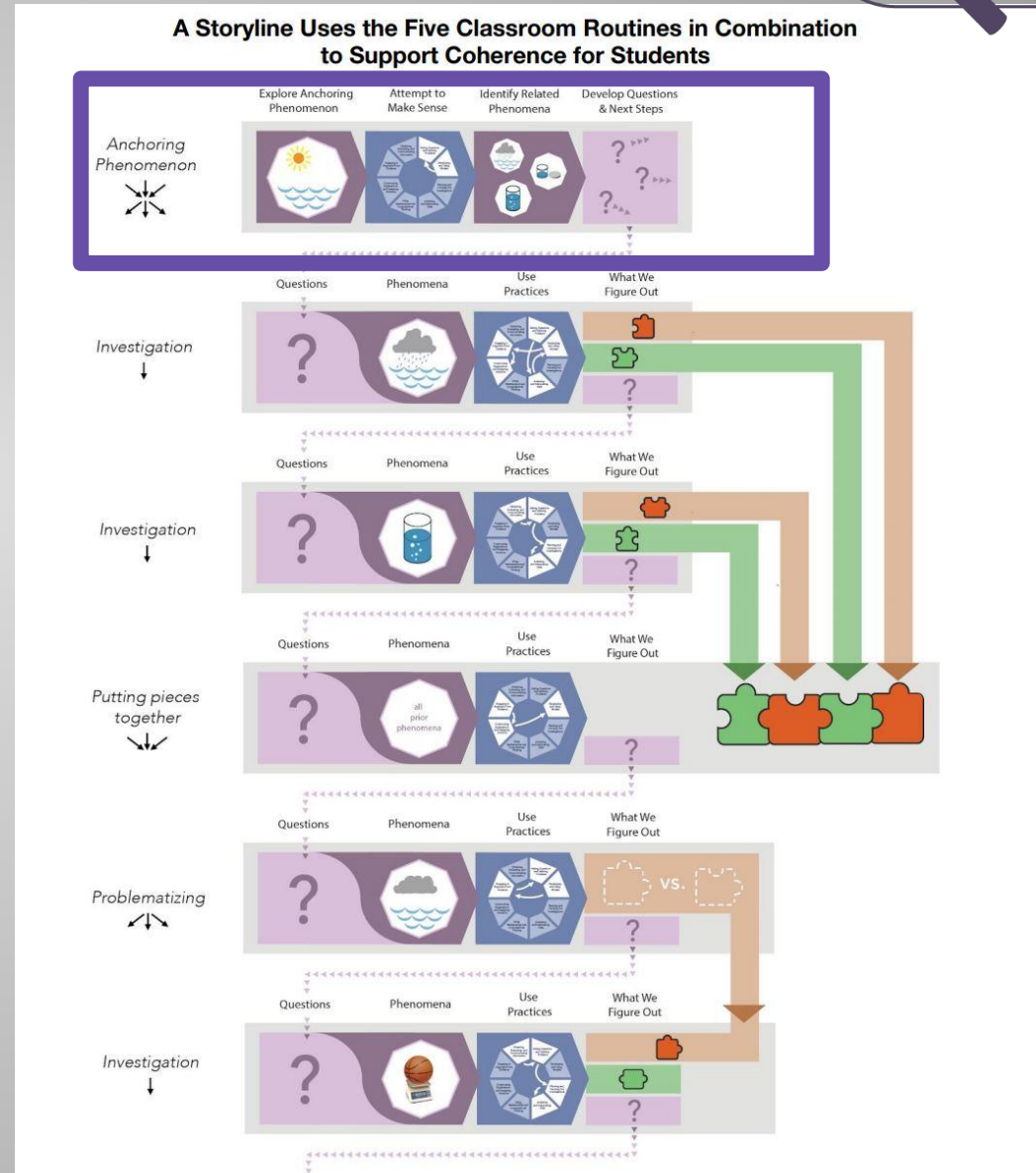


A Storyline Uses the Five Classroom Routines in Combination to Support Coherence for Students





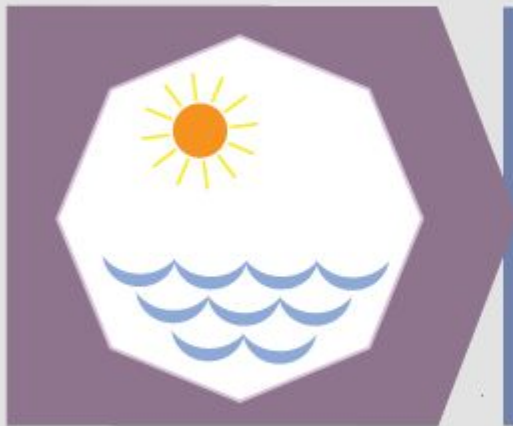
Earth Force / NextGenStoryline “Parallels”





NextGenStoryline Anchoring Phenomenon Routine

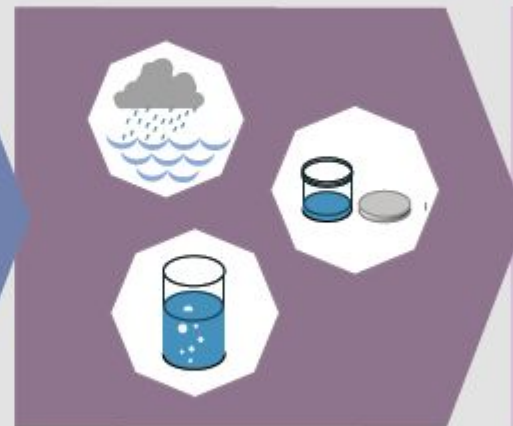
Explore Anchoring Phenomenon



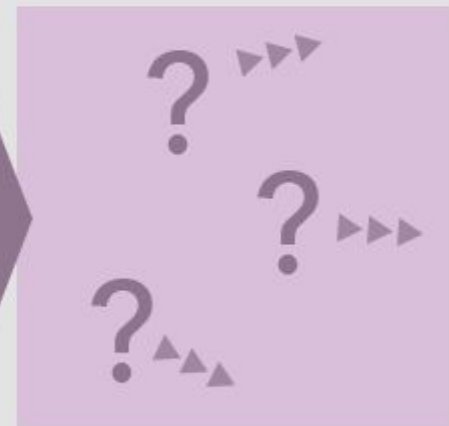
Attempt to Make Sense



Identify Related Phenomena



Develop Questions & Next Steps



Community Environmental Inventory

- Energy Audit
- Recycling Audit
- Environmental/Carbon footprint
- Food Waste Audit
- Guided Walking Tour
 - Pervious/Impervious Materials
 - Storm Water
 - Water Drainage
- Interviews
- Online Databases



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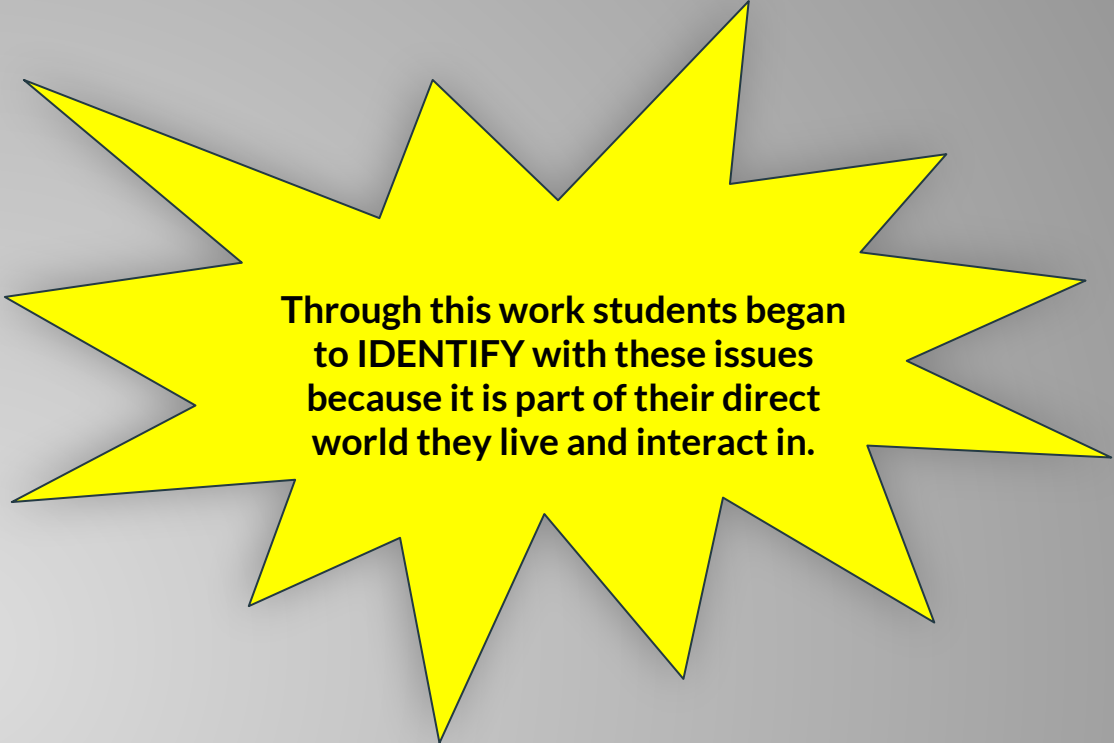
STEP 1: DISCOVER
COMMUNITY ENVIRONMENTAL
INVENTORY



