NEMO Intro/Credit Slide

This educational slide show has been created by the NEMO Project at the University of Connecticut Cooperative Extension System. The focus is on linking land use to water quality, since it is largely what we do on the land that affects water quality.

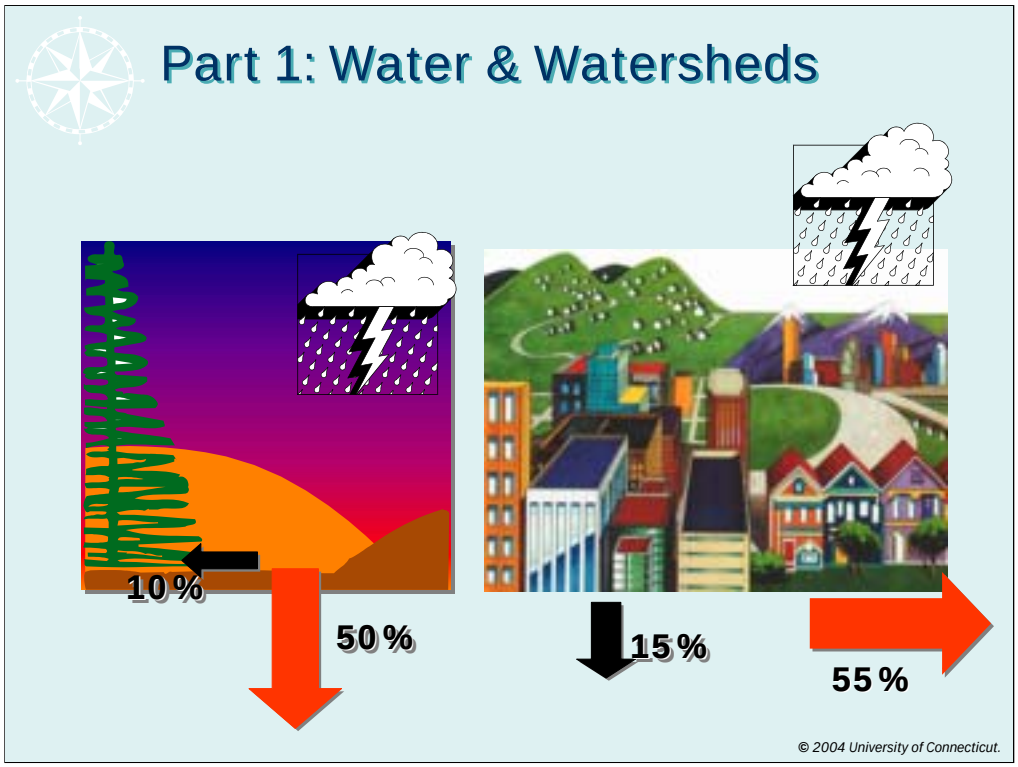
Linking Land Use to Water Quality

Created: University of Connecticut Cooperative Extension, 1992

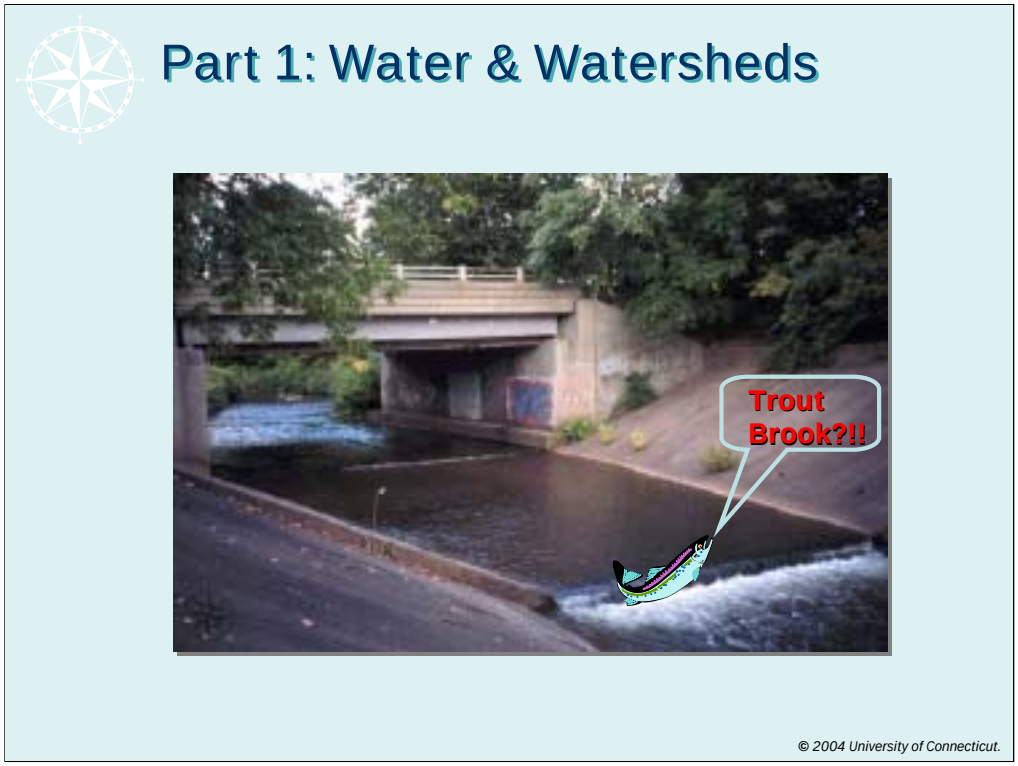
Abstract: This is the foundational presentation of the NEMO program and has since been referred to as "**Basic NEMO**". The intent of the program is to raise awareness of nonpoint source pollution and the contributions of land use decisions on water quality. The general outline of the program is:

- **Impact of development on waterways**
- **The pollutants in polluted runoff**
- **Using watersheds as a framework**
- **Land use impacts on water quality**
- **Impervious surfaces as an indicator**
- **A three-tiered strategy to address NPS**

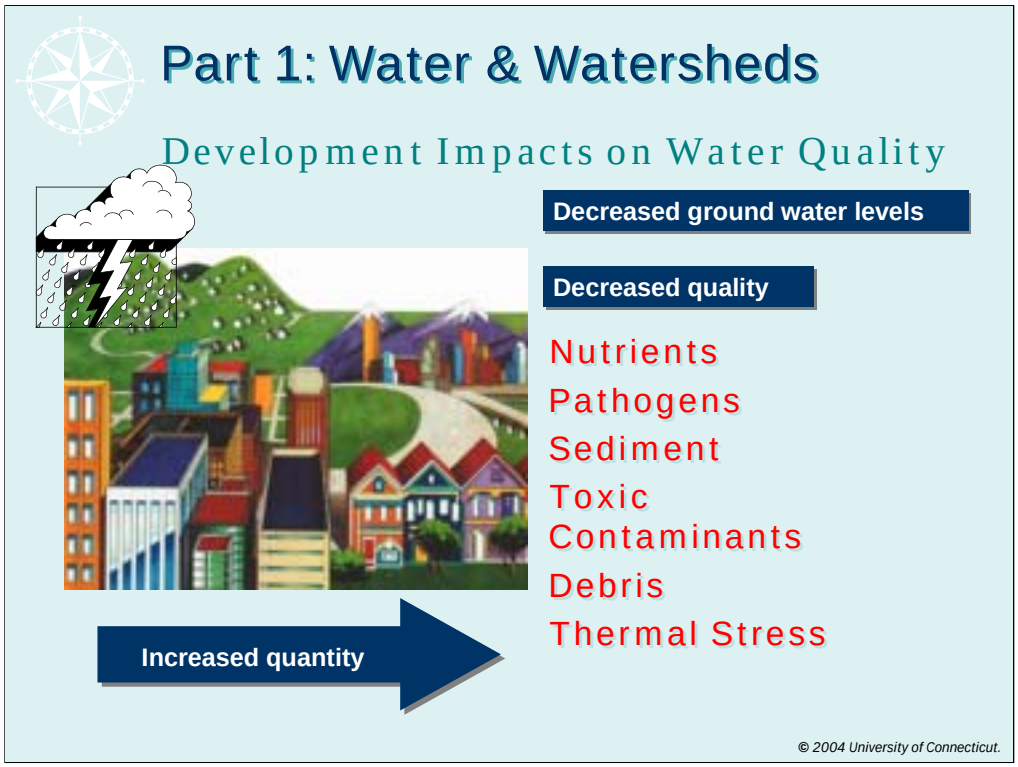
Duration: 45-55 minutes



Part one of the presentation looks at the NPS problem and how it affects water quality. A highly simplified water cycle is used (above) to show how development influences changes in the water cycle, specifically pointing out the increase of stormwater runoff under increased development.



