

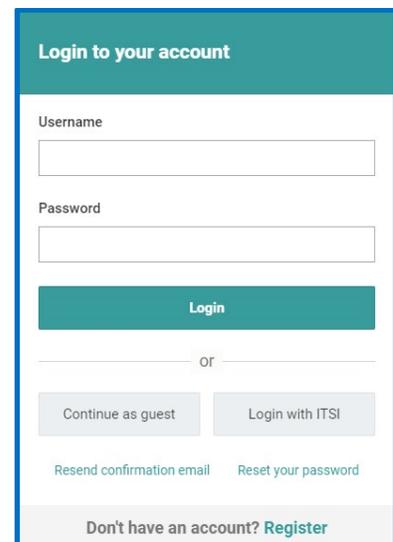
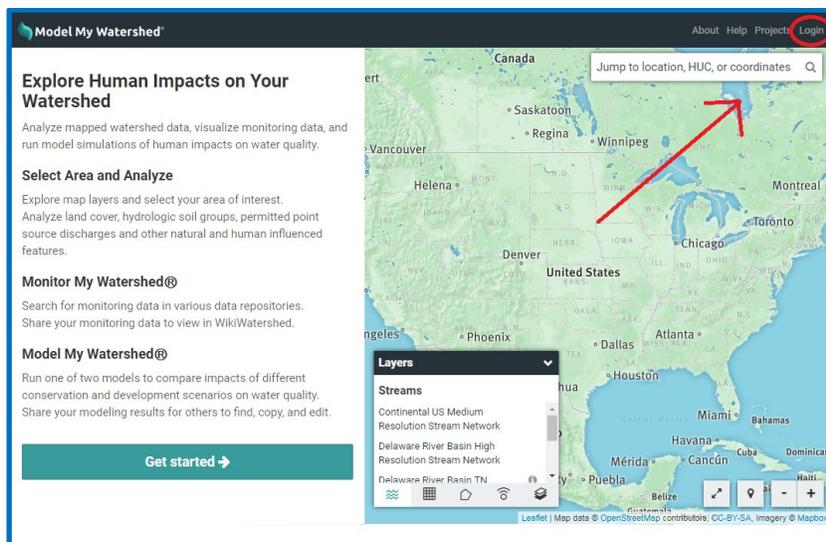
# Model My Watershed<sup>®</sup> Overview

[Model My Watershed<sup>®</sup>](https://modelmywatershed.org/) (<https://modelmywatershed.org/>) is an online GIS-based component of the [WikiWatershed<sup>®</sup> Toolkit](https://wikiwatershed.org/) (<https://wikiwatershed.org/>), a suite of web browser based tools designed to help citizens, conservation practitioners, municipal decision-makers, researchers, educators, and students advance their knowledge and stewardship of fresh water. The Model My Watershed<sup>®</sup> Site Storm Model simulates storm runoff and water quality by applying the [TR-55](#) & [STEP-L](#) water quality models for a single 24-hour rain storm over a selected land area within the continental United States. The results are calculated based on actual land cover data (from the [USGS National Land Cover Database 2011, NLCD2011](#)) and actual soil data (from the [USDA Gridded Soil Survey Geographic Database, gSSURGO](#)) for the selected land area of interest. The Watershed Multi-Year Model simulates 30 years of daily water, nutrient and sediment fluxes using the Generalized Watershed Loading Function Enhanced (GWLFE) model that was developed for the [MapShed](#) desktop modeling application by Barry M. Evans, Ph.D., and his group at Penn State University. The GWLFE model is also one of five watershed models available within [EPA's BASINS multi-purpose modeling application](#).

[Model My Watershed<sup>®</sup>](#) can be accessed online from any web browser at [modelmywatershed.org](https://modelmywatershed.org) and works best on desktop and laptop computers. It is also optimized for the Firefox browser. MMW works on touch-screen devices such as iPads, other tablets, and laptops with dual keyboard and touch-screen functionality but users may experience some re-orientation of tools or visibility due to screen size and touch-screen sensitivity.