Explore Anchoing
Phenomenon

Community Environmental Inventory

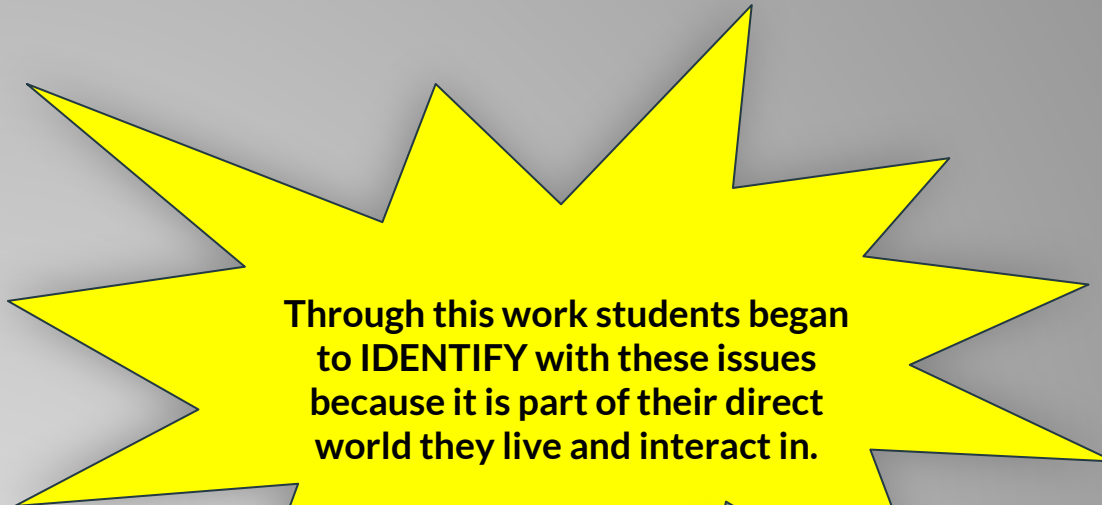
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Through this work students began to **IDENTIFY** with these issues because it is part of their direct world they live and interact in.

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Through this work students began to **IDENTIFY** with these issues because it is part of their direct world they live and interact in.



This builds student **INTEREST** in all of these pieces - because now they see how their lives intersect with the issues in their community

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“I’ve learned more in the first two weeks of this class than I have ever learned in any class for the whole year”

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Community Environmental Inventory data discussion

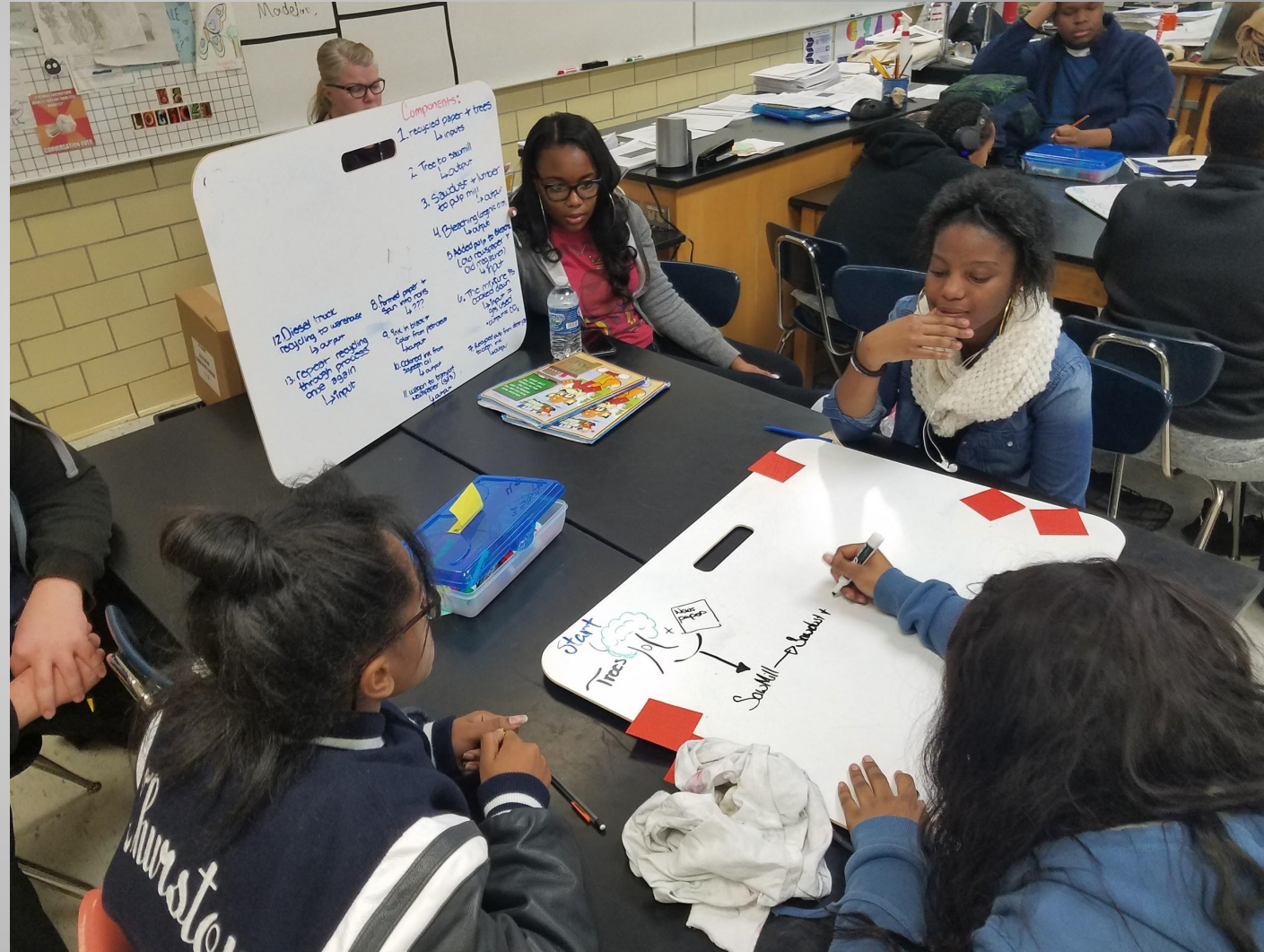
Determined Community Strengths and Potential Issues (listed below) after completing the audits:

- Food waste in our cafeteria
- electricity/energy waste throughout the building
- lack of convenient recycling opportunities for both plastic and paper
- several areas on campus where water pooled
- lots of impervious surfaces that ran directly into the sewer
- a human-made pond that was in disrepair and covered in duckweed and algae
- a retention pond/drainage ditch that had been overrun by invasive species



Issue Selection - Asking and Answering Initial Questions

- Determined list of initial questions that had to be addressed
 - Exploring cause and effect
 - Exploring assets and constraints involved
 - Does it meet the goal of improving watershed health?
- Groups presented potential projects to class



