



Natural Resources Conservation
Academy
University of Connecticut



Teacher Professional Learning 2018 Workshop Materials



This program is supported by a grant (PD-STEP 2016-05148) from the USDA National Institute of Food and Agriculture (NIFA) Agriculture Food and Research Initiative Education and Literacy Initiative, as part of their Professional Development Opportunities for Secondary School Teachers program. NRCA TPL was developed by faculty from UConn's Center for Land Use Education & Research (CLEAR), Department of Natural Resources & the Environment, Center for Environmental Sciences and Engineering (CESE) and the Neag School of Education.



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Water & Land Workshop Agenda

A 3-day short course centered on the NGSS **Earth & Human Activity** Disciplinary Core Idea

August 13-15, 2018

UConn main campus, Storrs, CT



Monday 8/13/2018

8:30 AM	Registration, coffee & muffins
9:00 AM	Introductions
9:30 AM	Course overview
9:40 AM	NGSS framework, Unit Lesson Plan & intro to modeling exercise
10:00 AM	modeling exercise
10:30 AM	Introduction to field exercise (a tale of 3 watersheds)
10:45 AM	Travel to stream sampling sites
11:00 AM	Stream sampling
12:30 PM	Travel back to campus
12:45 PM	Lunch
1:15 PM	Analyze water samples and discuss results
1:45 PM	Summary Chart with Student Hat then Review Lessons 1-3 with teacher hat
2:15 PM	Water and our changing landscape (presentation)
2:45 PM	Exercise #1: Exploring the Connecticut's Changing Landscape Story Map
3:30 PM	Introduction to geospatial science & technology (presentation)
4:00 PM	Exercise #2: CT ECO online mapping
4:45 PM	done for the day

Tuesday 8/14/2018

8:30 AM	Coffee & muffins
9:00 AM	A brief introduction to Low Impact Development (LID) (presentation)
9:30 AM	LID walking tour of UConn campus
10:45 AM	Exercise #3: Using the WikiWatershed Runoff Simulation Tool
11:15 AM	Exercise #4: Using the WikiWatershed <i>Model My Watershed</i> Tool
12:30 PM	Lunch
1:00 PM	Comments & discussion: using WikiWatershed in the classroom
1:15 PM	Summary Chart with Student Hat then Review Lessons 4-6; 13+ with teacher hat
2:30 PM	The human element: water & land regulatory frameworks (presentation)
3:30 PM	A bigger picture: beyond CT's borders (discussion)
4:30 PM	done for the day

Wednesday 8/15/2018

8:30 AM	Coffee & muffins
9:00 AM	LID walking tour of UConn campus, continued: DIY LID design
10:15 AM	Review lessons 8-12 with teacher hat
11:00 AM	Create final <i>Gotta Have</i> list and make final revision of model ; share final models
11:45 AM	Water and Land Lesson Plan Personalization
12:30 PM	Working lunch: work on lesson plans
1:30 PM	Follow-up: tools & resources to help you during the school year
2:00 PM	Follow up: evaluation and research
2:30 PM	DONE!



Teacher Professional Learning (TPL) Participant List

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Teacher Professional Learning (TPL) Program Support

After you have completed the workshop at UConn and return to your classroom, we will continue to provide curricular and technological support to help you carry out your Water & Sustainability unit that you developed during the workshop in your classroom. Support will be provided through:

Program Website

Web resources will be regularly added to the program website. We will inform you when new materials are posted, but also encourage you to check the website frequently. All web resources can be found at <http://nrca.uconn.edu/teachers/> under the Teacher Resources tab.

NRCA Participant Google Forum

A great resource we encourage all participants to use throughout the program is the NRCA Google Forum. This site will be used to provide more resources and communicate with program instructors and other participants about topics covered in all of our programs. This is the place to discuss tools and technology you are using in your classroom. Join the Google Community by clicking the link on <http://nrca.uconn.edu/teachers/forum.htm>.

Unit Planning Template

We will provide you with a *Human Impacts on Local Water Resources Unit Planning Template* that aligns with Next Generation Science Standards. This template is located at <https://goo.gl/4QWS7T> or in *Workshop Materials* under the Teacher Resources tab found at <http://nrca.uconn.edu/teachers/>.

Instructor Contact

If you have any questions, please feel free to contact the program coordinator or TPL instructors:

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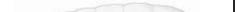
Materials List

- ✓ Macroinvertebrate Field Sheet
- ✓ Exploring Connecticut's Changing Landscape Story Map Activity
- ✓ Introduction to Online Maps Activity

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4:00 PM	Exercise #2: CT ECO online mapping
4:45 PM	done for the day

MONDAY

BENTHIC MACROINVERTEBRATES: Use the table below to record information about your collections. Record their abundance using this code: **(A)** > 50, **(C)** 5 – 50 and **(R)** < 5. Also record the number of different kinds. The # of kind's box indicates groups in which multiple kinds (families) are possible.. **Important note:** **ALWAYS RECORD THE NUMBER OF KINDS WHEN APPLICABLE.** (Illustrations are courtesy of the Cacapon Institute; Jennifer Gillies, artist)

 Stoneflies	# of kinds <input type="text"/>	 Mayflies	# of kinds <input type="text"/>	 Caddisflies	Case-builders	
 Dragonflies	# of kinds <input type="text"/>	 Common netspinner	# of kinds <input type="text"/>	 Caddisflies	Net-spinners <input type="text"/>	Free-living <input type="text"/>
 Damselflies	# of kinds <input type="text"/>	 Riffle beetle	# of kinds <input type="text"/>	 Water penny	<input type="text"/>	
 Hellgrammite	# of kinds <input type="text"/>	 Alderfly	# of kinds <input type="text"/>	 Other Beetles/Bugs	Other beetles <input type="text"/>	True bugs <input type="text"/>
 Midges	# of kinds <input type="text"/>	 Black fly	# of kinds <input type="text"/>	 Crane fly	<input type="text"/>	
 Watersnipe fly	# of kinds <input type="text"/>	 Other True flies	# of kinds <input type="text"/>	 Crayfish	<input type="text"/>	
 Clams	# of kinds <input type="text"/>	 Mussel	# of kinds <input type="text"/>	 Scud/Sideswimmer	<input type="text"/>	
 Operculate snails	# of kinds <input type="text"/>	 Non-operculate snails	# of kinds <input type="text"/>	 Aquatic sowbug	<input type="text"/>	
 Aquatic worm	# of kinds <input type="text"/>	 Leech	# of kinds <input type="text"/>	 Flatworm	<input type="text"/>	

Other aquatic life observed or collected:

Total # of Kinds

THE COORDINATOR WILL DETERMINE YOUR STREAM SCORE BASED ON THE INFORMATION PROVIDED ABOVE.

Connecticut's Changing Landscape Story Map

Hands-on Activity, Day One

CCL Story Map
Day 1

Exploring Connecticut's Changing Landscape Story Map

How is Connecticut's landscape changing? Where? How fast? This story map was designed to answer these questions through a combination of facts, statistics and maps. Connecticut's Changing Landscape is a remote sensing-based land cover study that examines landscape changes over a 25 year period from 1985-2010. In this activity, you will explore the interactive story map by reading and clicking through the different tabs. We encourage you to click on the maps to explore the state and your specific communities!

Open the Connecticut's Changing Landscape Story Map

The University of Connecticut's Center for Land Use Education and Research (CLEAR) has created a number of interactive story maps for Connecticut. For this activity, you will explore the Connecticut's Changing Landscape Story Map. Let's get started.

- First open a **web browser** (Google Chrome, Mozilla Firefox, etc.)
- Go to the UConn CLEAR website, "clear.uconn.edu"
- Scroll down the Home page to the Featured section, and click on "**CLEAR Story Map Gallery**"
- Finally click on "**Connecticut's Changing Landscape**" in the bottom left corner of the screen

<http://clear.uconn.edu>

The screenshot shows the UConn CLEAR website homepage. At the top, there are navigation links for Water, Land & Climate, Mapping, STEM, Overview, Geospatial Training, CT ECO, Changing Landscape, Story Map Gallery, Tools, Data, and Research. Below this, there's a large image of people at an outdoor event. To the right of the image, the text "Education and Research" is displayed. The "Story Map Gallery" link is highlighted with a red box and an arrow. Further down, there's a "New & Upcoming" section with publications like "CLEARscapes - Winter 2018 Edition" and a "Next Webinar - July 10th" section about the CT DOT's "MS4" General Permit. A red arrow also points to the "Connecticut's Changing Landscape" link in the bottom left corner of the main content area.

<http://clear.uconn.edu/storymaps>

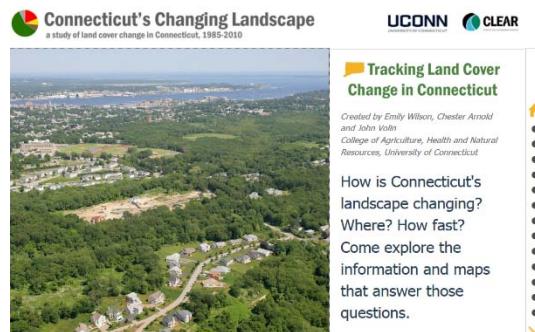
The screenshot shows the "CLEAR Story Map Gallery" page. It features a grid of nine story map thumbnails. The thumbnails are titled: "Connecticut's Changing Landscape" (by Emily Wilson and Chet Arnold), "Maps & Apps for Community Conservation Projects" (by Gary Chadwick), "Modeling Site Suitability of Living Shorelines" (by Jason Zylberman), "The Bears are Back: Getting to Know Connecticut's Bears" (by Gary Chadwick and Mike Evans), "Connecticut's Coast: Then and Now" (by Emily Wilson and Joel Stocker), "The Status of Low Impact Development (LID) Adoption in Connecticut" (by Dave Dickson and Marion LaFever), "NRCA" (by NRCA Website Contact), "UConn Campus Green Infrastructure Tour" (by Dave Dickson and Mike Dief), and "CT DOT's 'MS4' General Permit" (by Emily Wilson).