## Login to Model My Watershed<sup>®</sup>

When you first navigate to the [Model My Watershed<sup>®</sup>](#) application you may be asked to share your location data with the application. Sharing your location will automatically start the application at approximately your current location, but is not necessary for the application to work. Creating a login allows you to save your work to return to later, and to share your work with other users. Logging in as a guest gives you access to the full modeling and scenario capabilities of the application, but will you not be able to save and share any data.

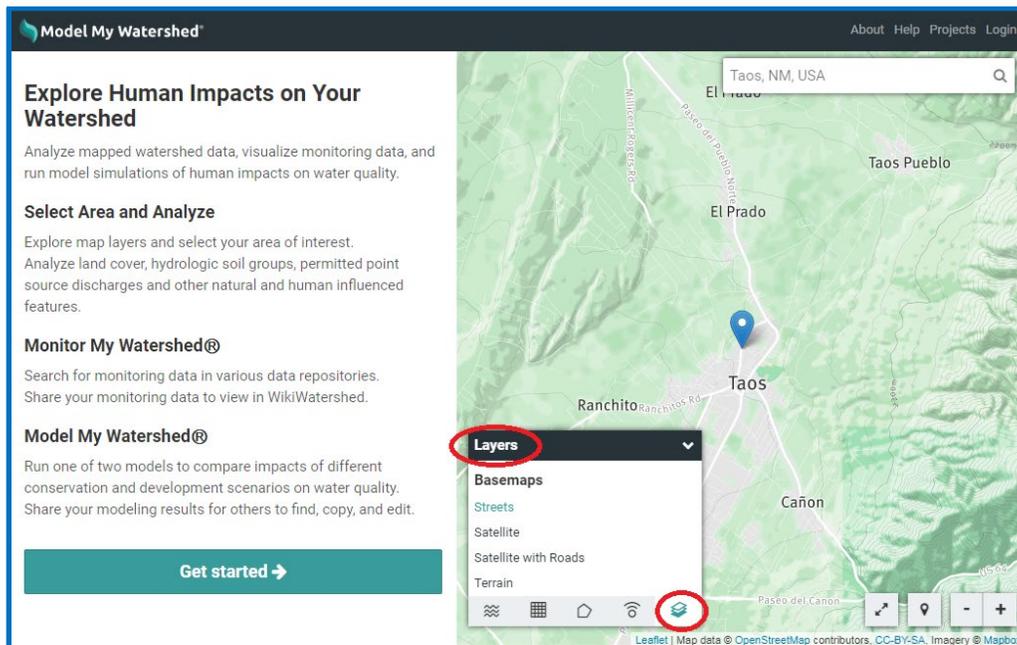


If you have an account already, simply type in your username and password and click "Login." New users can create an account by clicking "Register" at the bottom of the Login pop-up window. Fill in all of the required fields and submit the form, then check your inbox for an activation email. You must click

a link in the activation email to finish the registration process. Check your spam/trash folders if you do not see the account activation email in your inbox. These emails are sometimes blocked by institutional (e.g. business, agency, or school) spam filters, so you may need to contact your systems administrator.

## Navigating the Model My Watershed® App

Once you have logged into the application, you will see a map looking much like Google maps. If you shared your location, the application may zoom directly to your location; otherwise it will begin by showing a map of the entire lower 48 states of the U.S. As with most online map tools, you can navigate the map by clicking and dragging and zoom by pinching, using a scroll wheel, or using the zoom buttons on the lower right. You can also search for a location by name or address using the "Search" box on the upper right. To go or return to your current location, hit the "My Location" button with a picture of a pin next to the zoom buttons on the lower left.