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Goal and Project Selection

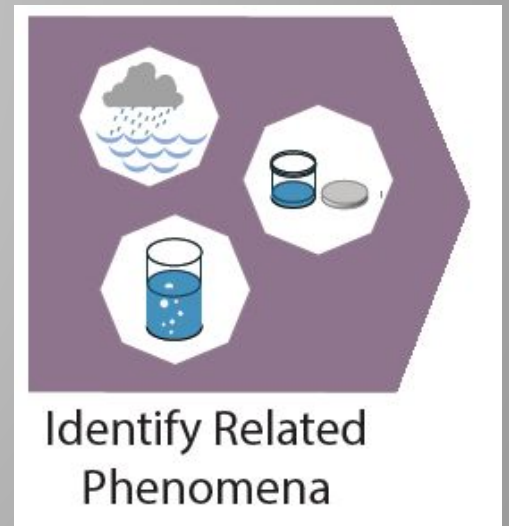
- The class decided on criteria that will help decide which project to choose. They addressed each of these criteria when presenting their group proposals:
 - **REALISTIC** will students be able to complete the project given the available resources?
 - **PRECEDENT** have others tried doing this before, and how well did it work?
 - **RELEVANCE** how much will the project actually address the problem we identified?
 - **SIMPLICITY** how easy or difficult will the project be to carry out?
 - **IMPACT** how likely is it that the project will have a lasting impact?
 - **OPPOSITION** how much opposition will you likely get from other people or organizations?

Goal and Project Selection

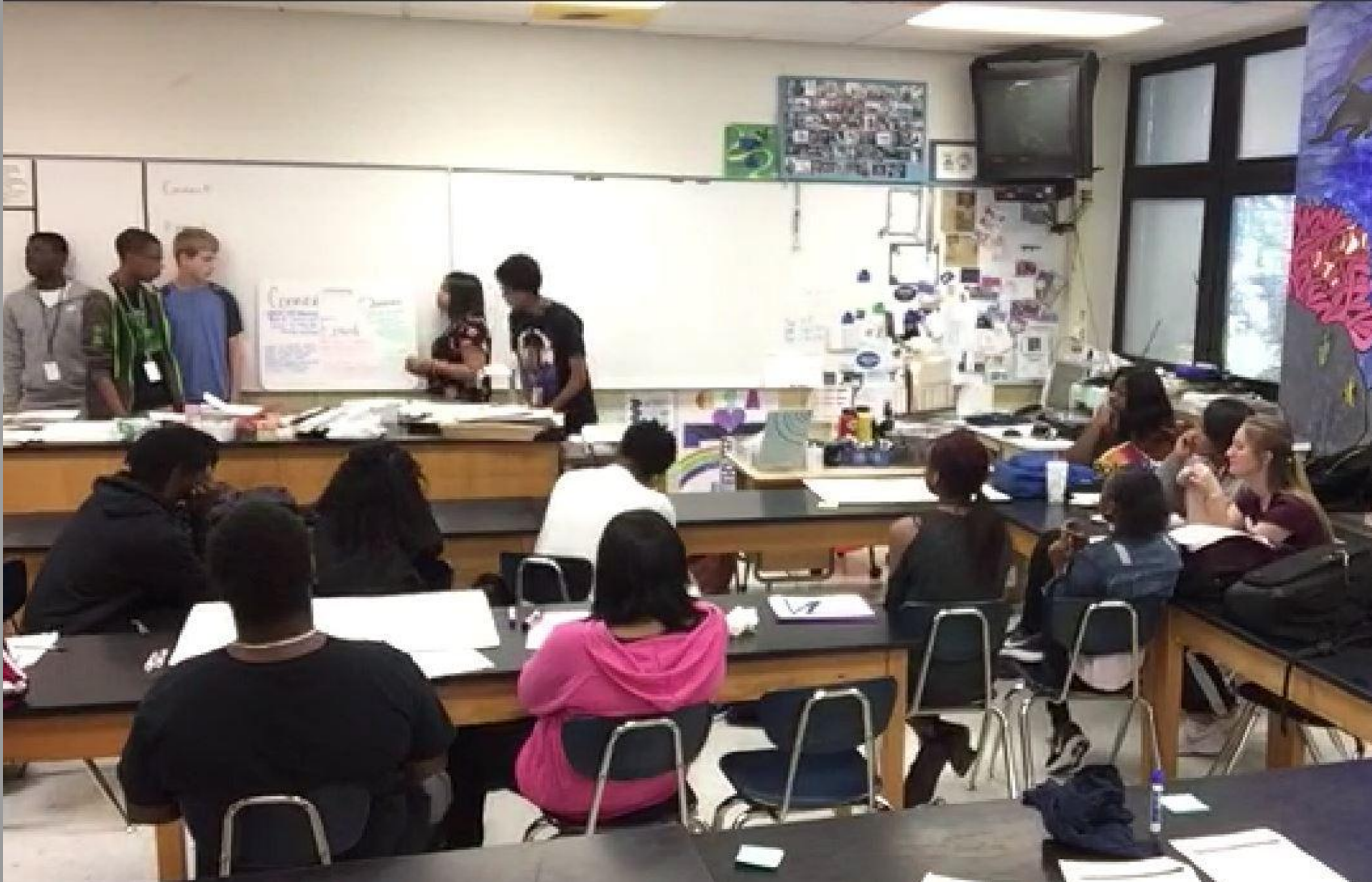
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STEP 3: DISCOVER
POLICY AND COMMUNITY
PRACTICE RESEARCH



Issue Selection - Consensus



The *Phragmites* infested retention pond

- has low biodiversity
- is not attracting pollinators
- is providing habitat for undesirable mammals (namely rats)
- dense reeds are trapping a lot of trash which was an eyesore and could cause other problems too
- Water is “dirty”

Project Goals

Student Goals

1. Improve watershed health
2. Increase biodiversity
3. Create opportunities for elementary and middle school students to have a local field trip where they learn about factors affecting the health of their local environment
4. Create opportunities for students (my AP students) to teach these concepts to the other students to raise awareness
5. Create outdoor space where students have place-based educational opportunities

Teacher Goals - Student Goals *PLUS*:

6. Prepare my students for the AP Environmental Exam by increasing their understanding of key content knowledge and science practices
7. Increase the analytical and critical thinking skills of students.
8. Increase the likelihood that students will think about the environment and become good environmental stewards and/or activists.
9. Increasing student knowledge of how to approach community leaders and think about stakeholders when leading stewardship action projects
10. Increase the likelihood that students will choose to go outside for recreation

Students Identified Questions they still need to answer

What do we need to figure out to be able to do this?

- What plants do we want?
- Why do we need a pond there? What does it do? Where would the water go otherwise? What are all these big things that look like drains?
- Retention pond/rain garden design - How big will it have to be? Where is the water coming from and how much water enters after rain events?

How will they find the information?

Who will find the information?

Do we need permission to do this?



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STEP 4: DECIDE
GOAL AND STRATEGY
SELECTION



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Who will find the information?