Connecticut's Changing Landscape Story Map

Hands-on Activity, Day One

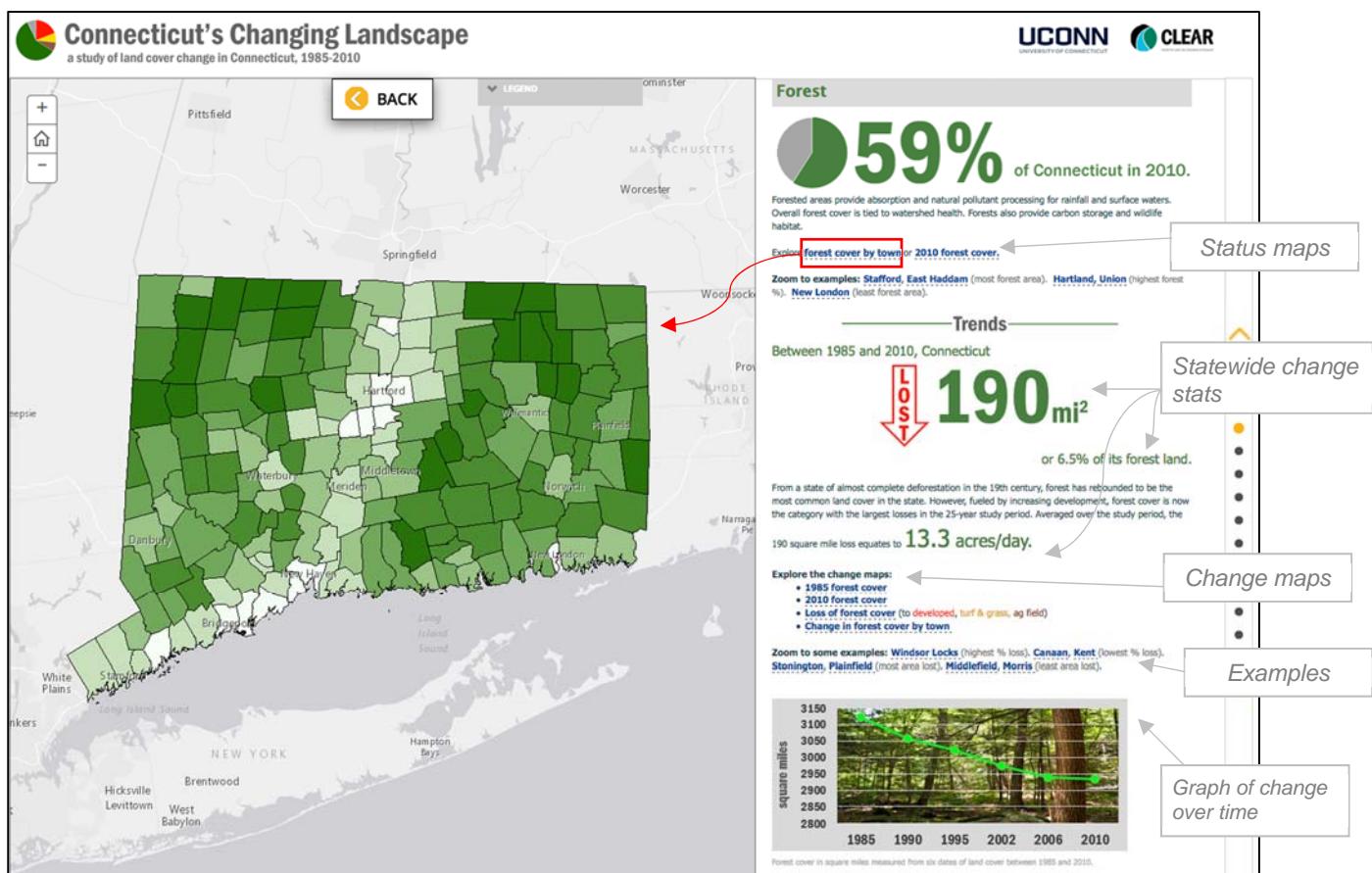
Explore the Connecticut's Changing Landscape Story Map

1. Take a few minutes to explore the story map. You can scroll down through the "pages" of the story using the dots on the right-hand side. You're just browsing so don't dwell on any one page for the moment – you'll be back!
2. Now, return to Page 2 (the second dot) to look into the land cover in your town. You can pan and zoom on the map using the Spyglass tool. To really check out your town, click on one of the example towns, which will turn the entire map into a land cover map. Then, pan & zoom to your town. Click anywhere in your town to see a box showing the land cover distribution.



Q: *What is the most common land cover in your town?*

3. The next four pages highlight the four major land covers in the state: forest, developed land, turf & grass, and agricultural fields. You can view the data by pixel, or averaged by town. And you can see both of these maps showing the situation in 2010, or showing the change from 1985-2010. There are also links to pre-set examples showing changes in that particular land cover, statewide statistics, and a graph of statewide change over the 25 years.



Connecticut's Changing Landscape Story Map

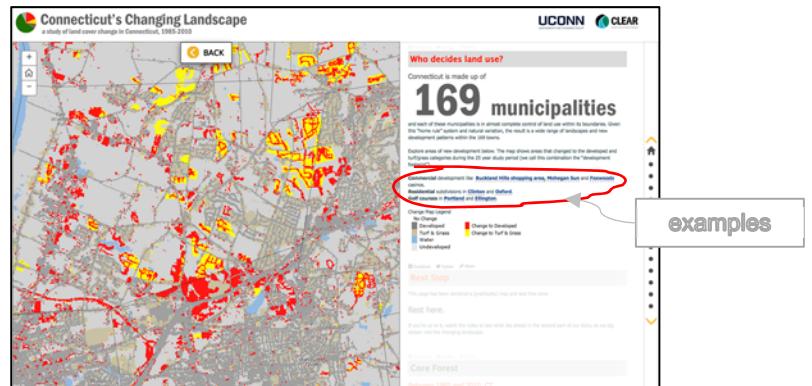
Hands-on Activity, Day One

Q: How many acres of forest did your town lose between 1985 and 2010? _____

Q: How many acres of agricultural field did Suffield have in 1985? _____ In 2010? _____

Q: How many average acres per day of Turf & Grass did CT gain during the 25-year period?

4. Go to Page 7 (Who decides land use?) and explore the pre-set examples of the “development footprint” in those towns to get a feel for the patterns that indicate each type of development. Then, zoom to your town and analyze the areas that have changed to developed or turf and grass. Where is the majority of change happening? For example, does it occur along a water source, close to a major roadway, or extending from a pre-existing shopping area? Think about the location, amounts and pattern of development in your town and the possible impacts (both good and bad) it has had on your community.



Q: Describe the development pattern in your town over the 1985-2010 period.

5. Go to Page 8 (Rest Stop) and watch the brief video on daily landscape change in CT.
6. Choose one of the four new analytical maps on Pages 9-12, and poke around. Whatever strikes your fancy: there are chapters on forest fragmentation, riparian zones, agricultural land, and impervious surfaces.

Q: Which map did you choose? _____

If you had to encapsulate the information of this map in one sentence, what would it be?



Exploring Online Maps: Build a Mapbook

Hands-on-Activity, Day One

Introduction to Online Maps

Connecticut Environmental Conditions Online (CT ECO) is a mapping website for viewing and exploring geographic data using only a web browser. You will explore several interactive map viewers on this site, take “screen shots” or pictures of the maps and assemble them in a powerpoint file to create a map book of one location showing lots of characteristics about that place.

The mapbook template is a guide and contains the maps listed below. These data layers are described in detail in Data Guides on the CT ECO website, <http://cteco.uconn.edu/guides/data.htm>. Feel free to make changes or add additional maps that may be of interest to you.

Base Maps

Map 1: Spring Aerial Imagery

Map 2: Hillshade Elevation

Map 3: Boundaries/Streets

Map 6: Open Space

Map 7: Critical Habitat & Natural Diversity DB Areas

Land Resources

Map 4: Hydric Soils

Map 5: Farmland Soils

Water Resources

Map 8: Watersheds, Hydrography & Wellhead protection areas

Map 9: Water Quality: Surface & Groundwater

More about CT ECO

<http://cteco.uconn.edu>

CT ECO is a partnership between UConn CLEAR and Connecticut DEEP (Department of Energy and Environmental Protection). The website provides different ways (pdfs, interactive viewers and map services) for users to see and interact with Connecticut's natural resource mapping layers.

In this activity, you will use the CT ECO Aerial Viewer, Elevation Viewer, Simple Viewer and Advanced Viewer to generate images of maps to copy/paste into a map book.



Exploring Online Maps: Build a Mapbook

Hands-on-Activity, Day One

Getting Started

A mapbook is a book of maps of the same location.

First, **view the sample mapbook** located at <http://nrca.uconn.edu/teachers/materials/> (look for Mapbook Sample link). Notice how it is a series of consistent pages that show different characteristics for the same location.