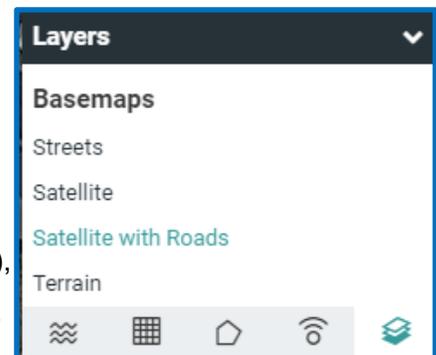


Just as Google maps allows you to switch between road and satellite maps, there are several options for both the base map and data overlays on top of the map. Use the

"Basemaps" (  ) tab of the "Layers" control box (  ) to access these. You can select a basemap image and several different types of overlays. If you have a very slow Internet connection, the base maps may be slow to load. The overlays include boundary lines (like school districts and USGS hydrologic units) and color shading for land uses and soil types.

Other tabs in the "Layers" control box are for displaying streams (  ), coverage grid (  ), boundary (  ), and observations (  ) overlays. Continental US medium resolution stream network, Delaware River Basin high resolution stream network along with other stream overlays

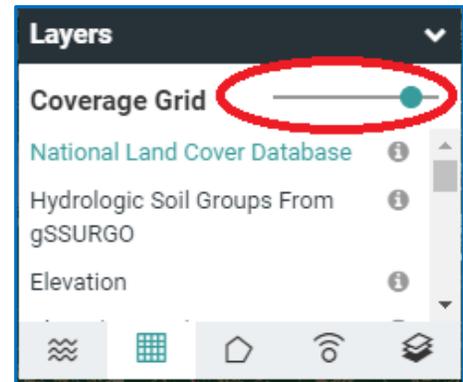
are enabled via the "Streams" tab (  ). The Continental US and Delaware River Basin stream network overlays are zoom dependent. Smaller streams are shown as you zoom in.



In the "Coverage Grid" tab (  ) of the "Layers" control box you can enable color shading of the USGS National Land Cover Database, the USDA Hydrologic Soils Groups, and other data. A "Coverage Grid" slider tool allows you to adjust the transparency of the color shading of the layer displayed on the map.

Boundary lines can be added in the "Boundary" tab (  ) of the "Layers" control box. You can add boundaries (lines show up in pink) for USGS Subbasin units (HUC-8, HUC-10, HUC-12), county lines, congressional districts, school districts, and municipalities (PA only). Additional watershed data is available in

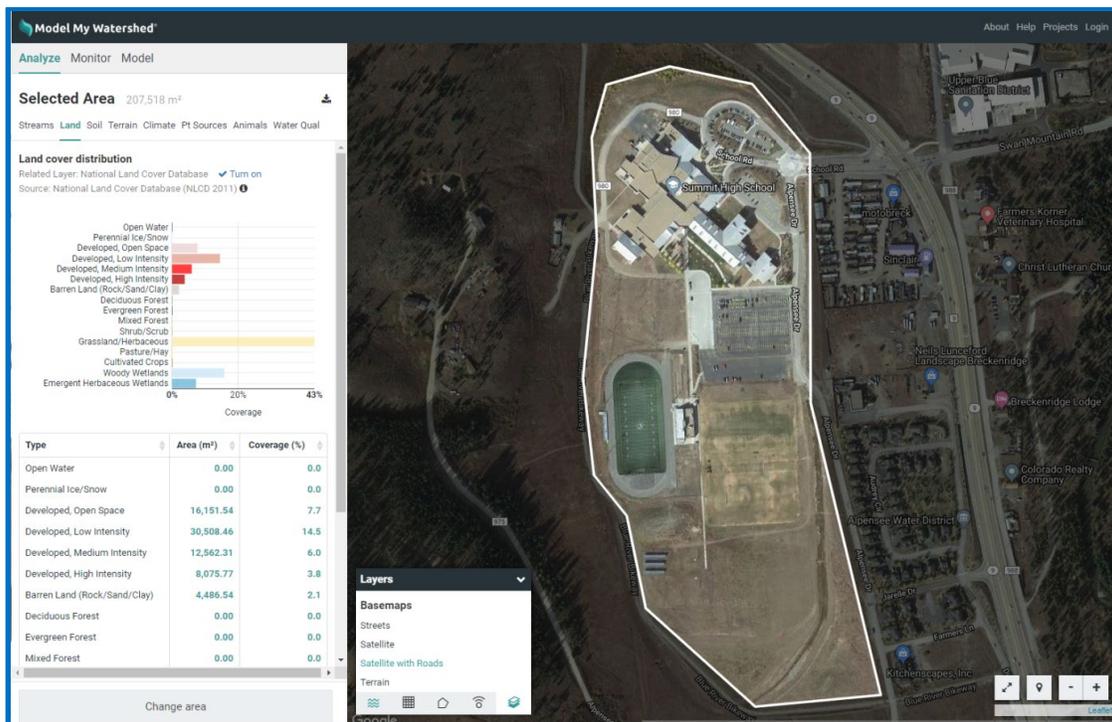
the "Observations" tab (  ) of the "Layers" control box. These data include USGS and other national river and weather monitoring stations. Please note that observation data is not available in all locations!