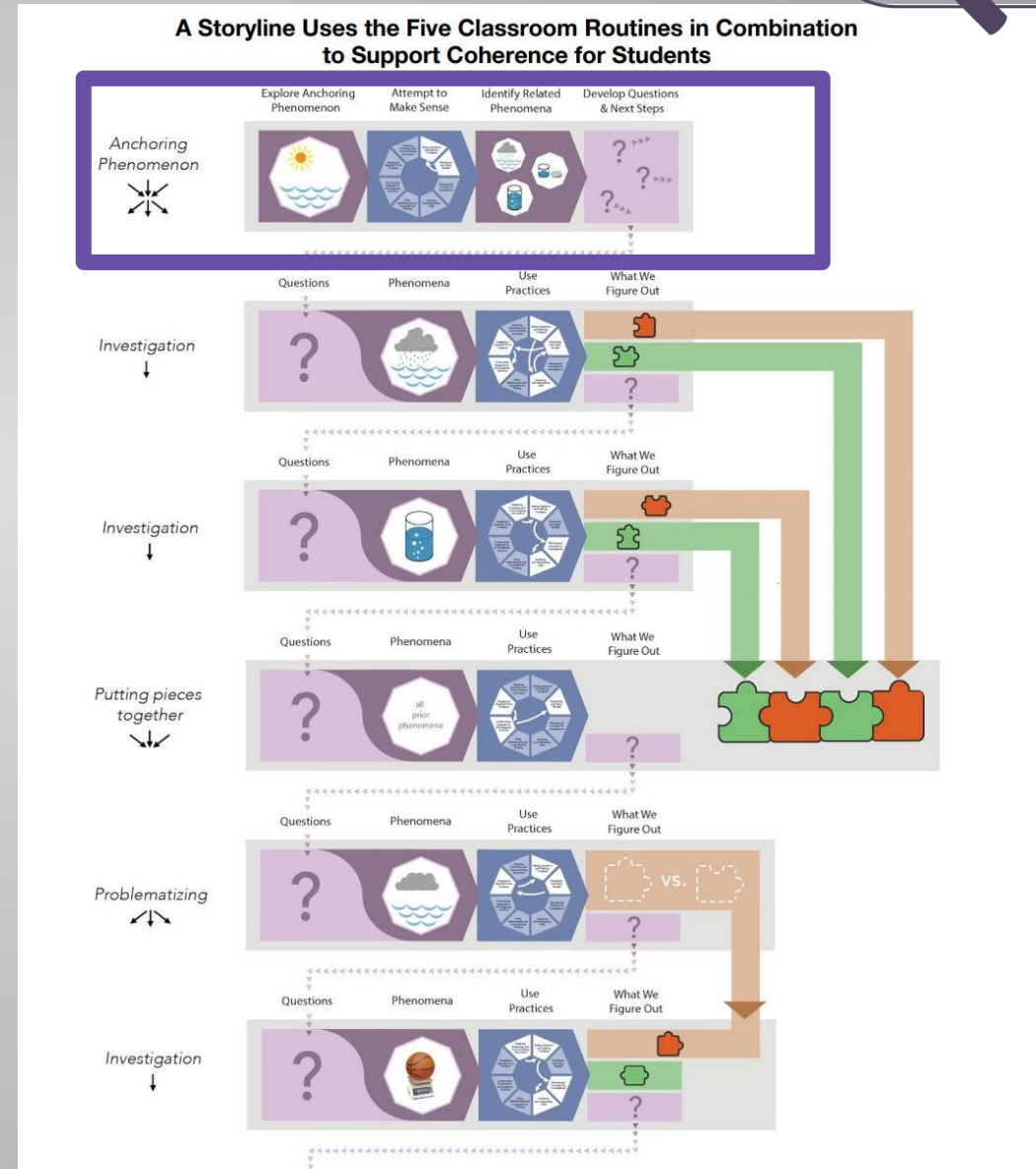
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Develop Questions
& Next Steps

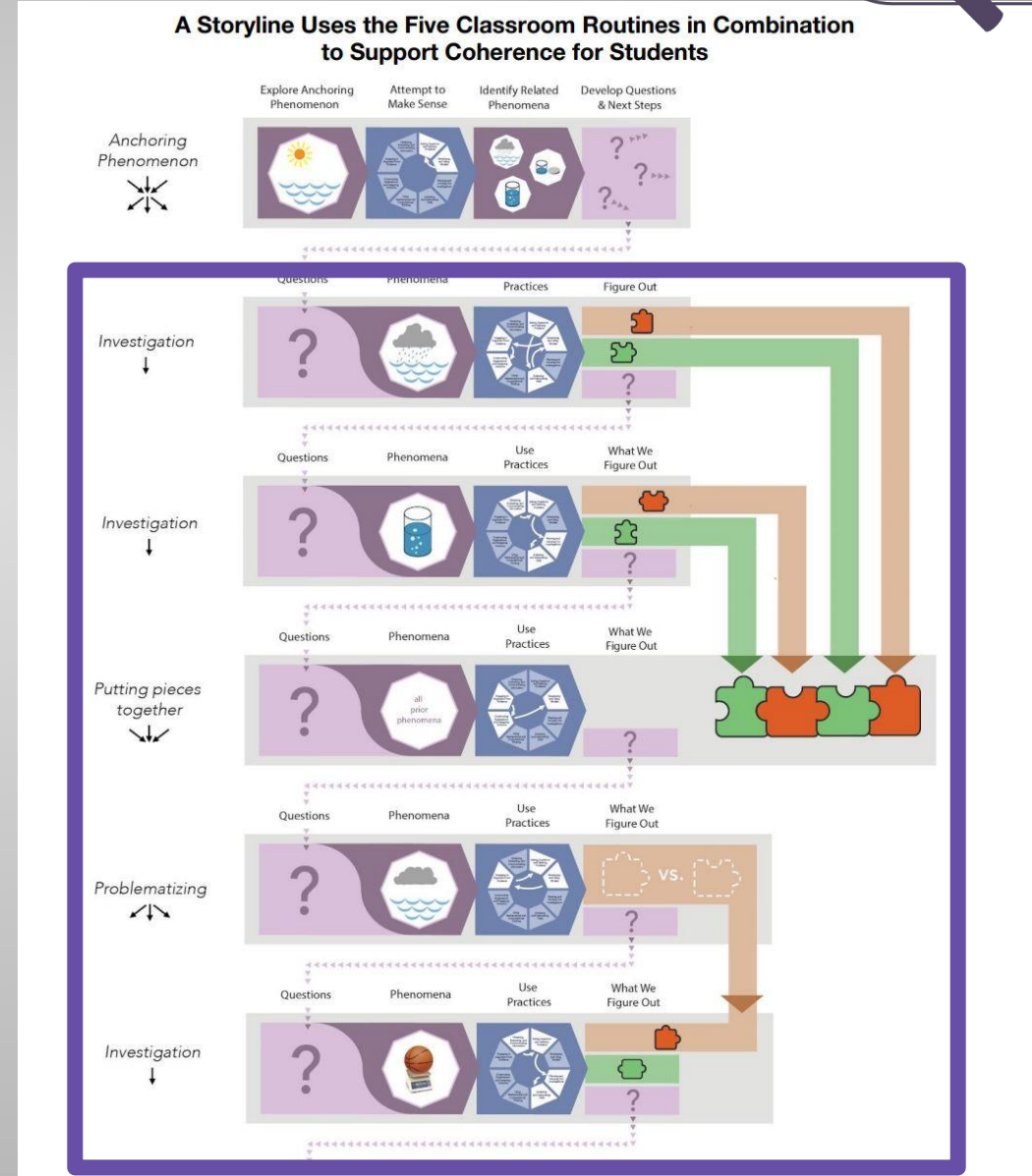


Earth Force / NextGenStoryline “Parallels”





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Planning and Taking Civic Action

Students formed task committees

- Soil type
- Native plant selection
- Equipment budget – determine best vendors
- Permitting for herbicide (do we need it?)
- Herbicide choice
- Methods removal and disposal
- Meeting with Superintendent for project approval