Now, **choose your location**. We suggest focusing on (approximately) the town level. Options could be the community where you live, or the community where your high school is located.

My Mapbook will be for _____

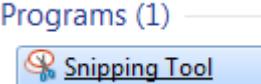
Mapbook File

- Go to <http://nrca.uconn.edu/teachers/materials/> and find the **Mapbook Template** link.
- Click on the link and **save the powerpoint file** to your flash (or hard) drive called *locationMapbook.ppt* where *location* will be the focus of your mapbook.

You will create your mapbook by completing the mapbook powerpoint template that you just downloaded and saved. You will add a picture of each map to your powerpoint using the Snipping Tool (PC) or Mac shortcuts.

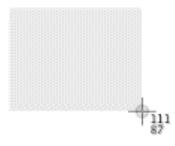
How to use the Snipping Tool on a PC

The Snipping Tool takes a “picture” of whatever you are viewing on the screen. Then you can either copy it for pasting or save it with a name. You will use the snipping tool to take pictures of maps and add them to your map book.

- Go to the **Start Menu** and start typing *snipping* until the **Snipping Tool** shows on the list. Alternatively, go to the **Start Menu > All Programs > Accessories > Snipping Tool**.
- Click on it to open the **Snipping Tool**.
- Click **New** and **draw a box** around what you want to “take a picture of” on your screen.
- When you release your mouse, your capture will show.
- Use the icon to **Save or Copy**  your image. Note that you can also save the file and give it a name. 

Screenshots on a Mac

- Press Shift-Command-4. The pointer changes to a crosshair.
- Move the crosshair to where you want to start the screenshot, then drag to select an area. While dragging, you can hold Shift, Option, or Space bar to change the way the selection moves.
- When you've selected the area you want, release your mouse or trackpad button. To cancel, press the Esc (Escape) key before you release the button.
- Find the screenshot as a .png file on your desktop.



Exploring Online Maps: Build a Mapbook

Hands-on-Activity, Day One

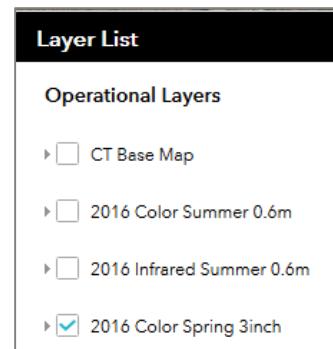
Follow these instructions to explore some Connecticut mapping resources and to add the maps to your mapbook using the snipping tool/screenshot. Don't worry if your individual maps are not perfectly aligned – close is good enough for this exercise!

NOTE: These instructions are also available in the notes section of each slide in your mapbook powerpoint template.

Aerial Imagery

The **Connecticut Aerial Imagery Viewer** on CT ECO contains most of Connecticut's digital aerial imagery.

- Go to the CT ECO website <http://cteco.uconn.edu>.
- Find **Map Viewers**.
- Find **Aerial Imagery Viewer** and click **Go to Viewer**.
- Zoom to your location. You can enter an address in the Geocoder if you wish.
- Click on the **Layers** button in the upper right-hand corner  to see all of the available layers. Turn on **2016 Color Spring 3inch**.
- Take a snip, copy and paste on the slide **2016 Spring Aerial Imagery**. Resize or crop if necessary.



Hillshade (Elevation)

The **CT ECO Elevation (Lidar) Viewer** contains a virtual mosaic of elevation data in the form of hillshade, shaded relief, slope and aspect.

- Go back to the **Viewers** page on the CT ECO website <http://cteco.uconn.edu> and find the **Elevation (Lidar) Viewer**.
- Click **Go to Viewer**.
- Zoom to your location.
- Take a snip, copy and paste on the slide **Hillshade**. Resize or crop if necessary.

Boundaries & Streets

The **CT ECO Simple Viewer** is designed for viewing a standard boundaries and streets base map or recent aerial imagery plus ONE natural resource theme at a time.

- Go back to the **Viewers** page on the CT ECO website <http://cteco.uconn.edu> and find the **Simple Map Viewer**.
- Click **Go to Viewer**.

Exploring Online Maps: Build a Mapbook

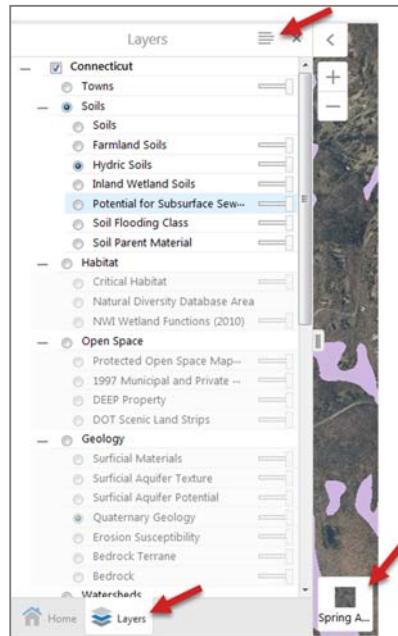
Hands-on-Activity, Day One

- Zoom to your location. The standard Towns boundary layer will already be turned on.
- Take a snip, copy and paste on the slide **Boundaries & Streets**. Resize or crop if necessary.

Hydric Soils

- Locate the **Layers tab** in the lower left. 
- Zoom to your location.
- Click on the radio button next to **Soils** and then the radio button next to **Hydric Soils**.
- Change the **Basemap** (lower right of the layer list) to **Spring Aerial**.
- Take a snip, copy and paste on the slide **Hydric Soils**. Resize or crop if necessary.

Note that the legend snip on the slide came from the **Show Legend** tab next to the **Layers** heading.



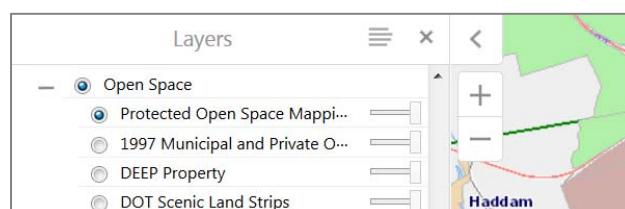
Farmland Soils

- Return to the **Simple Map Viewer** on CT ECO.
- Uncheck the radio button next to **Hydric Soils** and instead turn on **Farmland Soils**.
- Take a snip, copy and paste on the slide **Farmland Soils**. Resize or crop if necessary.



Open Space

- Return to the **Simple Map Viewer** on CT ECO.
- Check the radio button next to **Open Space** and then check the radio button next to **Protected Open Space Mapping**.
- **NOTE:** some towns do not have this data layer available; if so the town will be “grayed out” rather than displaying colored open space parcels. If this is true for your town don’t sweat it, just move on!
- Take a snip, copy and paste on the slide **Open Space**. Resize or crop if necessary.



Exploring Online Maps: Build a Mapbook

Hands-on-Activity, Day One

Critical Habitat & Natural Diversity Database Areas

The **CT ECO Advanced Viewer** is designed for viewing multiple natural resource layers at once and contains more tools than the Simple Viewer does. So, we'll use the Advanced Viewer to make a few thematic maps that require two or more data layers.

- Go back to the **Viewers** page on the CT ECO website <http://cteco.uconn.edu> and find the **Advanced Map Viewer**.
- Click **Go to Viewer**. The viewer is a draft so click the “**beta viewer**” **link in the first line of text**.
- Locate the **Layers tab** in the lower left.  Layers
- Zoom to your location.
- **Uncheck** the box next to **Towns**.
- Expand the **+** next to **Bioscience** and click on
 - o **Critical Habitat** and
 - o **Natural Diversity Database Area**
- Change the **Basemap** back to the original Basemap.
- Take a snip, copy and paste on the slide **Critical Habitat & Natural Diversity DB Area**. Resize or crop if necessary.



Water Resources

- Go back to the **Advanced Map Viewer**.
- Turn off (uncheck) the habitat layers you just used.
- Expand the **+** next to **Watersheds** and click on
 - o **DEEP Regional Basins**,
 - o **DEEP Subregional Basins** and
 - o **DEEP Local Basins**.
- Expand the **+** next to **Water Resources** and click on
 - o **Hydrography** and
 - o **Wellhead Protection Areas**.
- Change the **Basemap** to **Hillshade**.
- Take a snip, copy and paste on the slide **Water Resources**. Resize or crop if necessary.

Exploring Online Maps: Build a Mapbook

Hands-on-Activity, Day One

Water Quality

- Go back to the **Advanced Map Viewer**.
- Turn off (uncheck) the water layers you just used.
- Expand the **+** next to **Water Quality** and click on
 - o **Surface Water Quality**
 - o **Ground Water Quality**
- Change the **Basemap** back to the original Basemap.
- Take a snip, copy and paste on the slide **Water Resources**. Resize or crop if necessary.

Be sure to save your work!