## Modeling Changes to the Land in Model My Watershed®

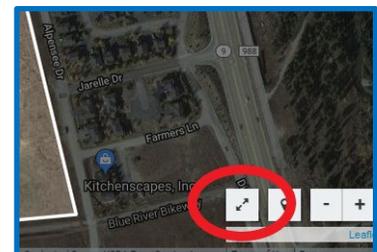
Click on "Get Started" to begin modeling and viewing additional data. Next select the type of area you would like to study and model. The first option is to "Select a boundary" area, with the same boundary options as you saw in the "Layers" control. Additionally in this "Select a boundary" tool, once you select a boundary you can then see the name of the defined areas when you hover over the map. Be aware of your zoom level when selecting by boundaries. If you are at too high of a zoom level, you may not be able to see the boundaries on your map. Your second choice is to "Draw area" with the options of free drawing a polygon of any size and shape you choose or drawing a 1 square Km area to model. Your third option is to "Delineate watershed". To use this option you must choose your stream resolution (Continental US Medium Resolution or Delaware River Basin High Resolution) then place a blue balloon anywhere on the map to define a point (purple circle). The delineate watershed function finds the most direct point (blue circle) down slope where water would runoff into a body of water. From the blue circle the app then finds the watershed boundary of all land surfaces that would drain to that point. The last option is to "Upload file" in which you can upload a shapefile from another GIS program.

As soon as you have selected an area, or closed the box of your custom area, the application will change into geospatial analysis mode. The right side of the screen will now show the area you selected in bright colors with the rest of the map greyed out. The left side of the screen will show the "Analyze" pane. The "Analyze" pane contains a wealth of data including; stream network statistics, land cover distribution, hydrologic soil group distribution, county-based estimated number of farm animals, permitted point source discharges, as well as climate, terrain, and water quality data. These calculations and analyses are done on the fly for each area based on nationally available data. You will not get some pre-computed estimate or "canned" number. These are real values based on the most recently available national land cover, soil type, and other datasets. Because of this, the analysis may take a few seconds to complete and you may see a loading wheel as this happens (It is generally very fast with a good Internet connection).

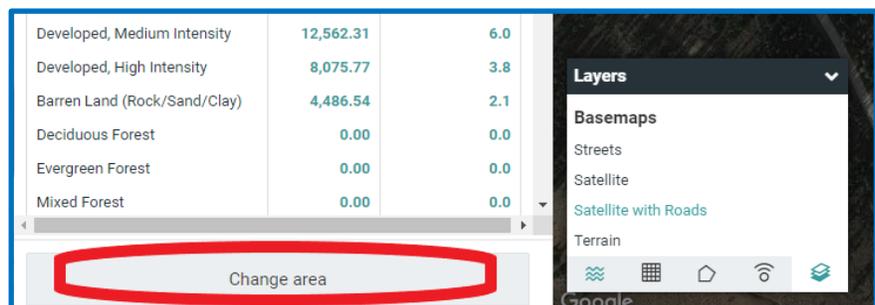


In the analyze pane, you can view the land use, soil type, stream, climate, and other data (some in both tabular and graphical form). Use the tabs at the top of the pane to switch between data types. You can sort the tabular data by type, area, coverage percent, and other units. The bar graph coloring in the land cover distribution matches the colors assigned by the National Land Cover Database and the bar graphs can be used as legends for the land cover and soil group overlays.

