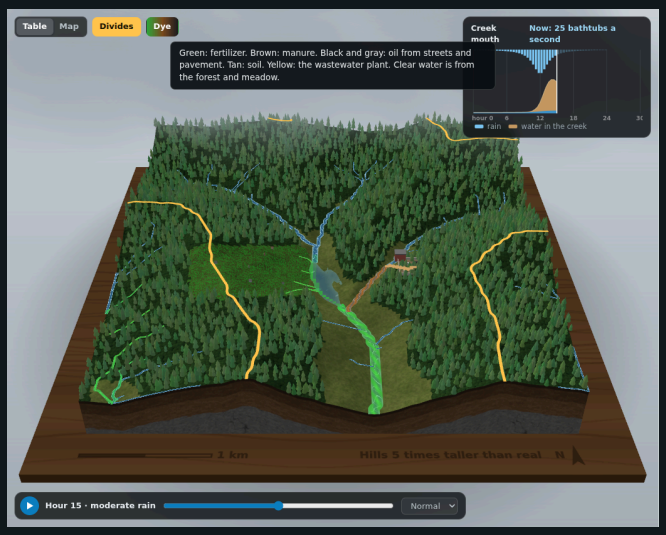
mytekDev

Watershed Lab: What Washes Into the Creek?

Grades 6-8 · 45 minutes

Earth science



Slides, rubric and answer key | **Print and go** | **No student accounts** | **Chromebook friendly**

What's included

- A one-page overview: objectives, essential question, vocabulary, standards and assessment
- A 45-minute lesson sequence: warm-up, direct instruction, guided practice, independent practice, closure
- Slides for the board: a PowerPoint file that also opens in Google Slides
- A student worksheet with a QR code and a before-and-after table
- A 3-question exit ticket, two to a page, with an answer key
- A rubric: 3 criteria, 4 levels, scored out of 12
- Differentiation for English learners, students with IEPs or 504 plans, and students who need more support or more challenge
- Cross-curricular extensions, and notes for teaching it in grades 4 and 5 and in high school environmental science
- Standards: NGSS

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Students build a cornfield, a feedlot and a town on a forest valley and rain on it with the dye on: green fertilizer, brown manure, dark oil from streets and tan soil swirl into the creek, and storm drains carry the town's water straight to it. They read the creek mouth, then change the land, meadow or forest in place of part of the field, forest in place of a parking lot, and rain again to see what each change keeps out.

At a glance

ESSENTIAL QUESTION

No single pipe is to blame. How does pollution from a whole valley get into the creek, and what keeps it out?

OBJECTIVES

Students will be able to:

- tell point source pollution from nonpoint source pollution
- explain how rain carries fertilizer, manure, oil and soil off the land into a creek
- explain where a storm drain goes, and why that water is not treated
- test a change to the land and judge how much it keeps out of the creek

VOCABULARY

Nonpoint source pollution, Point source pollution, Storm drain, Fertilizer, Buffer strip

STANDARDS

MS-ESS3-3

TIME AND MATERIALS

45 minutes, grades 6-8.

- One computer or Chromebook per student
- A projector
- The worksheet and exit ticket, one copy each per student
- The rubric, one copy per student if you grade the work

PREP

Make copies of the worksheet and exit ticket. Before class, open mytekdev.com/try/watershedlab?lesson=what-washes-into-the-creek&ref=tpt-watershedlab-4 once on a student computer: it opens on Millbrook Valley, rained once, in Cover the land. Run it yourself, about ten minutes: paint a cornfield on the valley floor, put a Feedlot beside the creek, paint a town, Rain with the Dye on, read the creek mouth on the card, then paint meadow over half of the field and Rain again.

ASSESSMENT

- Formative: the questions under What to look for, asked while students work, and the exit ticket (answer key included).
- Summative: the worksheet, scored with the rubric.

TECHNOLOGY AND PRIVACY

Runs in any browser, Chromebooks included, with nothing to install. Students need no account and no email: the link works signed out, and nothing they do is stored on our server unless they choose to save.