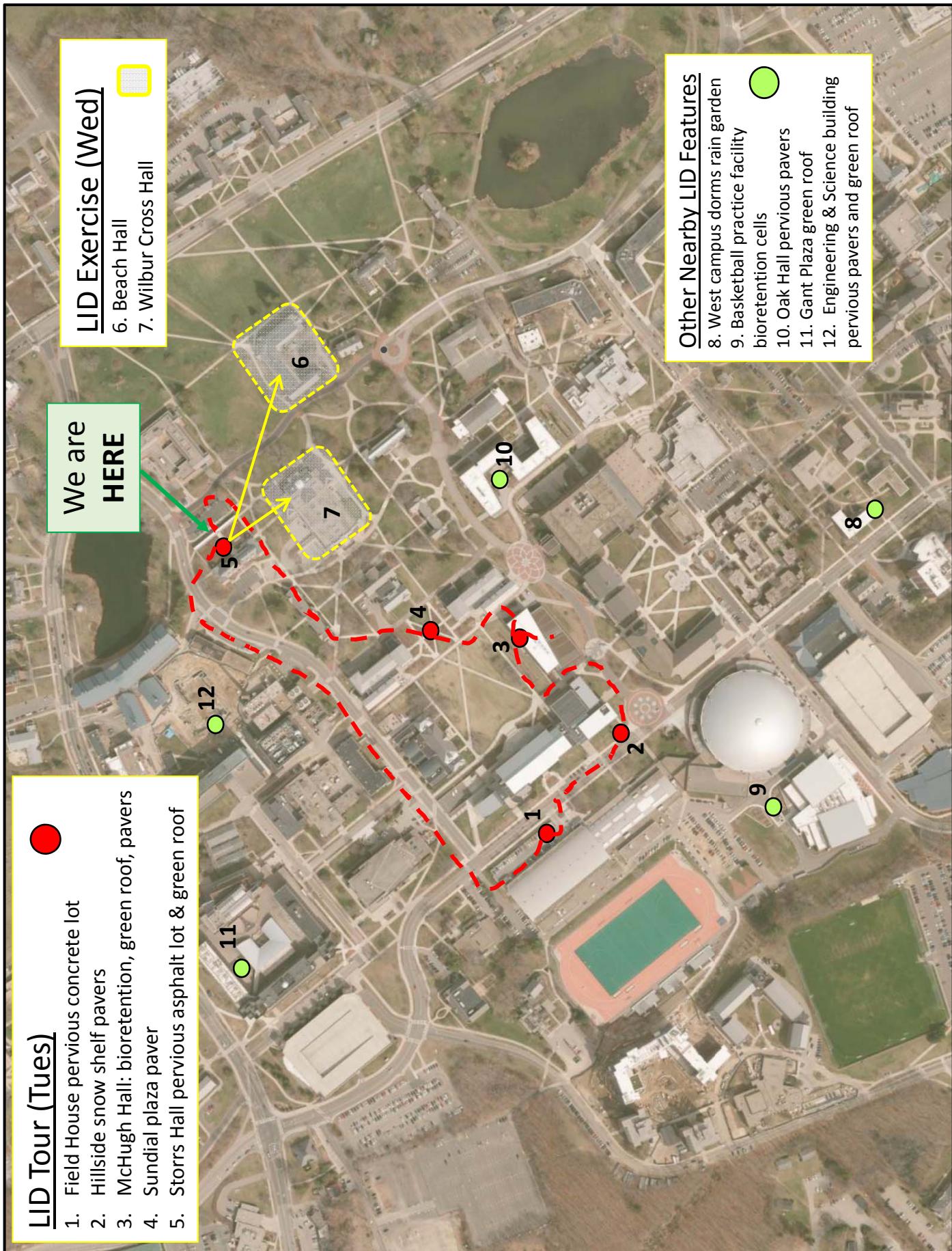


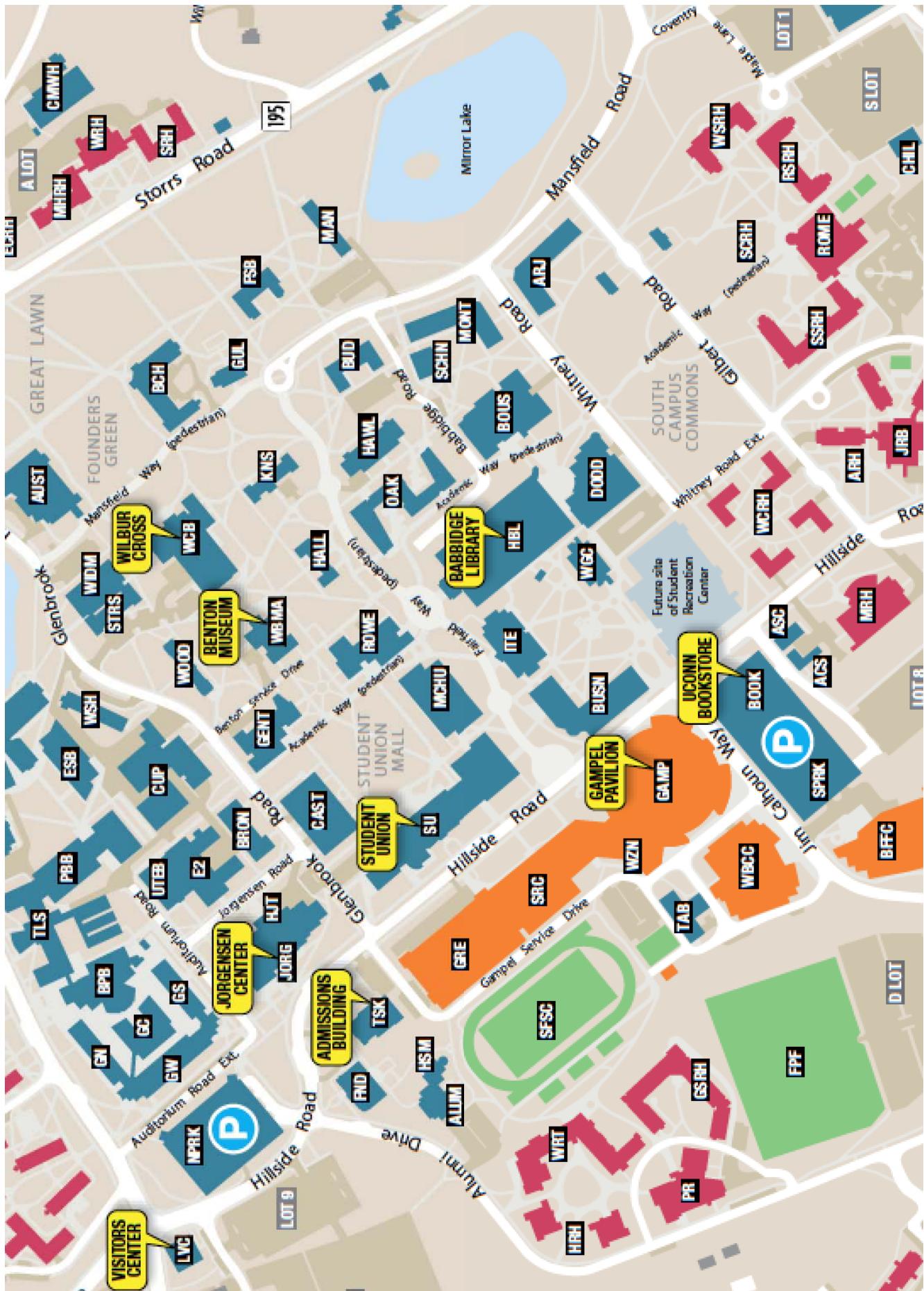
Materials List

- ✓ LID walking tour map
- ✓ LID walking tour observation chart
- ✓ WikiWatershed Runoff Simulation Tool (Micro Site Storm Model) activity
- ✓ WikiWatershed Model My Watershed Tool activity

TUESDAY

Tuesday 8/14/2018	
8:30 AM	Coffee & muffins
9:00 AM	A brief introduction to Low Impact Development (LID) (presentation)
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11:15 AM	Exercise #4: Using the WikiWatershed Model My Watershed Tool
12:30 PM	Lunch
1:00 PM	Comments & discussion: using WikiWatershed in the classroom
1:15 PM	Summary Chart with Student Hat then Review Lessons 4-6; 13+ with teacher hat
2:30 PM	The human element: water & land regulatory frameworks (presentation)
3:30 PM	A bigger picture: beyond CT's borders (discussion)
4:30 PM	done for the day





Low Impact Development Tour

LID Location & Practice	Observations - What do I notice?	Inferences - What do I think is going on here?	Questions - What do I wonder?
1			
2			
3			

Low Impact Development Tour

LID Location & Practice	Observations - What do I notice?	Inferences - What do I think is going on here?	Questions - What do I wonder?
4			
5			

WikiWatershed Tools

Hands-on Activity, Day Two

WikiWatershed
Day 2

Micro Site Storm Model

This simple model (not so simple underneath the hood) allows the user to explore the interplay of the major factors governing the fate of rainfall hitting the earth. It's a good precursor for those that will be using the full Model My Watershed tool. Description from the website: "The Runoff Simulation Model is an animated version of the Site Storm Model package of Model My Watershed. It allows users to learn how land use and soil together determine whether rainfall infiltrates into the soil, runs off into streams or is evaporated and transpired by plants."