The title at the top of the analyze pane will list the name of the area (if selected by boundary) and the total size of the area. You can still change the map zoom and overlays in the map pane. Try turning on the NLCD overlay to compare the layout of land covers on the map to the percent of each land cover in the area. To minimize the analyze pane and see a larger area of the map and you can click on the expand/contract map arrows button near the zoom button in the bottom right of the map.

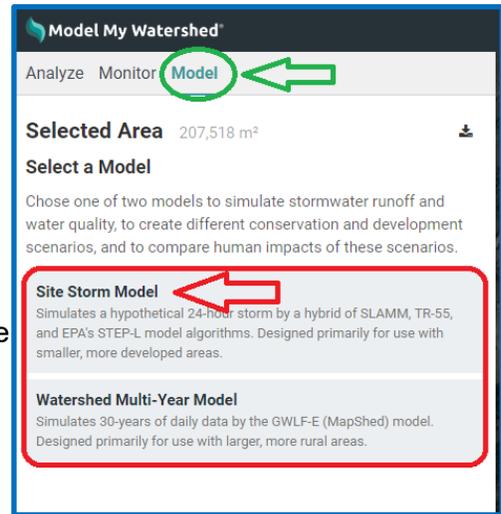


If you realize you made a mistake in selecting your area, hit the "Change area" button at the bottom left of the analyze pane. You will be taken back to the "Select Area" screen. To clear the map and start over completely at any time, click the "Model My Watershed®" title at the top left of the screen.