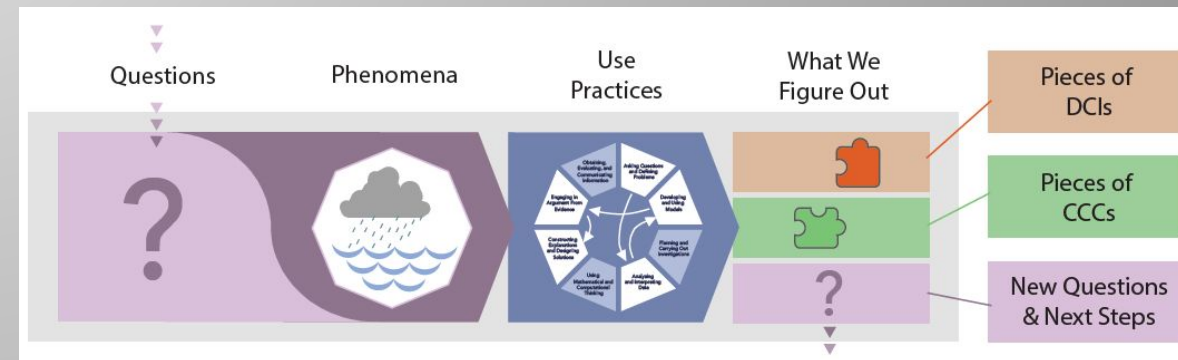
Developed a project timeline

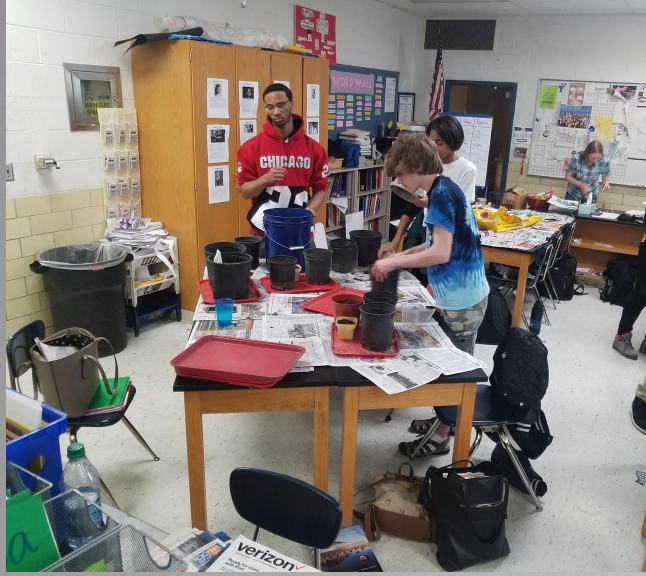
- Herbicide treatment - no permit necessary (fall 2017)
- Start seeds in greenhouse (late winter/early spring 2018)
- Mechanical removal and/or controlled burn - sadly we did not get permission for burn (Spring 2018)
- Due to a late spring, removal began later than anticipated and we already had nesting red-wing blackbirds. 80% of the biomass was removed (Spring 2018)
- students agreed project would need an extended timeline
- Identification of new growth (Fall 2018)
- THTV updates
- Spot treatment for returning Phragmites (Fall 2018)
- Final Biomass Removal (Spring 2019)
- Partial planting and pilot field trip event (Spring 2019)

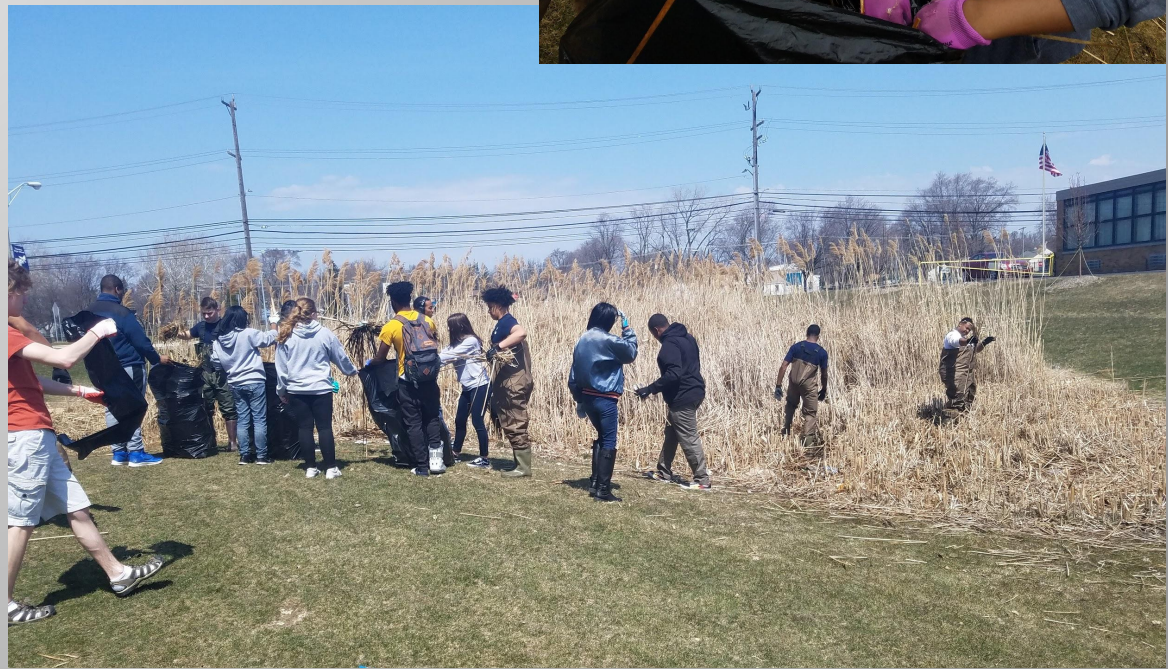


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A portrait of Trinity Pryor, a young woman with dark, curly hair, wearing a blue and white patterned t-shirt. She is standing in front of a dark door with a light fixture above it. The background is a plain wall with a light-colored panel on the left and right sides.

TRINITY PRYOR

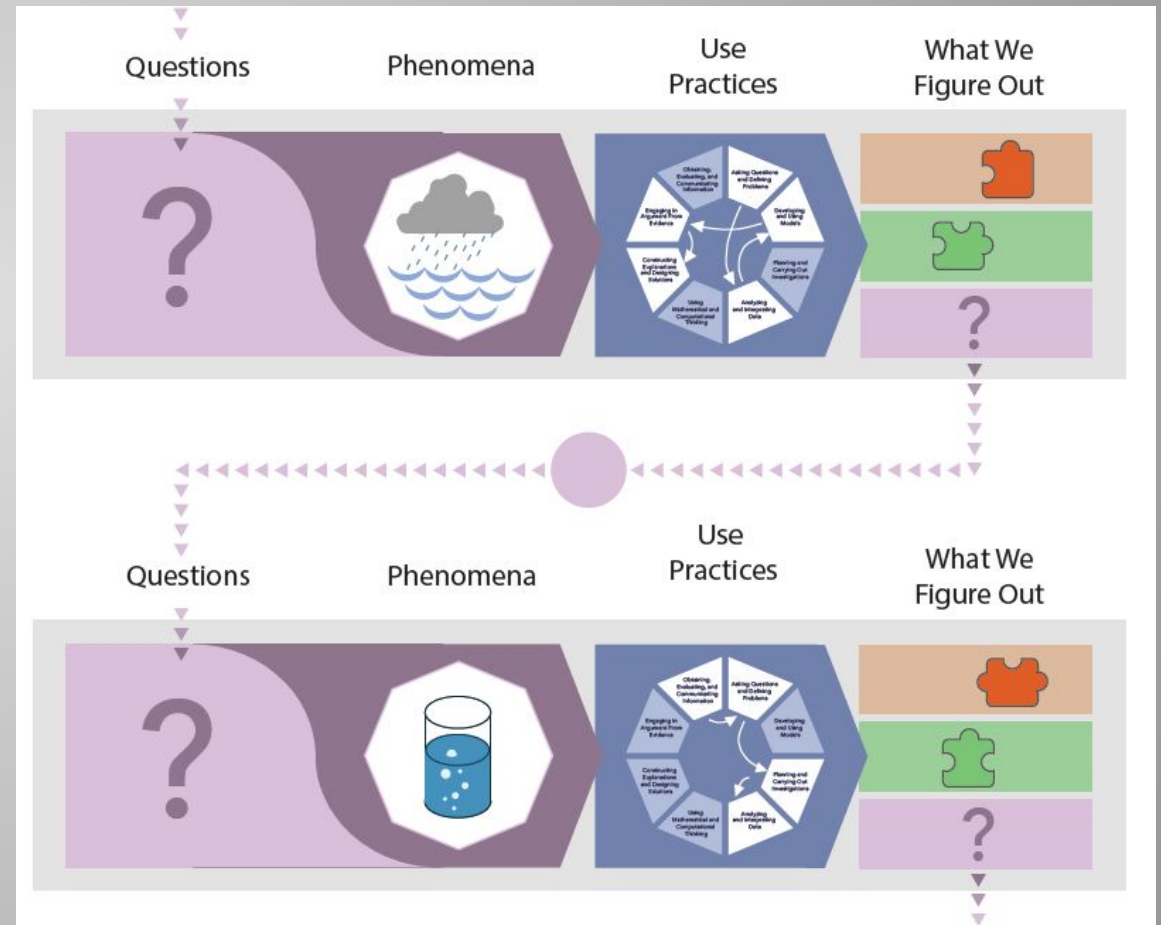
Water Quality Member

Tying this in to the “Big Picture”