Open the Runoff Simulation Tool

1. Go to WikiWatershed Home Page of the Stroud Water Research Center

<https://wikiwatershed.org/>

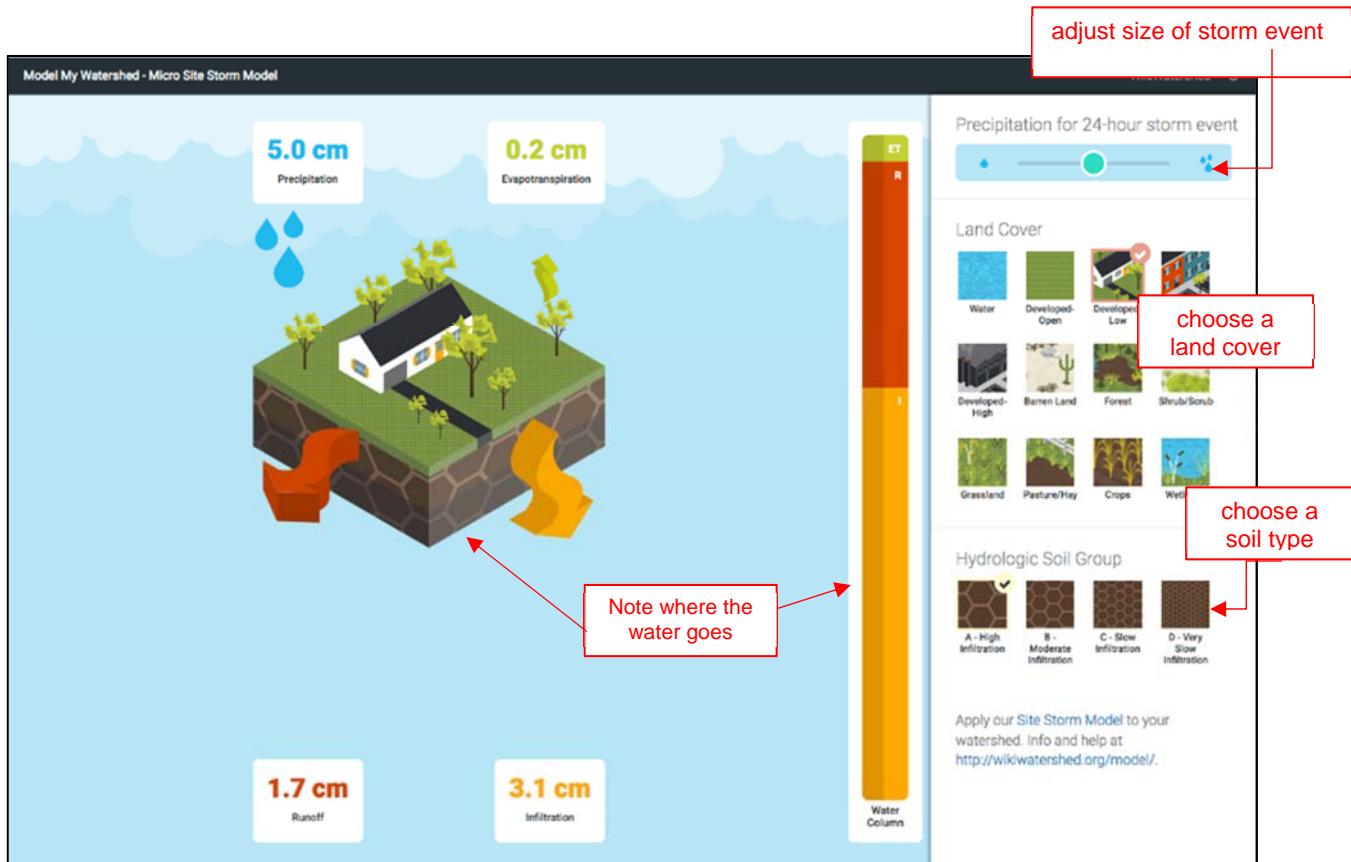
2. Launch the Runoff Simulation App

Spend some time playing with the three variables of the model: rainfall amount, land cover type, and soil type (see diagram, next page). Then, answer the questions on the following page.

The screenshot shows the homepage of the WikiWatershed Toolkit. At the top, there is a header with the Stroud Water Research Center logo and a brief description of the toolkit's purpose. Below the header, there is a main navigation bar with links like 'Explore the WikiWatershed Toolkit', 'Model My Watershed', 'Monitor My Watershed', 'Runoff Simulation', 'Leaf Pack Network', and 'Water Quality Mobile App'. A large yellow arrow points from the text above to the 'Runoff Simulation' section. The 'Runoff Simulation' section features a preview image of the app interface and a 'Launch the App' button. To the right of the toolkit navigation, there is a news sidebar with recent articles, a 'Subscribe to e-news' button, and an events sidebar listing a Rock Pack Workshop. At the bottom right, there is a video thumbnail for 'Teaching Environmental Sustainability With Model My Watershed (TES-MMW)'.

WikiWatershed Tools

Hands-on Activity, Day Two



3. Keeping the rainfall setting at 5 cm and soil type "A" (the default settings), choose different land covers and note the difference in the results of what happens to the rainfall.

Q: *What is the difference in runoff generated by a 5 cm storm (the default setting) between forest and highly developed land? _____ Between crops and low intensity developed land? _____*

Q: *What percentage of a 5 cm rainfall becomes runoff in medium intensity developed land? _____*

4. Adjust the soil type for 2 or 3 different land covers.

Q: *For the three developed classes, what changes occur in infiltration and runoff with different soil types? _____*

Q: *For grassland and crops, how does the infiltration and runoff change as the soil goes from "A" to "D"? _____*

5. Finally, see what happens when a bigger storm arrives. Choose a land cover and soil type and move from the 5 cm to the 8 cm to the 21 cm storm settings.

Q: *Circle the land cover that does the best job of infiltrating large storms:*
 developed/open forest grassland wetland

Q: *For a 21 cm storm, what percentage of the rainfall becomes runoff for a medium intensity developed area with highly infiltrating soils? _____*

WikiWatershed Tools

Hands-on Activity, Day Two

WikiWatershed
Day 2

Model My Watershed App

Model My Watershed is a powerful new tool created by the [Stroud Water Research Center](#) that relates demonstrates the relationship of land and water. It has some sophisticated models working behind the scenes to allow you to choose an area and:

- describe the area with national datasets showing land cover and soils
- model the runoff quantity and quality for the area using different storm sizes
- compare the current runoff conditions to those in scenarios that you create with tools that can alter the land cover and/or install conservation practices in the area

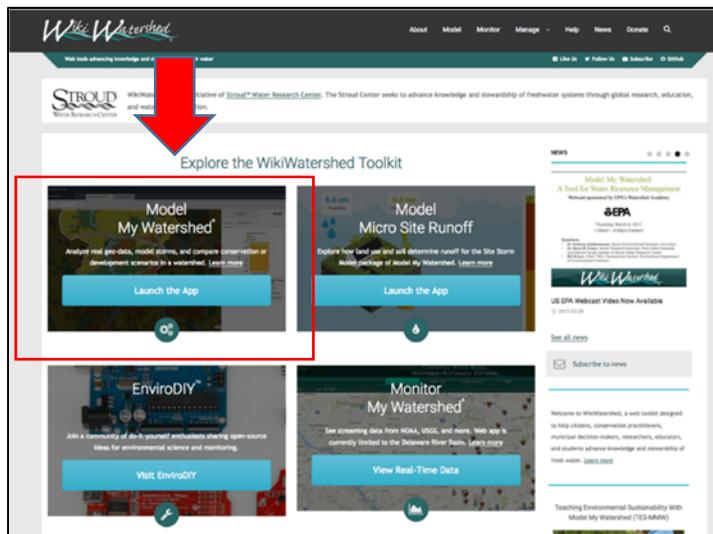
See also Stroud Center's Online Guide:

<https://wikiwatershed.org/documentation/site-storm-guide/>

Model YOUR Watershed

In this activity, you will use the Model My Watershed App to simulate stormwater runoff and water quality on your school property.

- ⇒ Open the **Model My Watershed** app from the Wikiwatershed home page or by typing <https://app.wikiwatershed.org/> into a browser window.



<https://app.wikiwatershed.org/>

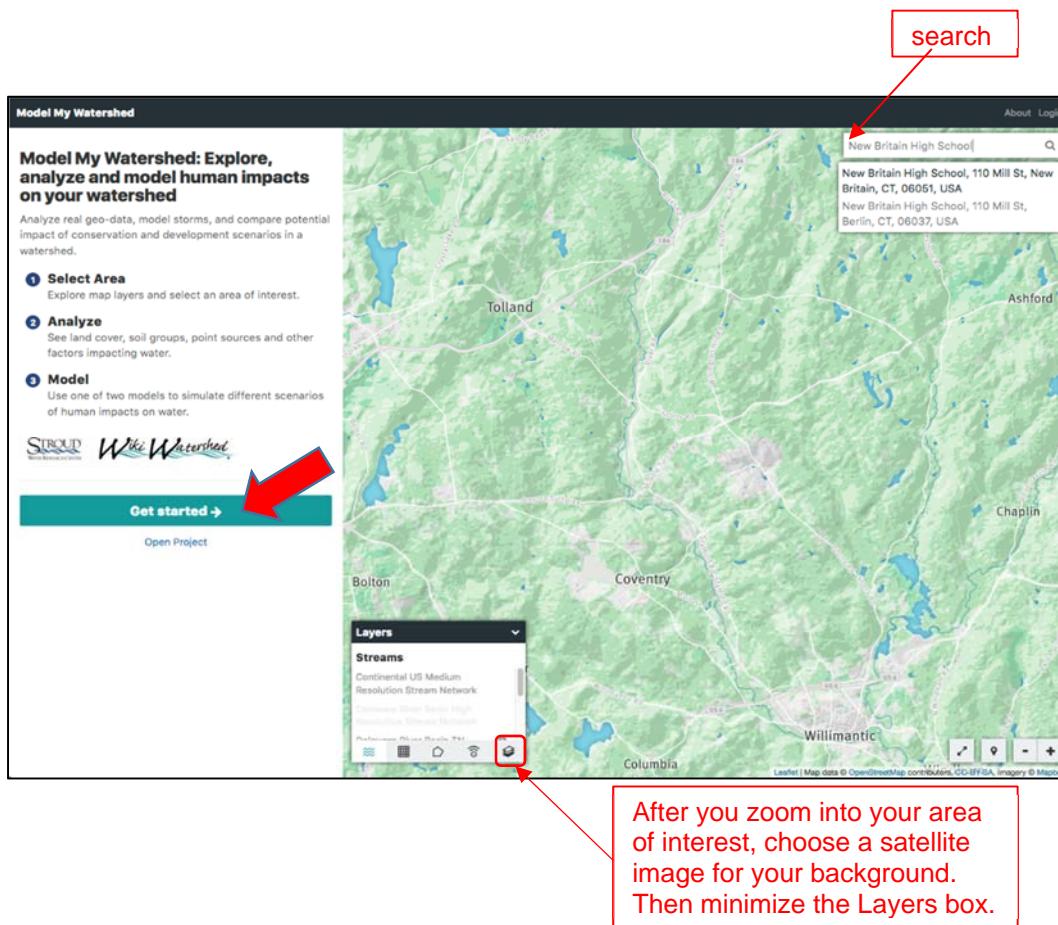
- ⇒ Create an account if you haven't done that already (Login box, upper right). You may need to log into your email to verify your account before going on to the next step. Write down your user name and password for safe keeping.