The use of pictures and graphics are a hallmark of NEMO presentations. We try to avoid the use of highly technical information or jargon whenever possible. The above sequence is designed to help viewers understand how development impacts streams in their area, using photos from their community or region.

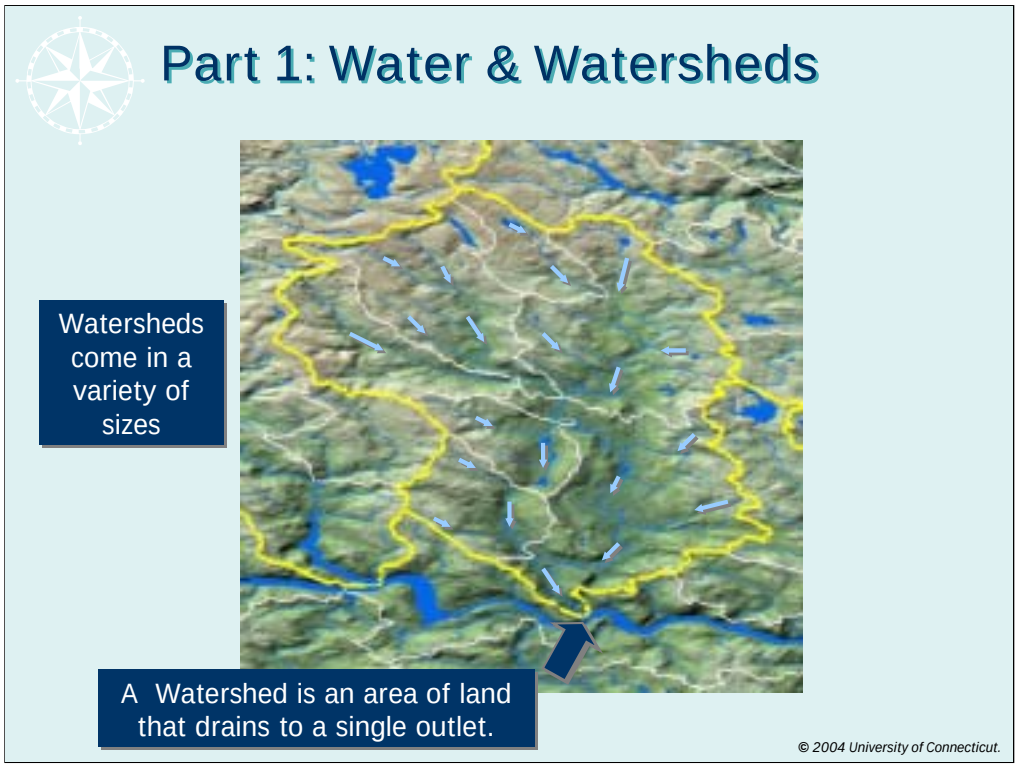


Part One also describes the ways that stormwater runoff affect water quality and identifies categories of NPS pollution.

Original text for this slide:

The Pollutants in Polluted Runoff (List)

There are a variety of pollutants that can get into our waters. Many officials know about sediment because there has been a lot of guidance and regulation on sediment and erosion control already; however, it's important to know that sediment is just one of several nonpoint pollutants and what we do to control sediment and erosion does not necessarily control for other pollutants as well. Let's take a few minutes to talk about each individual pollutant, and look at examples of how each affects the resources in our local communities.



Part One concludes by introducing the concept of watersheds. It underlines the fact that the best way to manage your water resources is by addressing what is happening on the watershed level, and that although we are talking about water, watersheds are really a unit of land.

