A web-based tool for guiding watershed management planning for improved water quality

The *Clean Water Roadmap* is an interactive, web-based tool that allows watershed stakeholders to visualize and evaluate baseline pollutant loadings from specific catchment areas, and to explore the relative benefits of implementing specific best management practices at various spatial scales.

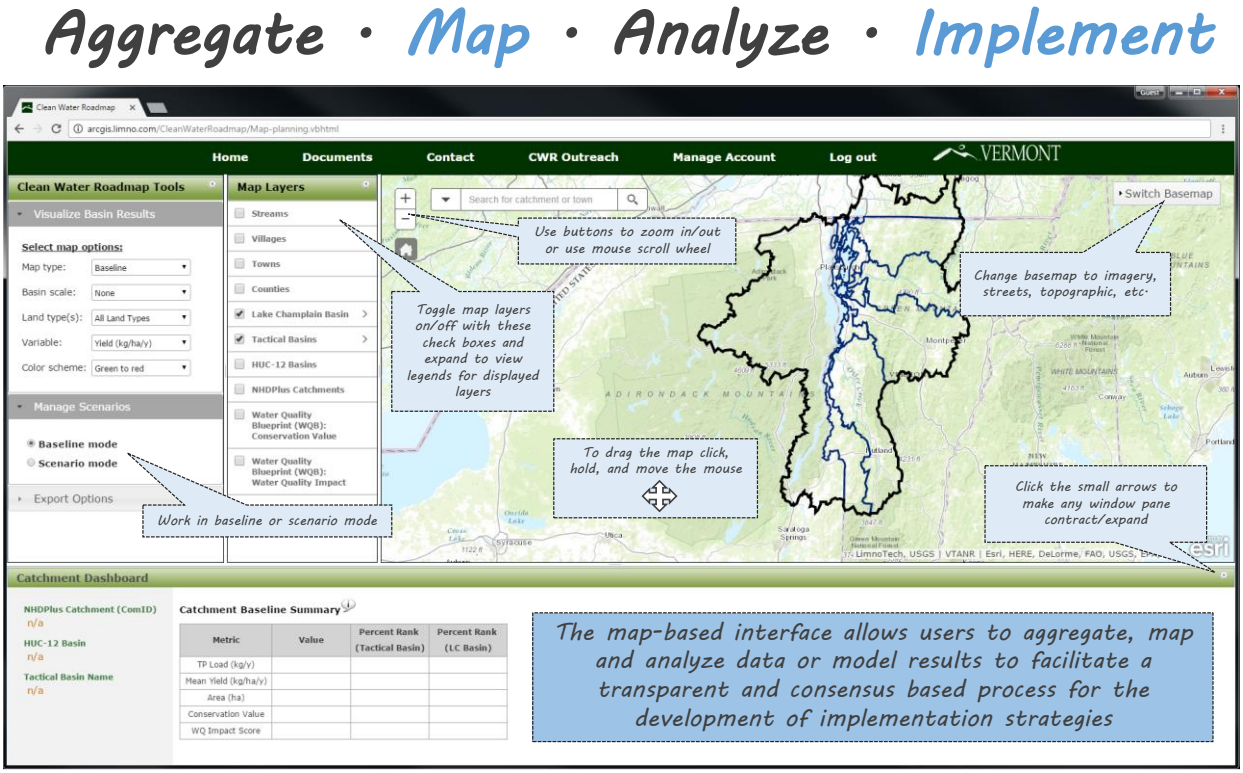
What is the *Clean Water Roadmap*?

The *Clean Water Roadmap* (CWR) is a web-based tool that provides an intuitive, interactive interface for visualizing and reviewing results associated with specific subbasins and combinations of land use, soils, and slope conditions within a larger (e.g., HUC-8) watershed unit. The tool was specifically developed for stakeholders who are interested in leveraging existing watershed model results to develop optimized combinations of best management practices (BMPs) that will achieve the greatest "bang for the buck" with respect to pollutant loading reductions.

The CWR was originally developed to support Vermont's basin planning efforts to achieve load reductions under the Lake Champlain Total Maximum Daily Load (TMDL) for phosphorus. However, the tool and its supporting database can be readily adapted to any watershed for which detailed modeling results are available.