Username _____
Password _____

WikiWatershed Tools

Hands-on Activity, Day Two

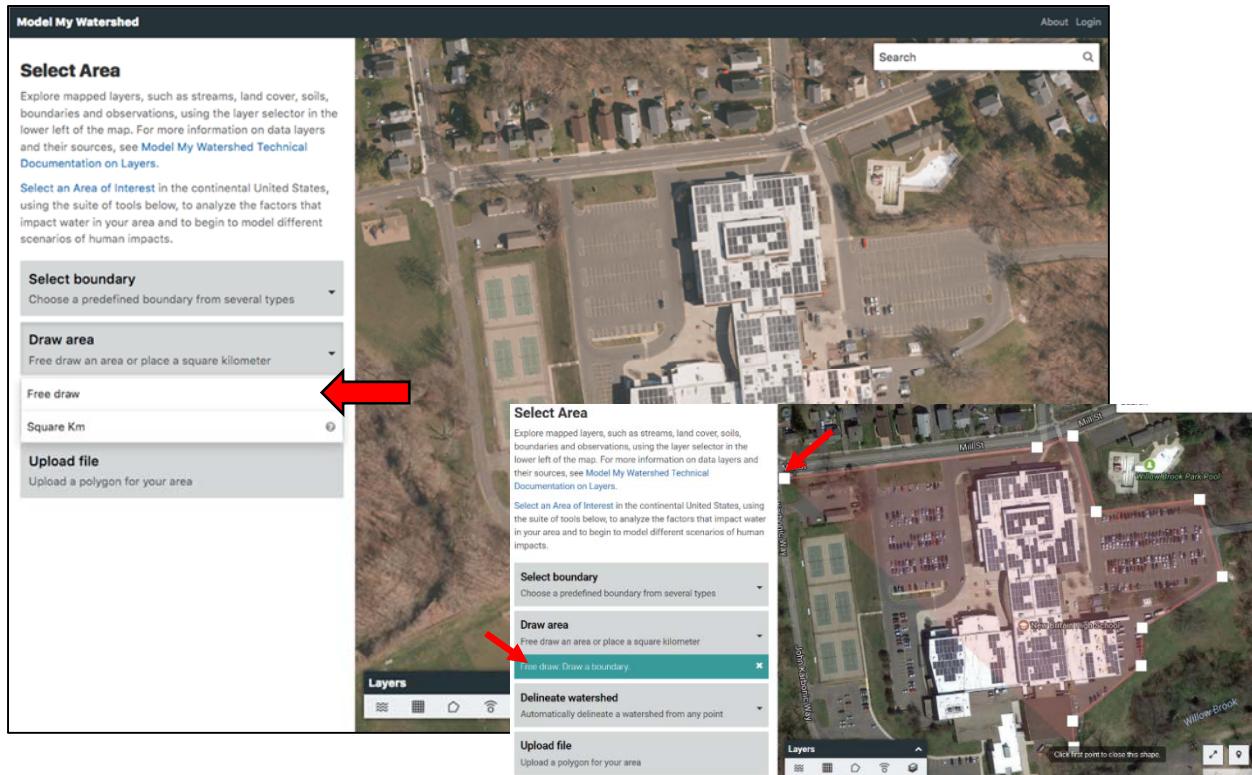
- ⇒ Once you are logged in, press the **GET STARTED** button.
- ⇒ Use the **search box** to locate your high school using an address or place name. Or, you can just pan and zoom to it.
- ⇒ Once you are zoomed to your campus, **change your base map** from the **Layers** box on the map. Choose “Satellite with Roads” for a base map. Once the base map updates, **minimize** the Layers box to see more of your screen by clicking the small down arrow to the right of the word Layers.



WikiWatershed Tools

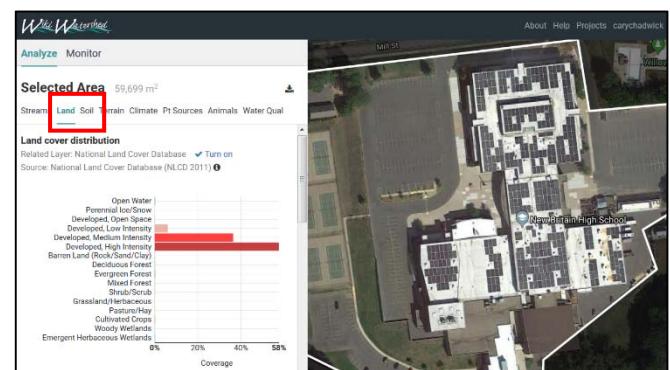
Hands-on Activity, Day Two

There are several ways to delineate the area that you're modeling, but the best ones for a small area like a high school campus are the “Draw Area” tools. You can choose a point (like the center of the school) and have the tool draw a 1 square km box around it (Square Km), or, better yet, you can draw your own outline of the campus (Free Draw). Let's take a look.



- ⇒ Click on the **Draw area** box and select the **Free draw** tool.
- ⇒ Hover your mouse over the map on one corner of your campus and click to place your first point.
- ⇒ Delineate your campus boundary by continuing to click along the outside edge of the campus (your best guess will do). Click on your first point to close the shape.

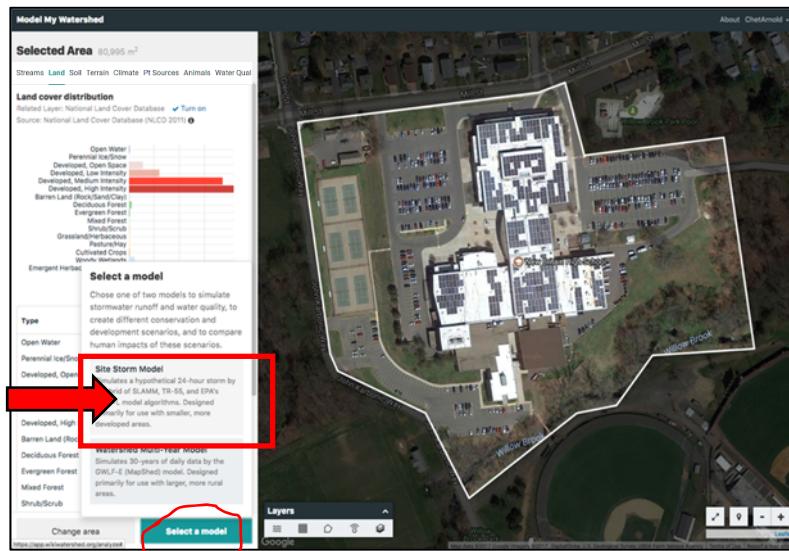
- ⇒ The Model My Watershed tool will generate statics for a number of variables once your shape is complete. Take a minute to explore the estimated **Land cover** and **Soil** distribution on your campus.