Lesson sequence

MINUTES	STAGE	WHAT YOU DO	WHAT STUDENTS DO
0 to 5	**Warm-up** Hook	Show the title, essential question and Today I can slides (about 1 minute). Then the warm-up: where does the water in a storm drain go? Write every answer on the board.	Answer the warm-up on the worksheet.
5 to 12	**Direct instruction (I do)** Model it	Project the app with the starter open. Paint a town, rain, and zoom in on it: the grates, the dashed pipe under the street, the pipe end on the creek bank. Show The dye and Point or nonpoint? > **It's working when:** Go back to the warm-up answers. In most towns the storm drain pipe is separate from the sewer pipe that goes to the treatment plant.	Watch, and fill in the vocabulary on the worksheet.
12 to 22	**Guided practice (We do)** Plant a farm together	Students open the link or scan the QR code. A short guide walks them through painting a cornfield and raining. Everyone turns on Dye and reads the creek mouth on the card. > **Watch for:** Students who think the green is a spill. It is fertilizer washing off the whole field with the rain, a little from everywhere.	Fill in the before column of the table: the readings at the creek mouth.
22 to 38	**Independent practice (You do)** Build, then fix	Students add a Feedlot by the creek and a town, rain, and read the creek mouth. Then each changes one thing to keep pollution out, meadow or forest over half of the field or in place of pavement, and rains again. Walk the room with the What to look for questions. > **If they ask:** "Did you rain the same storm before and after your change?" Fair test	Fill in the after column and say which change helped most.
38 to 45	**Closure** Showcase and exit ticket	Show the Showcase slide. Two students show their before and after numbers. Hand out the exit ticket.	Answer the exit ticket.

Before you teach: a ten-minute walkthrough

Open mytekdev.com/try/watershedlab?lesson=what-washes-into-the-creek&ref=tpt-watershedlab-4. A short guide opens over the app, on Millbrook Valley, rained once, with Cover the land open.

1. **A farm.** Pick `Cornfield` and paint the valley floor. Press `Rain`.
2. **The dye.** Turn on `Dye`: green fertilizer swirls into the creek below the field. The card lists what the storm's water tested at the creek mouth.

3. **A feedlot and a town.** Under `Put on the land`, pick `Feedlot` and click beside the creek; paint a `Town`. Rain: brown manure and dark oil join. Zoom in on the town: grates, a dashed pipe under the street, a pipe end on the bank.
4. **A fix.** Paint `Meadow` over half of the field, or `Forest` over a parking lot, and rain the same storm. Compare the creek mouth.

> The moment that lands is the storm drain: the pipe goes straight to the creek. Go back to the warm-up answers.

Background for the teacher

Point source pollution enters at one place, like a factory pipe or a wastewater plant; it can be measured, permitted and fixed at the pipe. Nonpoint source pollution washes off a wide area with the rain: fertilizer and soil from fields, manure from feedlots and pastures, oil and grit from streets and parking lots. In the United States it is the leading cause of water quality problems, and the hardest to clean up.

In most towns the storm drain pipe is separate from the sewer pipe that takes water from toilets and sinks to the treatment plant, so what washes into a grate reaches the creek untreated. Some older cities have combined sewers, where storm water does go to the plant except in heavy rain. Buffer strips of grass or trees along creeks, cover crops, and less pavement keep some pollution out.

Simplifications to know: the app does not model a buffer strip catching runoff, so a strip of meadow below a field changes little there; its fixes work by changing what covers the land. Algae in a real pond often depends more on phosphorus than on nitrate, which is the only nutrient the app tests; and in tile-drained farmland much of the nitrate reaches creeks underground between storms. The valley is a model with numbers of the right size, not a real place. The runoff uses the curve numbers engineers use, and the storms are real ones for central Iowa.

What to look for

Ask these while students work. A student who has understood the lesson can answer them without help:

- Point to the green in the creek. Where did it start?
- Where does the water in a storm drain go?
- Which of your sources is a point source, and which are nonpoint?
- Did you rain the same storm before and after your change?
- Why is nonpoint pollution harder to clean up?

> The second question is the real test: a student who says the storm drain goes straight to the creek, untreated, has the idea.

Cross-curricular extensions

- Civics: find who looks after storm drains in your town, and whether the drains near school are marked "drains to creek".
- Math: compare the creek mouth's nitrate before and after your fix. What fraction did the fix keep out?
- Art: design a storm drain marker for the school that tells people where the water goes.
- English: write a short public service announcement about what not to pour down a storm drain.

Vocabulary

Nonpoint source pollution	Pollution that washes off a wide area with the rain, like fields, lawns and streets.
Point source pollution	Pollution that enters at one place, like a pipe.
Storm drain	A grate in the street. In most towns its pipe runs straight to the creek, separate from the sewer, so nothing cleans it.
Fertilizer	Nutrients like nitrogen spread on crops. What the crops do not take up can wash into creeks and feed algae.
Buffer strip	A band of grass or trees between land and a creek that slows runoff and catches some of what it carries.