Part Two is about land and how its use has a direct affect on our water resources. It starts by looking at land cover for the entire state, and then focusing in on their town.

Original text for slide:

Land Cover - CT

Looking at this satellite-derived land cover map, you can quickly see the major patterns of development and urbanization by the color concentrations. (Red is commercial/industrial, yellow is residential, brown is agriculture and used open space, and green is forest and wetland areas). Though CT is still relatively forested, there is concentrated development along the major travel corridors (I-91, I-84, I-95/Rt 1), and a considerable amount of development further sprawled and hiding under the increasingly fragmented forest cover.

The use of land cover maps are an important part of the NEMO program and time is spent in this section describing what it is and how they can be used. The land cover maps have been significantly simplified to reflect only 4 land cover categories.

Original Text from slide:

Land Cover Categories

Categories are: forested & wetland areas, agriculture & used open space, residential, and commercial/industrial. Each category contributes differently to polluted runoff.

For a given town, each of the 4 land cover categories is identified…

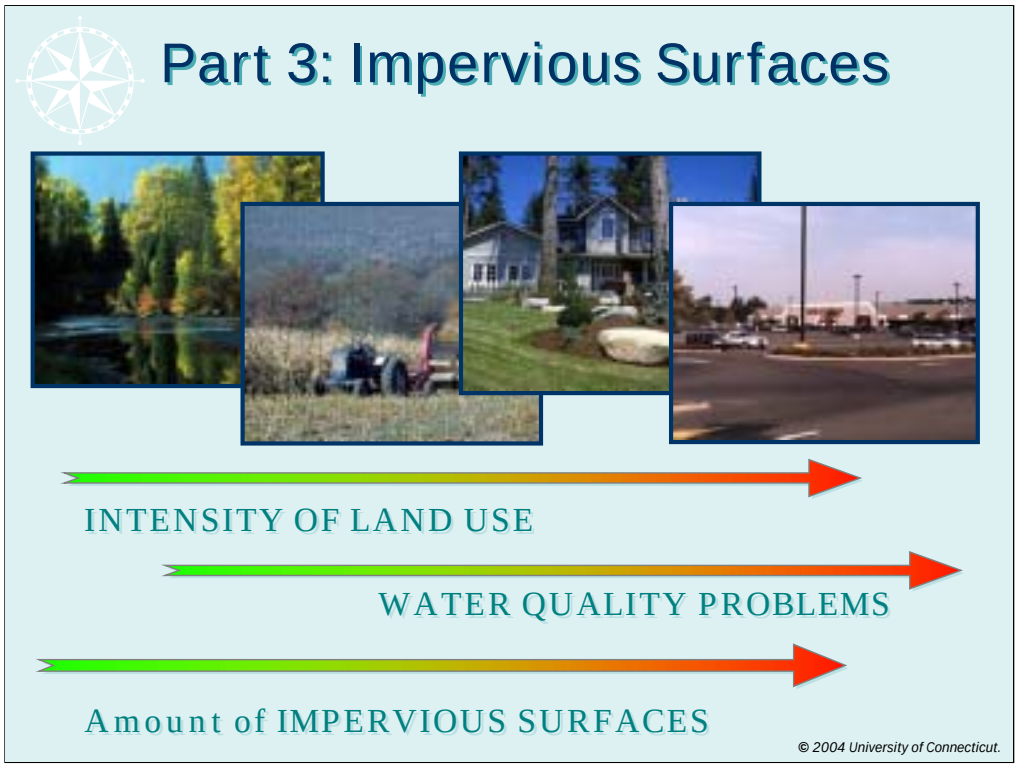
Part 2: Land and Land Use

Residential Areas

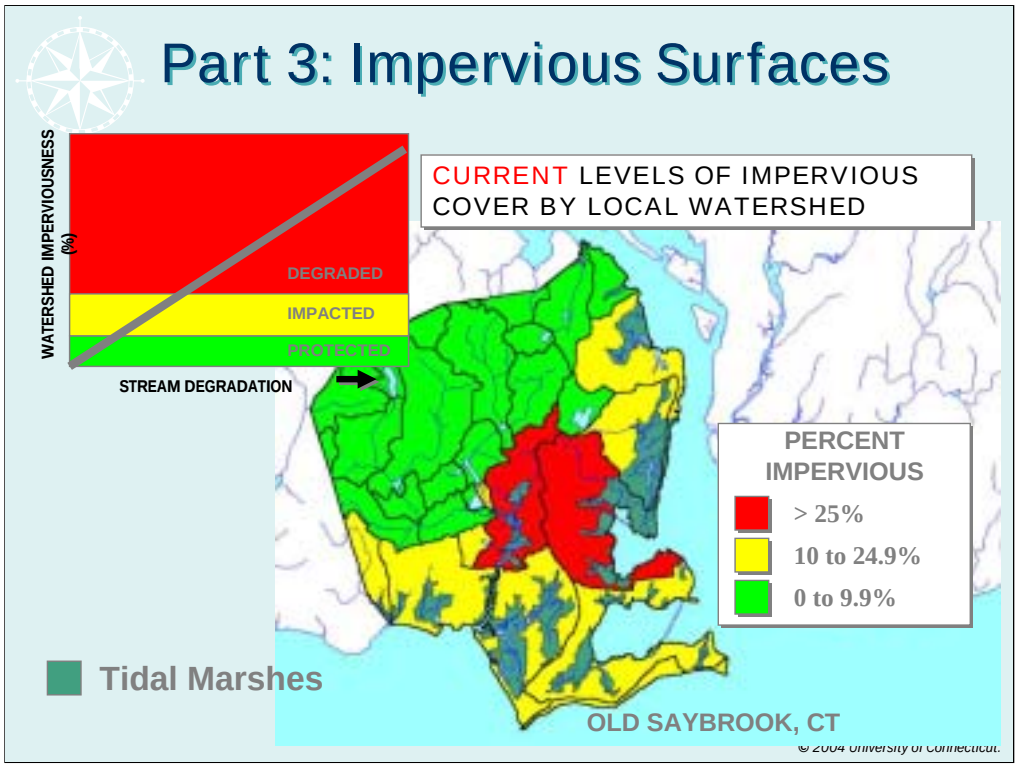
Stormwater Runoff May Contain...

Nutrients:	lawn fertilizers & septic system effluent
Pathogens:	malfunctioning septic systems, pet waste
Sediment:	construction, road sand, erosion from lawns & gardens
Toxic:	household products, pesticides
Debris:	litter & illegal dumping
Thermal:	heated runoff, removal of streamside vegetation, impoundment's

…and the specific pollutants from stormwater runoff that might be expected are listed.



Part three introduces the concept of impervious surface and how these surfaces are correlated to increased development.