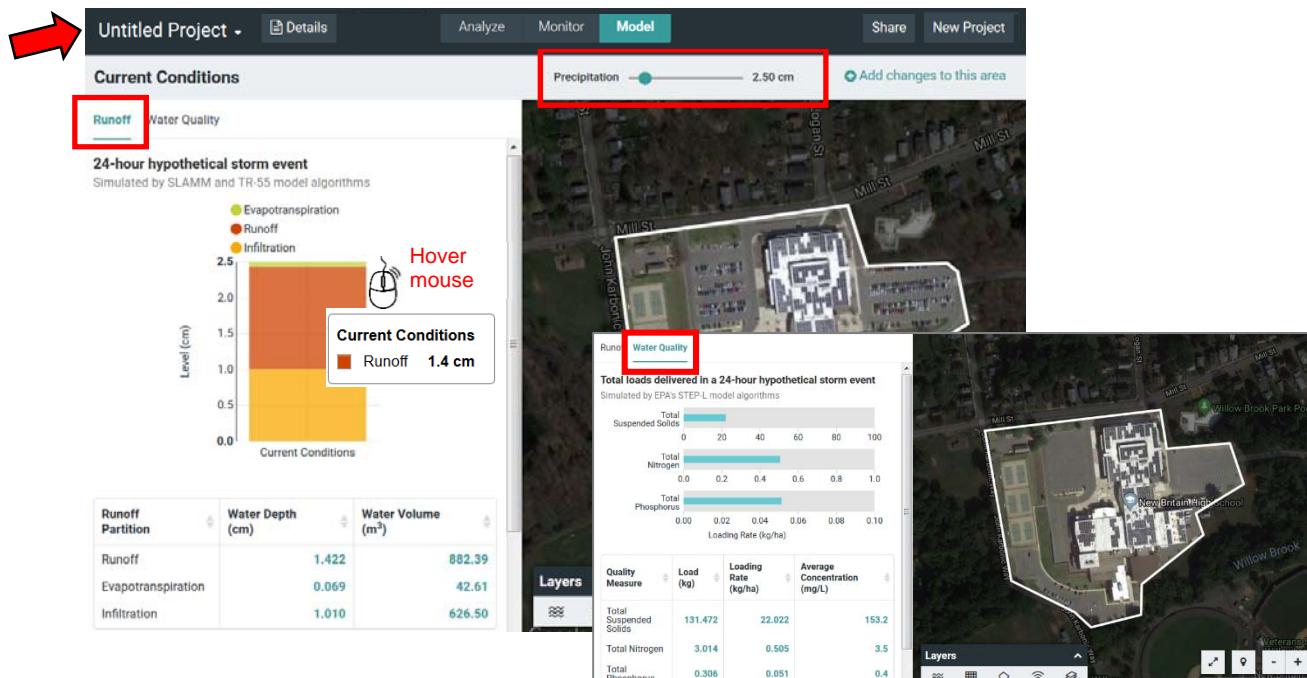
WikiWatershed Tools

Hands-on Activity, Day Two

- Once you have delineated your campus and explored the land and soil distribution, click on **Select a Model** and choose **Site Storm Model**. The frame will automatically calculate the runoff of the current site from a hypothetical 24 hour storm and display it in a bar chart.



- Take a minute to explore the **Runoff model**. Hover your mouse over the bar chart to see the estimated runoff values for the current condition. Note that you can change the magnitude of the simulated storm event by adjusting the Precipitation slider at the top right. Note it may take a few seconds for the model to recalculate.
- Now is a good time to **name your project** by clicking on the “Untitled Project” pull-down menu in the upper left-hand corner.
- Switch from Runoff to the **Water Quality** simulation to view the estimated loads delivered during a 24-hour storm event.



WikiWatershed Tools

Hands-on Activity, Day Two

Create Your Own Scenario

Now, HAVE AT IT! In this next step, you will remake your school campus by adding conservation practices and/or changing the land cover to see how it changes the quantity and quality of the runoff generated on the property.

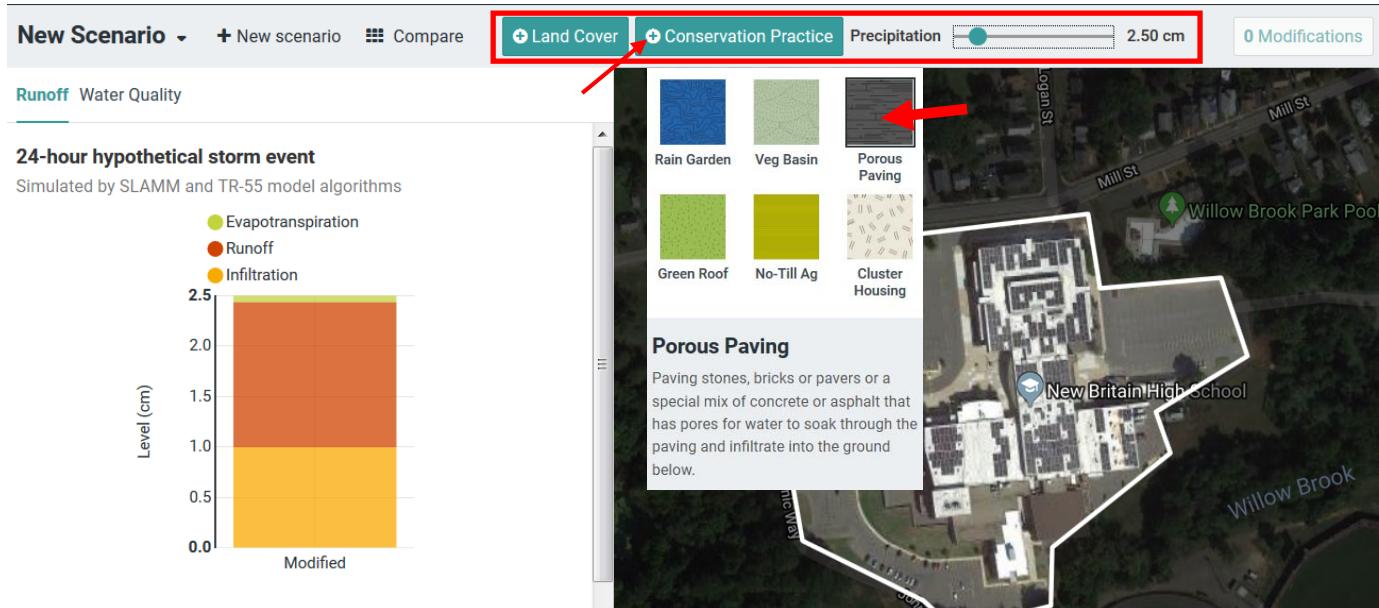
- ⇒ Click on the **Add changes to this area** link in the upper right hand corner of the tool. Your **New Scenario** (upper left) will be a copy of your “current conditions” that can be altered.



- ⇒ Two **new tool boxes** will appear: “Land Cover” and “Conservation Practice.”

click this link to start making new scenarios

- ⇒ Click on **+Conservation Practice** and select **Porous Paving**.



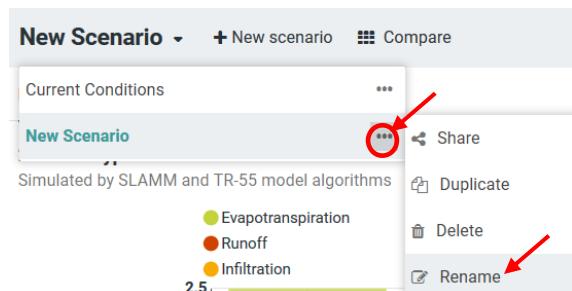
- ⇒ Change one of the parking areas on campus from traditional paving to porous paving. Click in a corner of the parking lot to get started. Delineate the area by continuous clicks, returning to the first point to close the shape. The runoff model will update once the new conservation practice has been added. Notice you can also change the Precipitation amount.
- ⇒ Before we compare the scenario changes, add a second Conservation Practice. Try a Green Roof or Rain Garden...or both.



WikiWatershed Tools

Hands-on Activity, Day Two

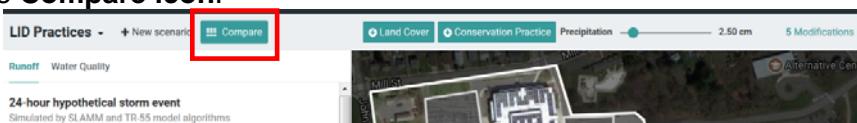
- ⇒ Before we compare our changes to the Current Conditions, let's rename this scenario to avoid confusion. Click on the **small black arrow** next to the words "New Scenario" in the upper left corner of the project. Click on **three dots** next to "New Scenario" and select **Rename**. Name the scenario **LID Practices**.



- ⇒ If you're feeling ambitious, you may wish to add (change) land cover on campus using the **+Land Cover** button. Perhaps there is a big wetland on campus that is not being accounted for, or planned development on campus that could be added.

Compare Scenarios

- ⇒ Click on the **Compare icon**.