Differentiation

ENGLISH LEARNERS

- Keep the vocabulary slide up, and point at the screen as you say each word: the yellow line, the creeks and the gauge carry the meaning.
- Pair each learner with a partner; the dye colors carry the meaning.
- Accept the table as more or less, without sentences.

STUDENTS WHO NEED MORE SUPPORT

- A sentence starter: "The ___ kept ___ out of the creek because ___."
- A check-in after the guide: every student has the dye on and can name one color.
- Ask only which color in the creek came from which place.

STUDENTS WITH IEPS OR 504 PLANS

- Pair students, one painting and one filling in the table.
- Zoom the browser to 125%; the card and the dye stay readable.
- Allow the guided run and one change, where the IEP allows a modified assignment.

STUDENTS READY FOR MORE

- Find the change that keeps the most nitrate out for the least land.
- Explain why the feedlot shows brown only in a storm.
- Write a rule for the town that would keep the creek mouth under the swimming line.

Adapting for other grades

Younger students: In grades 4 and 5, open Setup and pick grades 2 to 5: readings are in words and pictures and the sheet asks the simpler questions. Do the guide together and stop there; skip the third rubric row; total 8, and 6

meets the objectives.

Older students: In high school, pick high school in Setup. Students compare two fixes by how much nitrate each keeps out of the creek mouth, and explain why much of the nitrate from real tile-drained farmland reaches creeks underground, between storms.

Student worksheet

Name: _____ Date: _____

Open the app: scan the QR code, or go to mytekdev.com/try/watershedlab?lesson=what-washes-into-the-creek

Essential question: No single pipe is to blame. How does pollution from a whole valley get into the creek, and what keeps it out?

Warm-up: Where does the water go when it runs off a street into the grate at the curb?

_____

1. **Vocabulary.** Nonpoint source pollution, point source pollution, storm drain, fertilizer, buffer strip: write each in your own words.

2. **The before-and-after table.** Before your change: the creek mouth readings _____. Your change _____. After, with the same storm: the readings _____.

1. Name one point source and one nonpoint source in your valley. Why is the nonpoint one harder to clean up?

2. Which change kept the most out of the creek? Use your numbers.

Watershed Lab: What Washes Into the Creek?

Exit ticket

Name: _____

1. Fertilizer washing off a whole cornfield in the rain is (A) point source pollution (B) nonpoint source pollution (C) not pollution

2. In most towns, water in a street storm drain goes (A) to the wastewater plant (B) straight to a creek, untreated (C) into the ground under the street

3. Name one change to the land that keeps pollution out of a creek, and explain how it works.

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Answer key: exit ticket

QUESTION	ANSWER	WHY
1	B	It comes from everywhere on the field at once, not from one pipe.
2	B	In most towns the storm drain pipe is separate from the sewer, so nothing cleans it.
3	For example, meadow or forest in place of part of a field or a parking lot	Less fertilizer or oil is on the land, and more rain soaks in. A buffer strip along a real creek also slows runoff and catches some of what it carries. Naming a change without how it works is half.

Rubric

Score each row from 1 to 4.

Name: _____

CRITERIA	4 EXCEEDS	3 MEETS	2 APPROACHING	1 BEGINNING
The before-and-after table	Readings at the creek mouth before and after each change, with the same storm, and the change named.	Readings before and after one change.	Some readings recorded.	No readings.
Point and nonpoint	Explains the difference with an example of each from the app, and why nonpoint is harder to clean up.	Explains the difference with one example.	Names the two words with no difference.	No explanation.
The fix	Judges which change kept the most out, with numbers, and explains how it works.	Names a change that helped, with a reason.	Names a change, with no evidence.	No change tested.

Total: ____ / 12. A score of 9 or more meets the objectives.

Standards

The lesson is built for MS-ESS3-3: students test ways of minimizing a human impact on water.

FRAMEWORK	CODE	GRADES	STANDARD	HOW THE LESSON MEETS IT
NGSS	**MS-ESS3-3**	6-8	Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.	Students model runoff pollution from farms and a town and test land changes that keep it out of the creek.

Checked November 2026 against: NGSS MS-ESS3-3, Earth and Human Activity.

Optional: save student work in a free class

The whole lesson runs at the link on the worksheet, with no accounts and no sign-up.

To keep students' work, and see it all in one place, make a free class. It takes about ten minutes, once, and covers every lesson in this series: mytekdev.com/tools/class-setup

Students in a class open mytekdev.com/tools/watershed-lab/lessons/what-washes-into-the-creek/start instead of the worksheet link. Each one gets their own copy of the starter, and the same link reopens it next time.

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