- By starting here and looking at the potential impact we could have by helping restore this small wetland, students wondered about other wetlands and their impact on the watershed.
- They also figured out what data to collect and analyze to have an idea about the biodiversity levels in our system and to judge the water quality



Connected Investigations

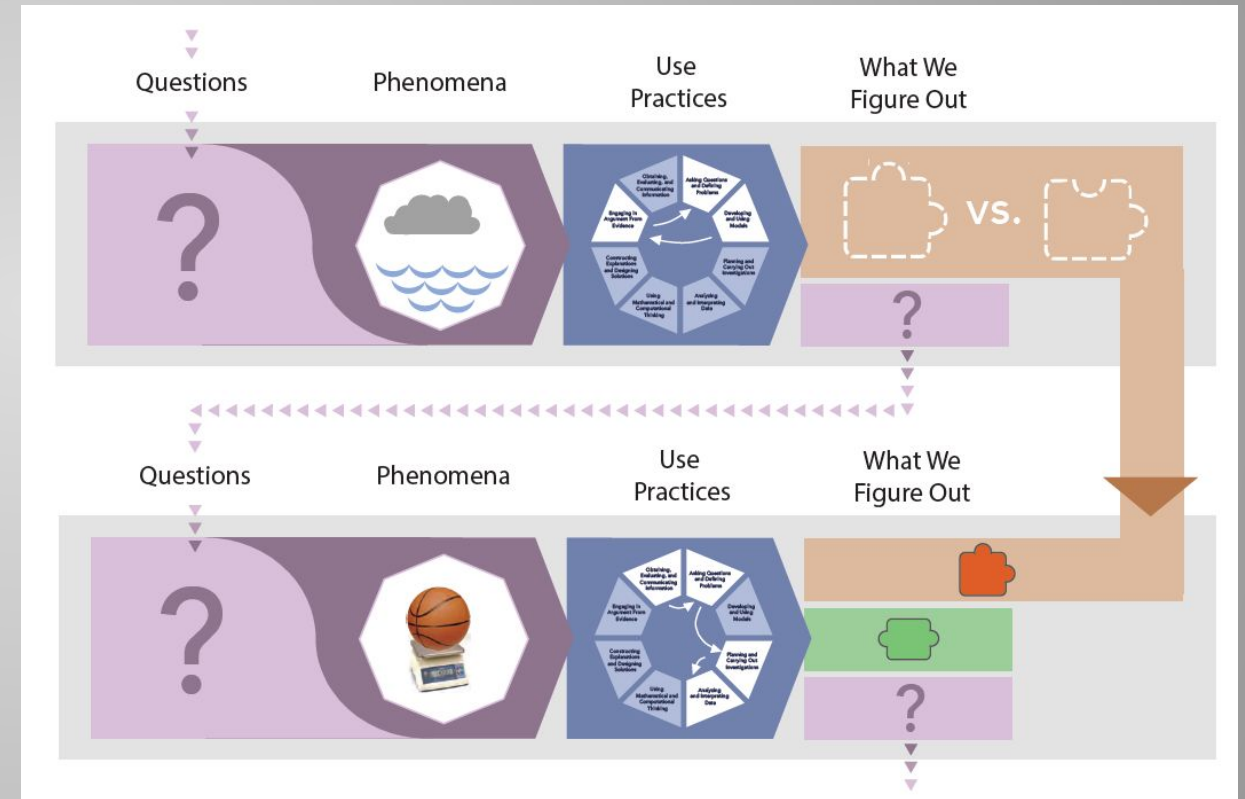


Tying this in to the “Big Picture”

- The wetlands and bodies of water they expanded their study to were vastly different in size and other important characteristics
- Students figured out that similar phenomena have similar causes in these systems - and these systems are connected
- they also figured out the kinds of allowances we need to make to account for scale, proportion and quantity



Problematizing Routine



Citizen Science/Community Science programs

Students expressed the need to learn more about biodiversity, wetlands and our watershed and wanted to be a part of more projects that could help.

[Michigan Natural Features Inventory](#) - [Vernal Pool Patrol](#)

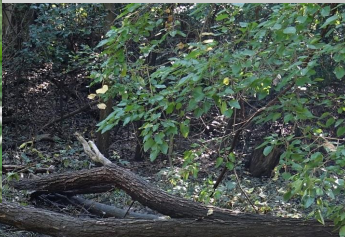
[Friends of the Rouge](#) - [Rouge Education Project](#)

[GLOBE](#) - [Aren Project](#), [Lilac Phenology](#), [Arctic Bird Migration](#), [Biometry](#), [Land Cover](#)

[Cornell Lab of Ornithology](#) - [eBird](#), [Project Feederwatch](#), [Nestwatch](#)

[iNaturalist](#)

[MISIN](#) - [Midwest Invasive Species Information Network](#)



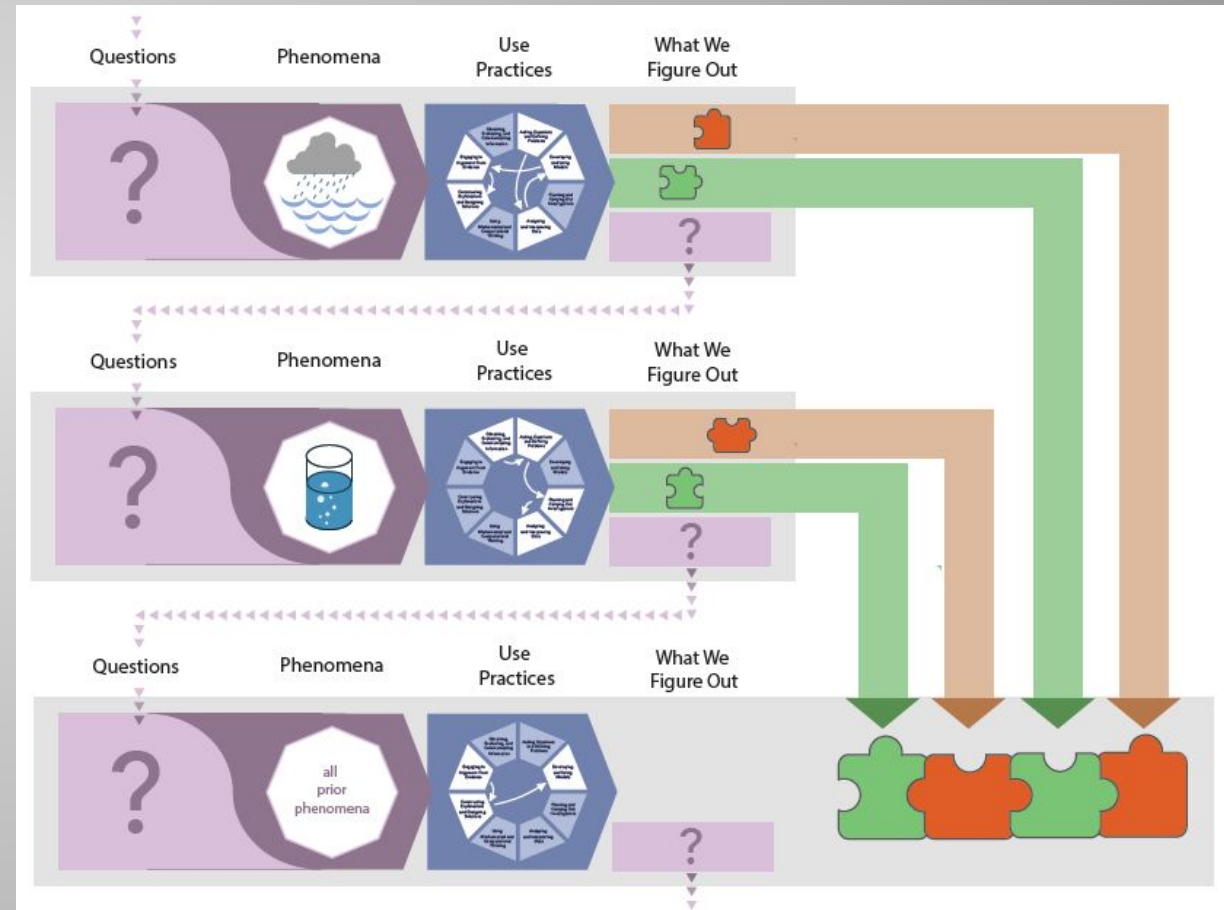


Tying this in to the “Big Picture”

- During this time students also looked at their own Eco-footprint (and that of their family)
- They identified their own contributions and realized that they needed to help educate others
- Plans to use our finished space as a outdoor education lab and will host field trips for elementary classrooms
- First visit scheduled for this spring!