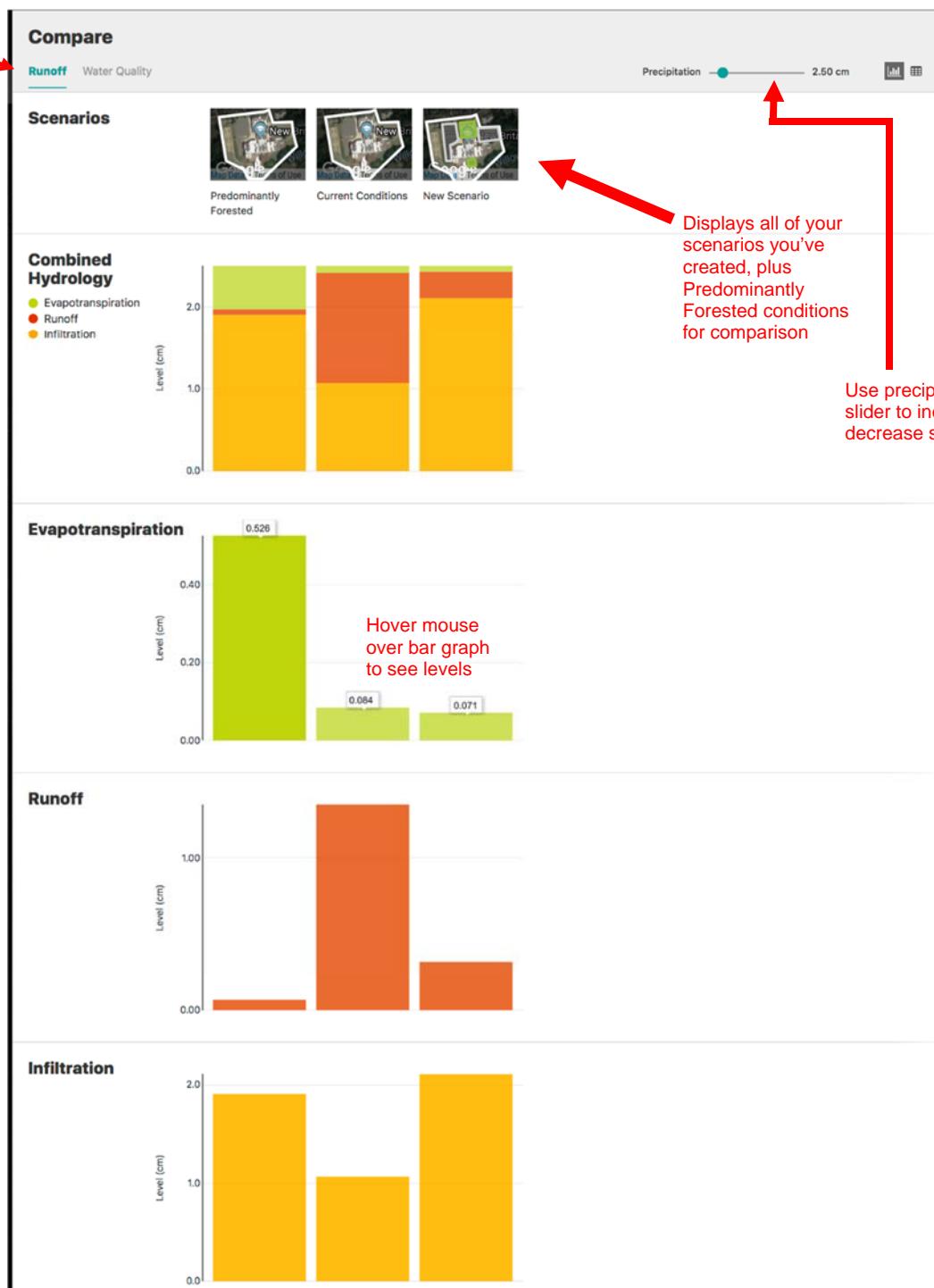
A new window will open showing a comparison of three scenarios – Predominantly Forested, Current Conditions, and your new LID Practices. This window allows you to efficiently compare both the **Runoff** and **Water Quality** models generated for the three scenarios. Note you can also still change the size of the storm event by adjusting the **Precipitation** amount.

- ⇒ Use the image on the following page to explore your results in depth.
- ⇒ You can always go back and add more changes, or create yet another scenario with a different suite of changes by clicking the Back button.

WikiWatershed Tools

Hands-on Activity, Day Two

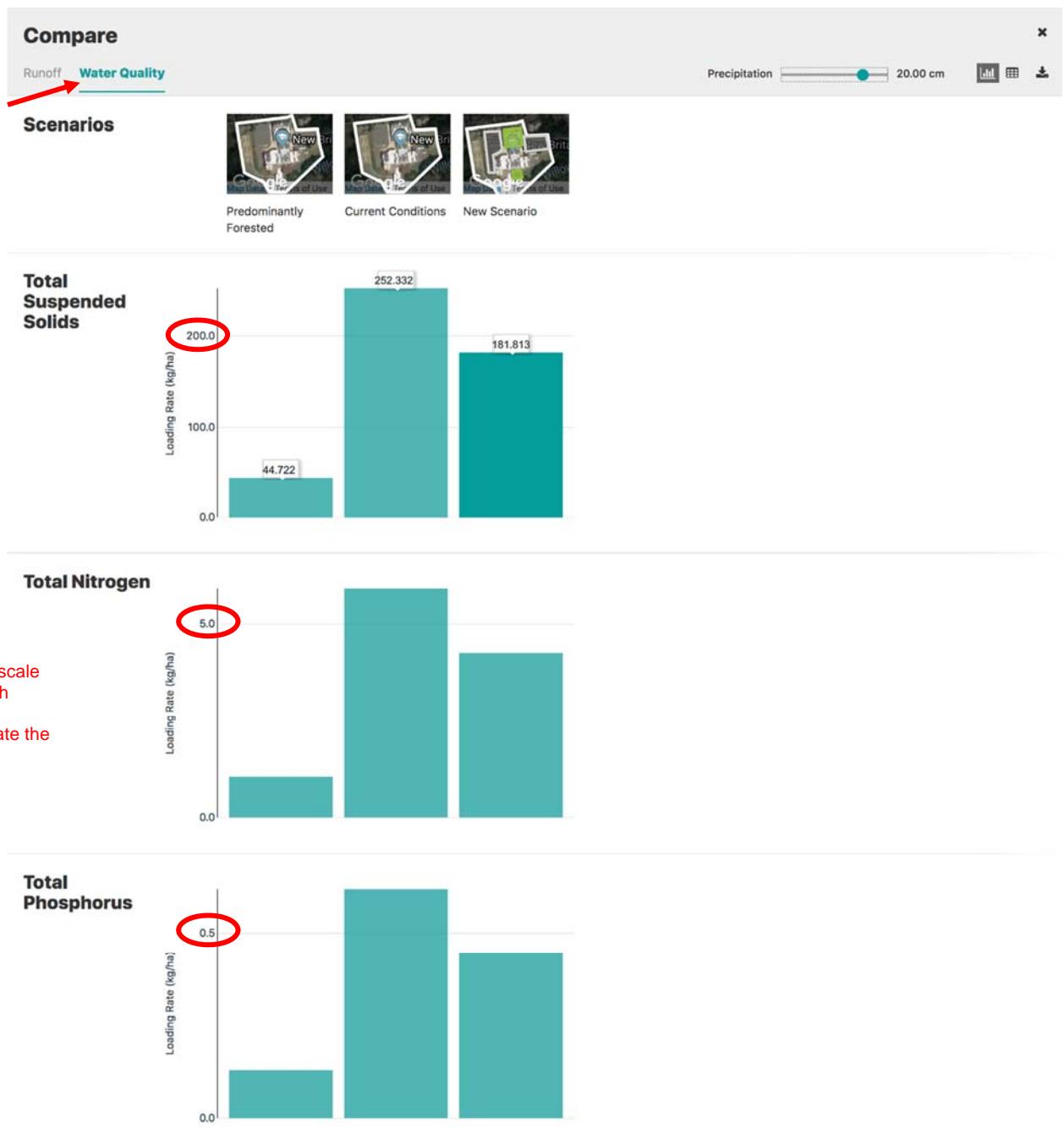
Choose Runoff or Water Quality Comparison



WikiWatershed Tools

Hands-on Activity, Day Two

Be sure to check out Water Quality Comparison



WikiWatershed Tools

Hands-on Activity, Day Two

Compare

Runoff Water Quality

Precipitation: 20.00 cm

Scenarios

Predominantly Forested Current Conditions New Scenario

	Predominantly Forested	Current Conditions	New Scenario
Runoff	10.052 cm	17.202 cm	12.395 cm
Evapotranspiration	0.526 cm	0.084 cm	0.071 cm
Infiltration	9.422 cm	2.714 cm	7.534 cm

You can also view results in a table format or download them as a CSV file (compatible with Excel).

Compare

Runoff Water Quality

Precipitation: 20.00 cm

Scenarios

Predominantly Forested Current Conditions New Scenario

	Predominantly Forested	Current Conditions	New Scenario
Total Suspended Solids	44.722 kg/ha	252.332 kg/ha	181.813 kg/ha
Total Nitrogen	1.044 kg/ha	5.906 kg/ha	4.255 kg/ha
Total Phosphorus	0.129 kg/ha	0.619 kg/ha	0.446 kg/ha

WikiWatershed Tools

Hands-on Activity, Day Two

Thinking about your results:

1. If you added LID practices in your scenario, how much were you able to decrease the runoff from your campus? How close was this to the 100% Forest Cover baseline?
2. Test your comparative results in a modest rainstorm (5 cm) versus a gully-washer (25 cm). What happens to the differences between your scenarios, in terms of runoff? Why?
3. What are the best LID opportunities on your campus? If you could build a rain garden or two, where would they go?
4. What did you like best about this tool? What did you like least? Do you think it would be a good teaching resource for your students? Why or why not?



Natural Resources Conservation
Academy
University of Connecticut



Materials List

- ✓ LID walking tour, DIY design

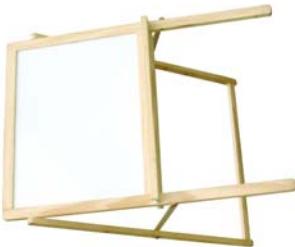
Wednesday 8/15/2018

Wednesday 8/15/2018	
8:30 AM	Coffee & muffins
9:00 AM	LID walking tour of UConn campus, continued: DIY LID design
10:15 AM	Review lessons 8-12 with teacher hat
11:00 AM	Create final Gotta Have list and make final revision of model ; share final models
11:45 AM	Water and Land Lesson Plan Personalization
12:30 PM	Working lunch: work on lesson plans
1:30 PM	Follow-up: tools & resources to help you during the school year
2:00 PM	Follow up: evaluation and research
2:30 PM	DONE!

WEDNESDAY

Low Impact Development Tour

Design your own LID Practice



Location/Building: _____

Observations:

Recommended LID Practice(s): _____

Sketch your stormwater solution below.