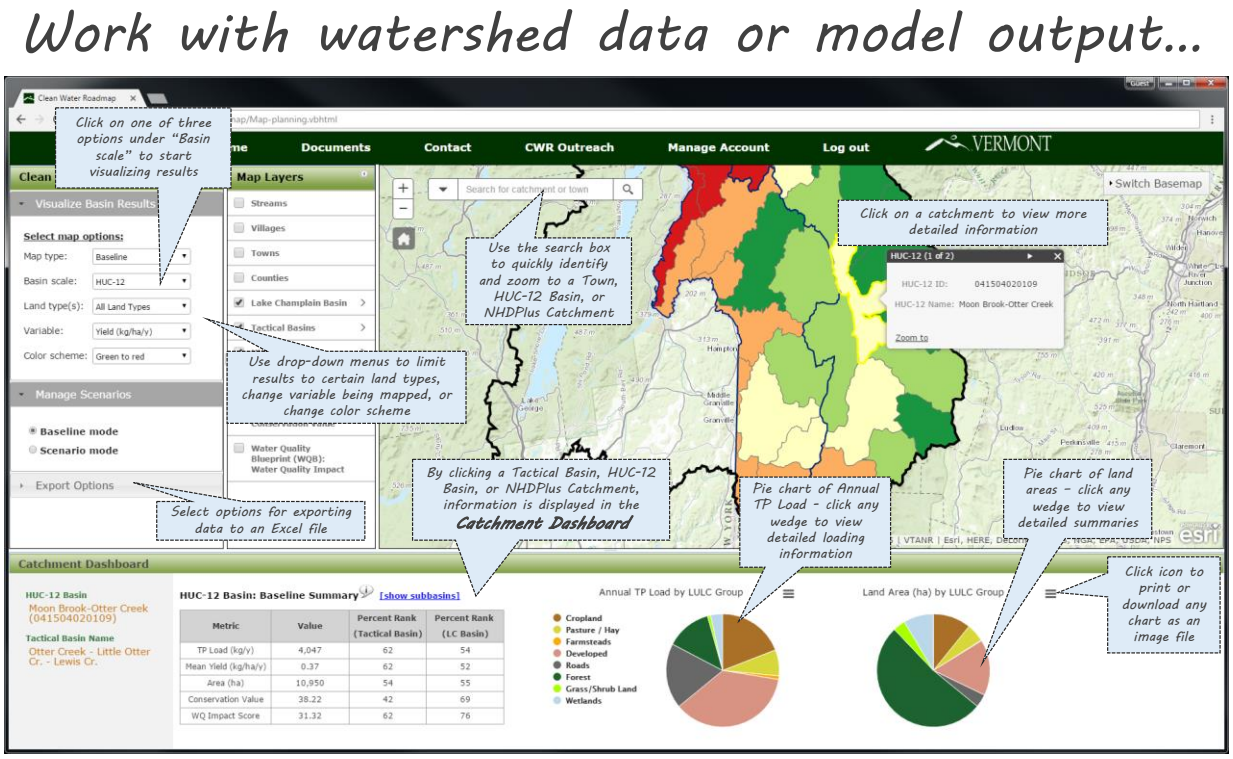
Aggregate → Map → Analyze → Implement

The CWR provides a wide range of features that can allow users to rapidly visualize and engage with detailed watershed modeling results and supporting information that would otherwise be difficult and inefficient for stakeholders to work with and use. The CWR aggregates and maps information at various catchment scales, which allows users to analyze and use the information to identify optimal management strategies for implementation within the watershed. The intuitive map interface and layer list incorporates key spatial layers, including multiple basin scales (e.g., HUC-12 units, NHDPlus catchments), political boundaries, instream water quality condition, and other information relevant for planning, such as conservation value. In addition to the map viewport and layer list, the CWR provides a "tools" pane where users can select specific map views, toggle between baseline and scenario modes, and export results to a spreadsheet format. The "Catchment Dashboard" summarizes loading and other information for whichever catchment is selected on the map, and also provides a point of entry for exploring catchment loadings in greater detail and assigning BMPs to the catchment.