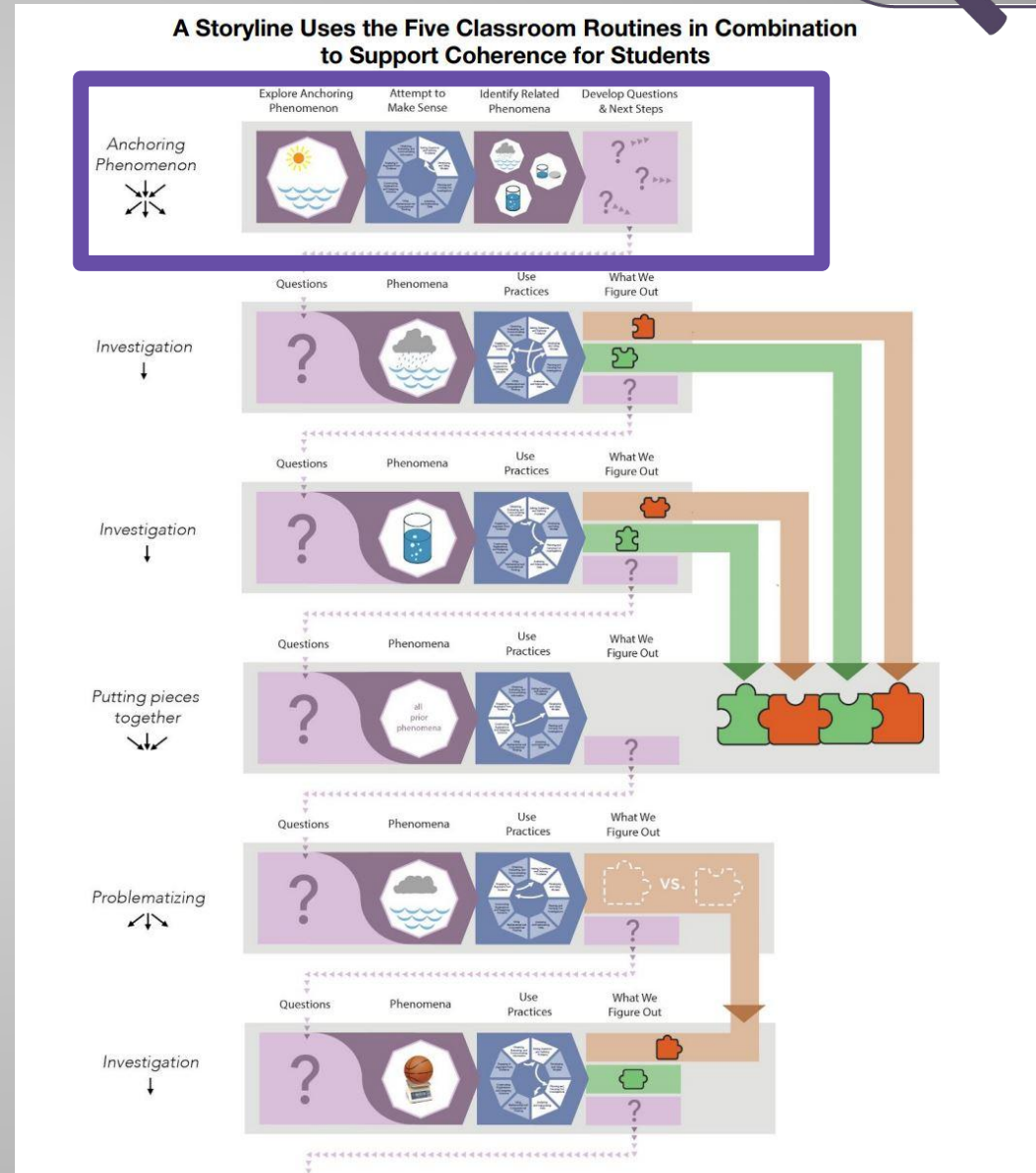


Putting the Pieces Together



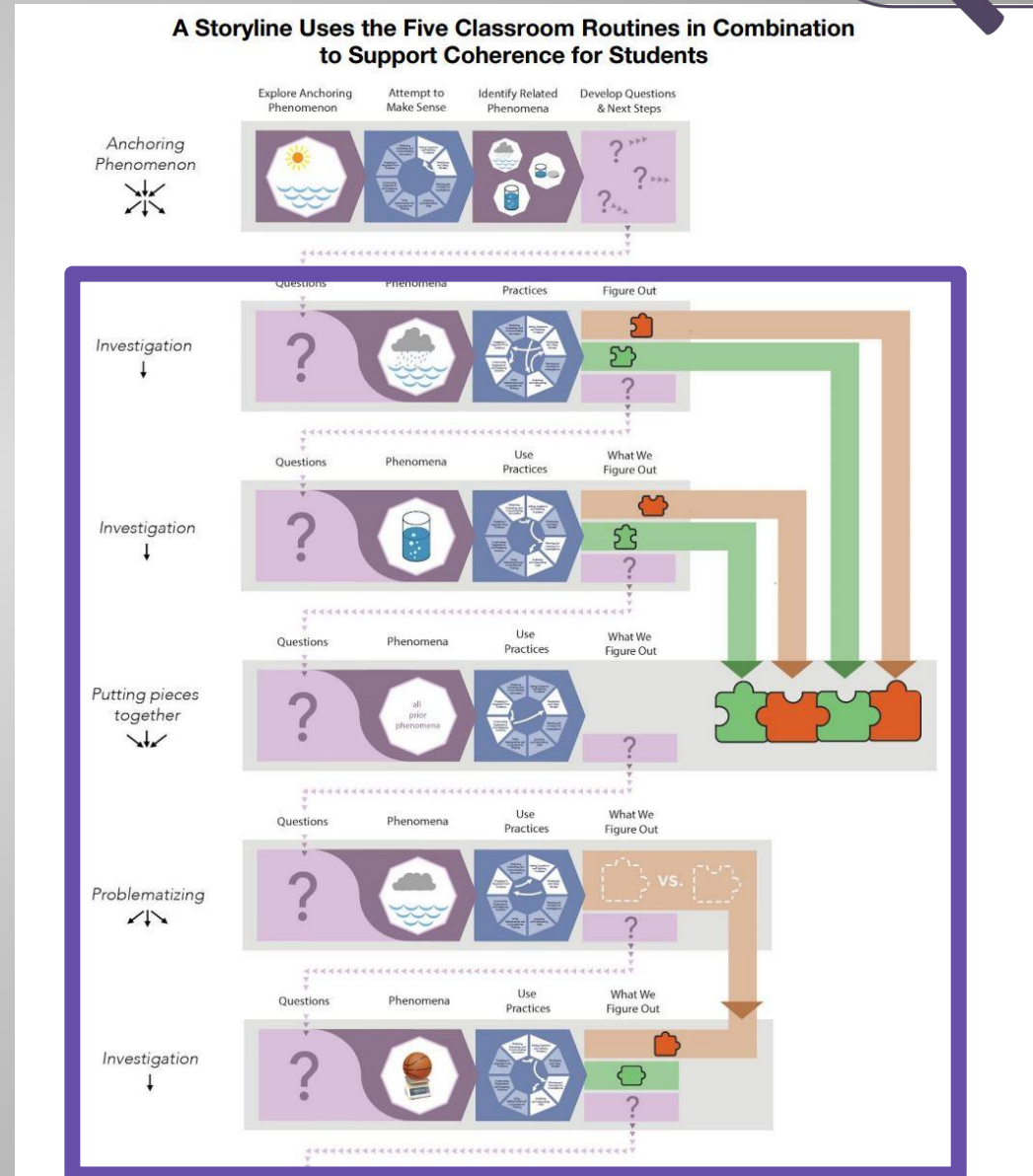


Earth Force / NextGenStoryline “Parallels”





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Work on this project was possible through:

Lots of grant writing (and a some awards which bought also me a little “clout” with admin)!