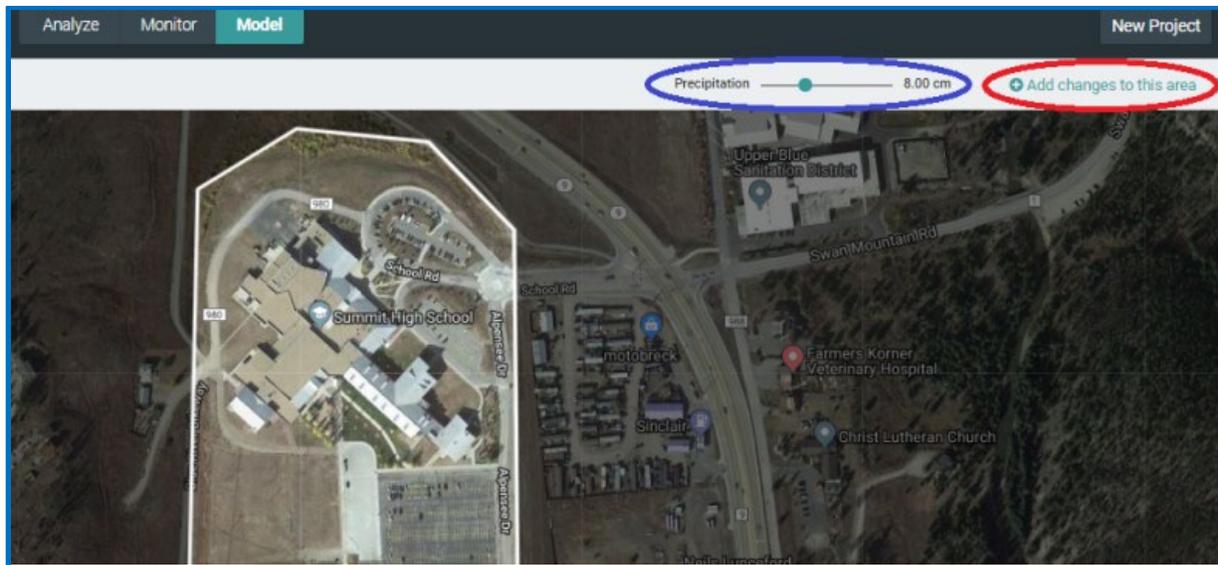


When you are happy with the area you selected, you can move on to modeling and modifying the area by clicking the "Model" tab (green circle in picture on right) in the analyze pane on the left side, then selecting from the two models available to simulate stormwater runoff and water quality, to create different conservation and development scenarios, and to compare human impacts of these scenarios.

- Site Storm Model: Simulates a hypothetical 24-hour storm by a hybrid of multiple algorithms; designed primarily for use with smaller, more developed areas.
- Watershed Multi-Year Model: Simulates 30 years of daily data by the MapShed model; designed primarily for larger, more rural areas.