Work with Watershed Data or Model Output

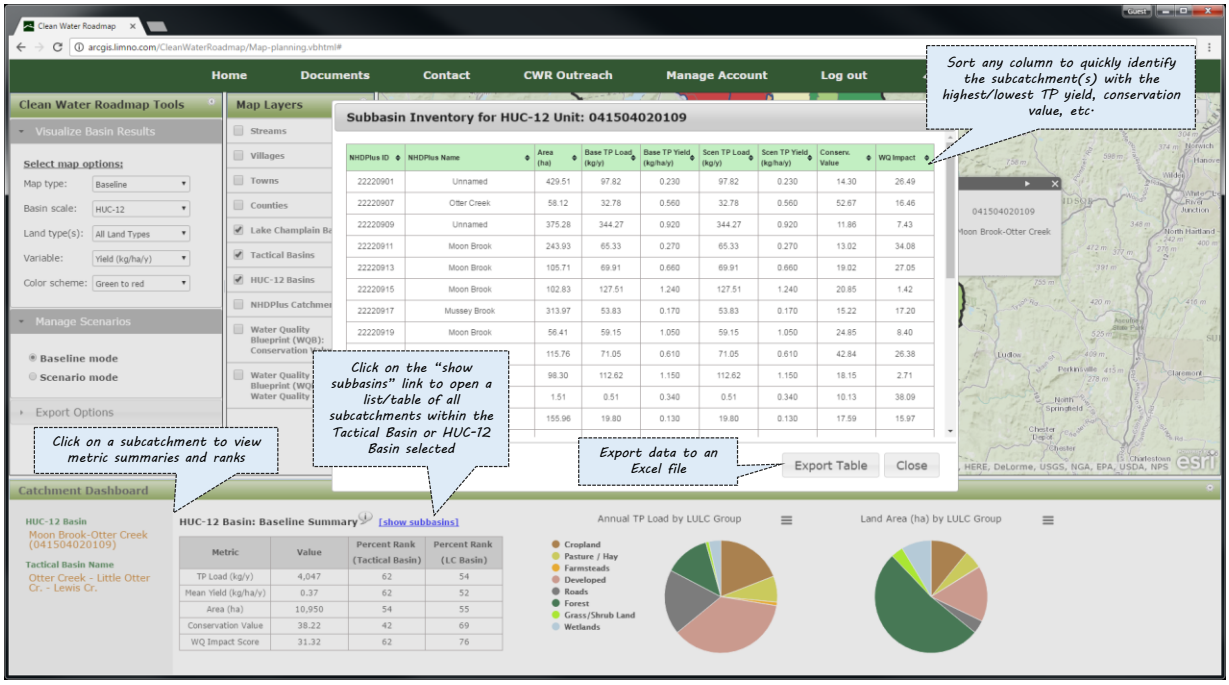
The CWR's "Visualize Basin Results" pane allows a user to map pollutant yield or loading rates at multiple basin/catchment scales. Maps can represent the overall loading condition for the selected basin scale or for specific land use types, such as cropland and developed land. If available, supporting management information such as conservation value can also be visualized at the selected catchment scale. Modifying any of the available visualization options will immediately refresh the map, which makes it easy to rapidly compare watershed model results to other data aggregated at the basin scale. Once a particular basin map has been created, clicking on a specific basin will populate the "Catchment Dashboard" with pollutant load, yield, and conservation metrics, percent rank statistics for those metrics, and pie charts summarizing the distribution of pollutant loading across land use/cover groups.



Create a Cohesive Watershed Priority Scheme

Priority areas for BMP implementation can be identified using a combination of the map and the "Catchment Dashboard." As priority catchments are identified, more detailed breakdowns of the pollutant loading distribution within a basin can be generated by clicking the "[show subbasins]" option or clicking on the loading pie chart in the dashboard. The "show subbasins" option will generate a sortable list of subbasins within the selected basin, including fields for pollutant loading and yield and surface area. This table can be used directly to identify priority subbasins within the parent basin of interest and/or the information can be exported to a spreadsheet for further analysis. Clicking on a pie slice will launch a loading "tree" view that allows the user to drill down into loading information by land use/cover type, hydrologic soils group, and slope category.

Create a cohesive watershed priority scheme...



Develop Implementation Strategies

When working in scenario mode, the loading dialog and “tree” view can be used to assign specific BMPs and associated load reduction efficiencies to specific land use/cover types, soils, and/or slope categories. As BMPs are interactively assigned, the CWR calculates and reports the percent reduction in load for the selected land type and then aggregates the reductions up to the basin level. Specific management strategies can be formulated by developing different CWR scenarios and comparing the relative benefits of each based on their unique combination of basin- and land-specific BMP assignments.