- MWEA/MSTA Dan Wolz Clean Water Education Grant - \$1000
- Cornell Lab of Ornithology Garden Grant - \$1000
- Meemic Classroom Improvement Grant - \$300
- MAEOE Grant - \$500
- NOAA B-WET Grant (through Watershed Field Course) - \$300 plus extras
- Knight Center for Environmental Journalism Grant - \$1000 for Env Sci/\$1000 for video productions
- 2018 Michigan Lottery Excellence in Education Award - \$500
- NOAA Planet Stewards Education Project Grant – \$2500
- MDSTA Mini Grant - \$500
- Meemic Traditional Grant - \$500
- KidsGardening.org Budding Botanist Grant - \$3000
- Michigan Natural Features Inventory Healthy Watersheds grant - \$500
- MonachWatch.org/NRDC Green Gifts - Flat of Milkweed plugs
- 2019 MSTA Michigan High School Science Teacher of the Year
- 2019 NSTA Shell Science Teacher Award Semi-Finalist



Work on this project was possible thanks to:

Professional Learning opportunities provided by and in collaboration with:

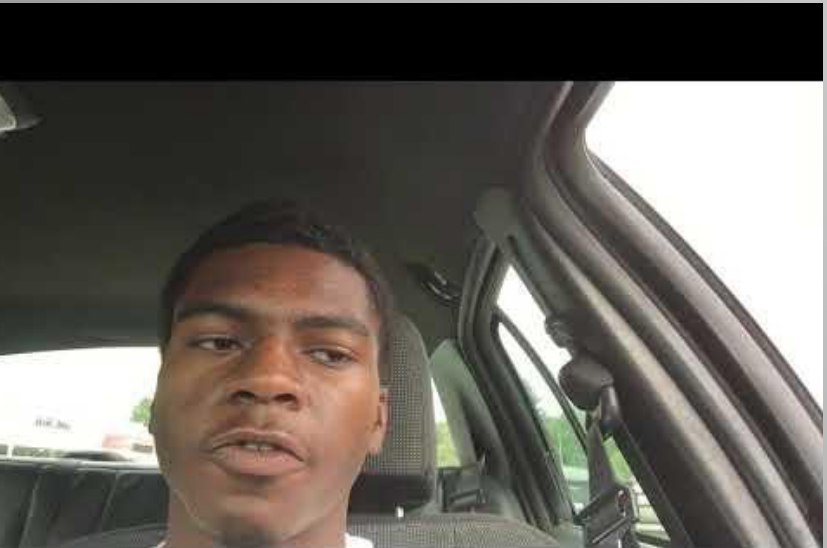
- Northwestern University Science Storylines Team/NGSX Learn While Teaching Alpha Pathway
 - *Brian Reiser, Michael Novak, Tara McGill, Kelsey Edwards, Aliza Zivek, Trey Smith, Sarah Michaels (Clark University), Renee Affolter (Lead Instructor NGSX and Vermont Science Initiative), Deanna Bailey (NGSX) Trish Shelton (NSTA)*
- University of Colorado Boulder, Denver Public Schools and the iHub Team
 - *Bill Penuel, Katie VanHorn, Douglas Watkins*
- Inland Seas - Watershed Field Course
 - *Jeanie Williams and Chelsea Nestor*
- NOAA Planet Stewards Community
 - *Claire Lannoye-Hall, Bruce Moravchik, Molly Harrison*
- Michigan Natural Features Inventory
 - *Daria Hyde, Yu Man Lee, and Phyllis Higman*
- Rouge Education Project
 - *Erin Cassady*
- Earth Force
 - *Michelle Blodgett and Grace Scarsella*
- Cornell Lab of Ornithology
 - *Lyndsay Glasner and Kelly Schaeffer*
- Achieve Inc.
 - *Vanessa Wolbrink, Aneesha Badrinarayan, and Matt Krehbiel*
- Michigan Math and Science Leadership Network
 - *Mary Starr, Wendi Vogel*
- Wayne County Math and Science Center
 - *Rich Bacolor, Dave Bydlowski, Greg Johnson*
- Twitter PLNs
 - *#NGSSchat, #NGSS_tweeps, #NGSNavigators, #MiSciPLN*

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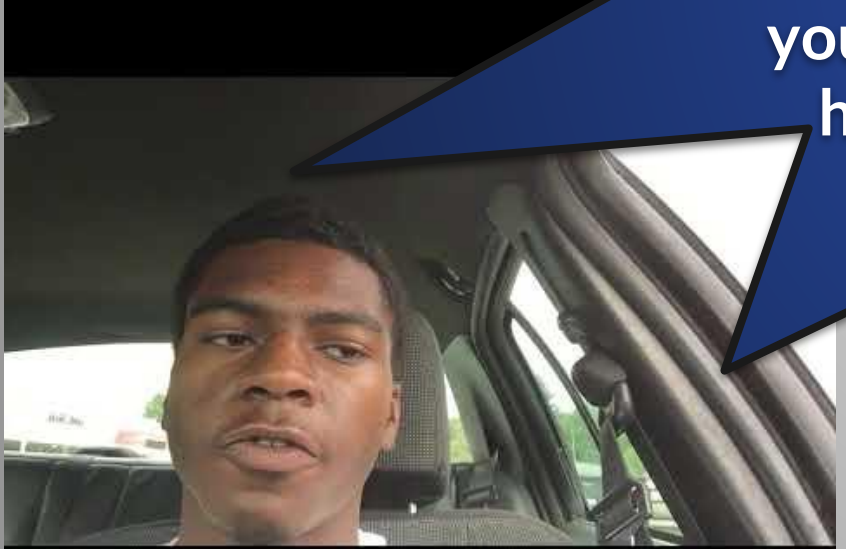
South Redford School District administrators, teachers (especially Wayne Wright, Lynda O'Donnell and Jessica Mahl), and our students!







Find many more examples at
<https://hollyhereau.weebly.com/>
feel free to explore for ideas and I
would also love to hear from you if
you are interested in collaborating!
holly.hereau@southredford.org



Explore the links below for examples, tools, resources and ideas



[Nextgenstorylines.org](https://nextgenstorylines.org)



[STEM Teaching Tools](#)



[MNIF](#)



[NOAA](#)



[iHUB](#)



[The Cornell Lab of Ornithology](#)



[Earth Force](#)



[The Center for Great Lakes Literacy](#)

Links to where you can find applications for funding to support this work

- [MWEA/MSTA Dan Wolz Clean Water Education Grant](#)
- [Cornell Lab of Ornithology Garden Grant](#)
- [Meemic Classroom Improvement Grant](#)
- [Michigan Alliance for Environmental and Outdoor Education \(MAEOE\) Grant](#)
- [MACUL grant](#)
- [Watershed Field Course \(NOAA B-Wet Grant funded\)](#)
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- [KidsGardening.org link to open grants](#)
- [Michigan Natural Features Inventory Healthy Watersheds \(NOAA B-Wet Grant funded\)](#)
- [Project Learning Tree Greenworks Grants](#)
- [Lowe's Small Toolbox for Education Grant](#)
- [Wild Ones Lorrie Otto Seeds for Education \(SFE\) Fund](#)
- [Annie's Grants for Gardens](#)
- [Whole Kids Foundation Garden Grants](#)
- [Whole Kids Foundation and the Bee Cause Project Bee Grants](#)
- [Fiskars Project Orange Thumb Grants](#)
- [USDA Farm to School Grant Program](#)
- [Big Green Learning Gardens](#)
- [Jeffers Foundation School Garden Grants](#)
- [Green Education Foundation Green Thumb Challenge](#)
- [Captain Planet Foundation EcoSolution Grants](#)
- [The Pollination Project Grants](#)
- [Toshiba Grants for grades K-12](#)
- [Walmart Foundation Community Grant Program](#)
- [Target Field Trip Grants](#)
- [NEA Student Achievement Grant](#)
- [MonarchWatch.org and Kansas Biological Survey Free Milkweek Plugs](#)
- [Cornell Douglas Foundation Grants](#)
- [The Awesome Foundation Grants](#)
- [Costco Grants](#)
- [Quadrattec Cares "Energize the Environment" Grant Program](#)
- [Cliff Bar Family Foundation Grant](#)
- [Patagonia Environmental Grants](#)