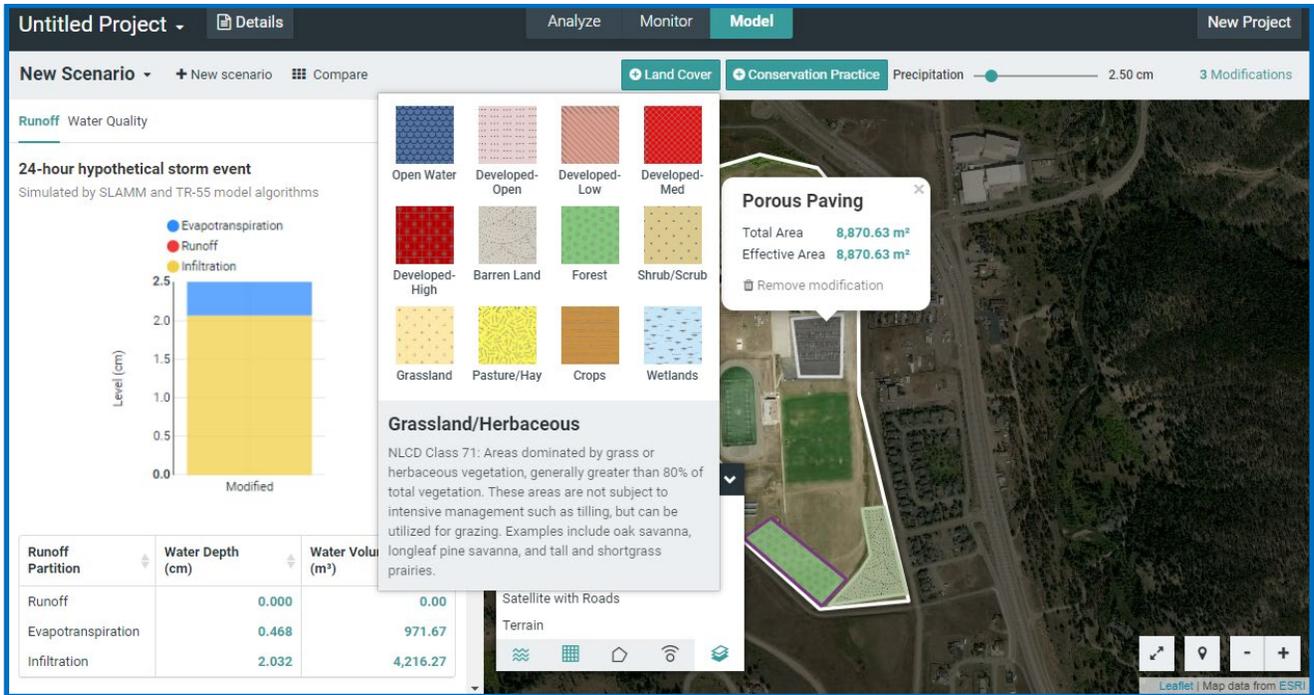


Once you have entered the modeling mode, the application will show runoff and water quality data for the current conditions. The runoff quantities are calculated using a combination of the [TR-55 runoff model](#) developed by the US Department of Agriculture and the Small Storm Hydrology Model for Urban Areas developed by Robert Pitt for a single 24-hour rain storm. The water quality parameters are calculated using the EPA's [STEP-L water quality model](#). For more information on the specifics of these calculations, see other documentation at [WikiWatershed.org](#). The runoff tab shows the partitioning of the rainwater into runoff, infiltration, and evapotranspiration as a stacked bar graph. In the water quality tab, you will see both tabular and graphical data showing predicted water quality for any streams in the selected area. Because the model is running with real data on your custom area, it may take some time for the model to run and you may see a loading icon. The 24-hour rain event model is set for 2.50 cm by default but can be changed using the slider near the top right of the map (circled in blue below).

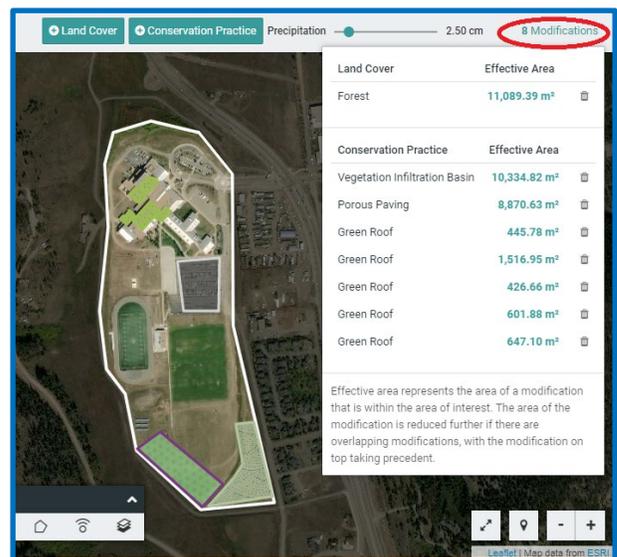


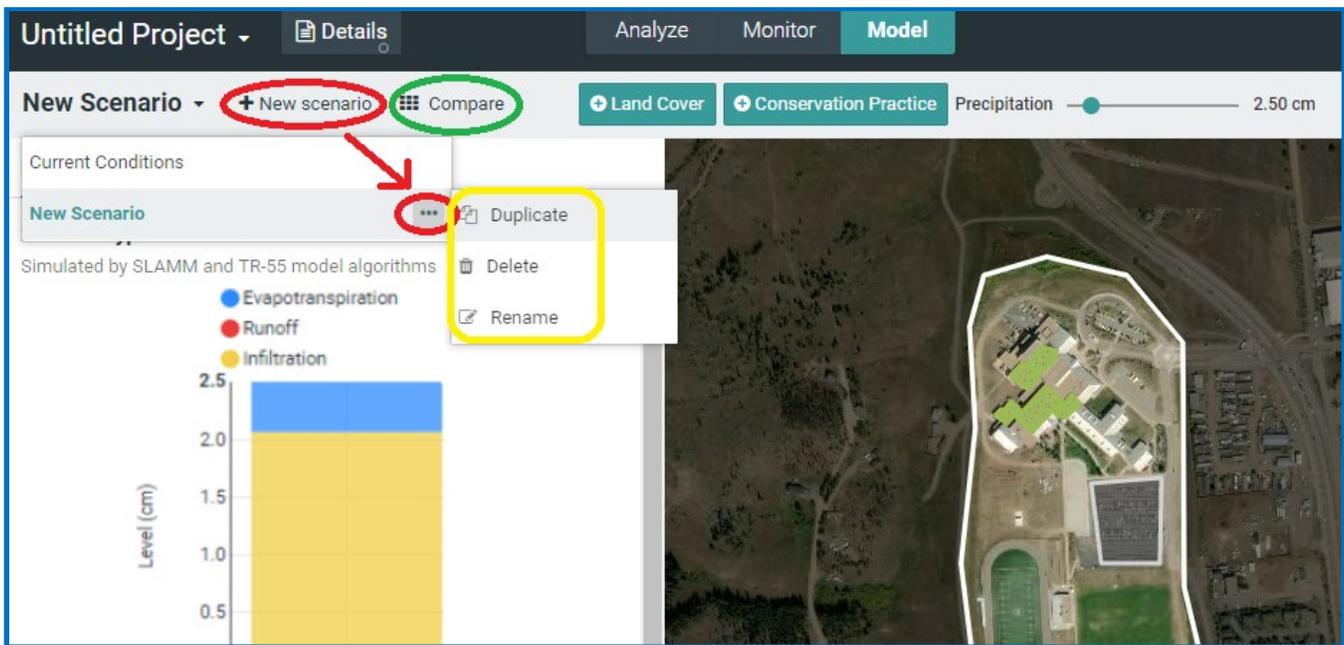
New scenarios, in which you can modify the landscape by changing the land cover type or applying conservation practices can be modeled by selecting the "Add changes to this area" button in the top right corner (circled in red above). At first, this "New Scenario" map and data look exactly like the current conditions map but with two new tool boxes above the map, one for "Land Cover" and another for "Conservation Practices". Each of these is a free-hand drawing tool to modify the current land use.

The model output pane also changes to show the original results from the "current conditions" tab and the modified results as you change the landscape. Select a land use or conservation practice from the toolboxes at the top of the screen and then click points on the map to draw an area over which to apply it. As soon as you add a new land cover or conservation practice, the model will re-run in the background to calculate what has changed and all of the plots will be updated. You will see loading icons again in the model pane as this happens. Remember that you can expand/contract the map pane to give more screen space to work on landscape modifications. See other documentation for an explanation of how the runoff and water quality contributions of conservation practices are calculated.



As you add land cover changes or conservation practices, you can see the amount of area changed by clicking on any polygon you added. You can also see a list of all of the modifications you made in the scenario by clicking on the space in the upper right of the map pane where it says "x modifications." This gives a "shopping cart" of modifications grouped by the type of modification. You can delete any modification by clicking the trashcan next to it. If it helps to decide where to make changes, you can still use the "Layers" control box to select which overlays to display on the map.





You can create many possible scenarios of landscape modification by clicking on the "+ New Scenario" next to the drop down list of current conditions and scenarios. This opens up a new scenario with no modifications on it (a copy of "Current Conditions"). Scenarios can be renamed by clicking the three dots "." next to the scenarios in the scenarios drop down list. Select the "Duplicate" option to create a copy of the scenario that you are working on to add or delete more changes while saving your "New Scenario." You can also rename your entire project by clicking the small down arrow (circled in blue above) next to the "Untitled Project" text in the top left corner and, if you are logged in, share your project through the same menu. If you have made your project publicly accessible and given someone the link, they will be able to view all of your scenarios and results. They will not, however, be able to modify it. Any public project can be made private again from the same menu.

Once you have created several scenarios, you can compare all of them by clicking "Compare" (circled in green above) in the upper toolbar. This gives a side-by side comparison of all of the scenarios along with the original conditions before any modifications. It also shows what the partitioning would be if the landscape were 100% forested. This 100% forested condition will give the maximum amount of infiltration for the landscape, given its soils. In the toolbar at the top of the Compare view you can select the type of output you would like to compare (runoff or water quality), change the amount of precipitation in the 24-hour storm event, and toggle between viewing the data as a graph (📊) or a data table (📄). At the top of each scenario is a map showing the original area and modifications. When you hover the cursor over a scenario map, you will see a list of the modifications. To scroll through many scenarios, use the "Navigate Scenarios" arrows on the right side of the Scenario maps. Click the ✕ in the upper right hand corner to close the Compare window and return to the scenarios.