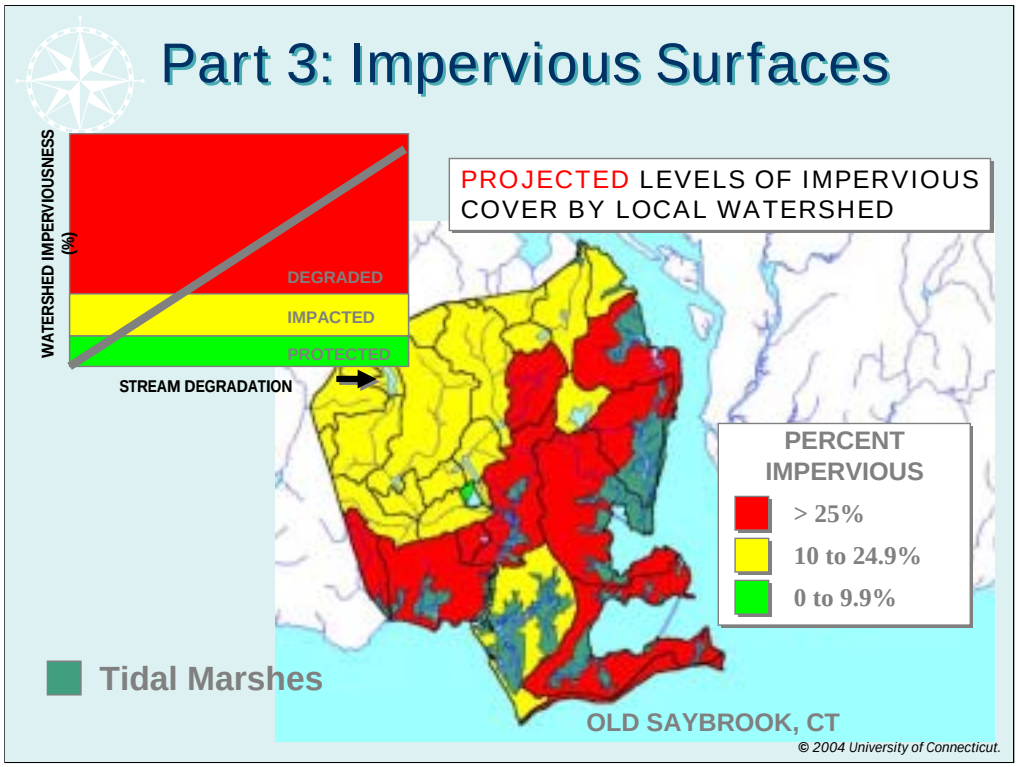


To illustrate how land use contributes, we perform a “build-out” analysis of impervious surfaces. The analysis is predicated on the so-called Schueler Graph, which is based on national studies looking at the effect of watershed imperviousness on stream morphology and water quality. The Build-out is the most critical analysis of the presentation, since it looks at their community and identifies elements of their regulations that are encouraging excessive use of IS.

Original Text from Slide:

Impervious estimate based on current land cover - Old Saybrook

We can estimate impervious cover for a given area -- to see what that tells us about water quality -- based on the satellite-derived land cover in that town, because we know from the scientific literature how impervious each of those land cover categories is (on average). This shows current levels of impervious cover averaged across each local watershed of the town. Again--green areas indicate low levels of imperviousness that are most protective of water quality, yellow areas indicate moderate to high levels that have a definite impact on water quality, and red areas indicate high levels that unavoidably degrade water quality. By looking at these levels of impervious cover, we can begin to visualize the overall impact of our current land cover on our water resources. We see patterns on the landscape of where we are protecting, impacting or degrading the waters.



Projected Impervious Build-out

Text from Original Slide:

Projected Imperviousness based on current zoning - Old Saybrook

We can also estimate future levels of impervious cover by looking at future growth scenarios. Here, we projected development in the future based on the town zoning, in what is called a "build out" scenario. [This is a 100% build out, taking out the undevelopable areas, which include wetlands and steep slope.] Keep in mind, the zoning is the guidance town leaders and decision makers use to foster and approve development--it is basically the vision for how a town will develop in the future. Based on that future land cover, we then estimated future levels of impervious cover. As we look at this, we see the changes that may occur. Impervious levels increase and, as a result, water resources will be much less protected and much more impacted and degraded. Is this what the town wants? What can the town do to shape its future?

The final section gives a 3-tiered approach to addressing the impacts of development on natural resources and water quality.

Community Comprehensive Planning is the important **first** step in addressing this strategy:

•inventory community resources, including both natural, economic and cultural resources.

•prioritize areas for protection

•target development to most appropriate areas

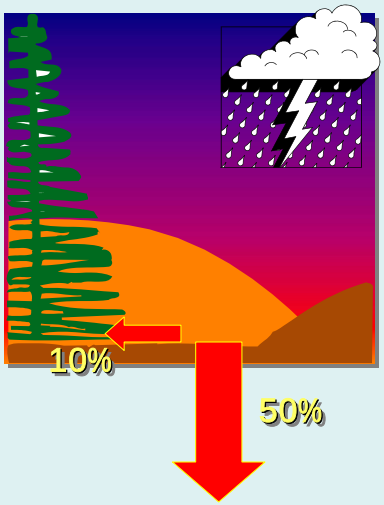
•incorporate open space planning

•develop a plan of action both on the local and watershed level

Only then should a community revise zoning and subdivision regulations to support their plans.

Part 4: What You Can Do...

Strategy for Reducing
Impacts from Development



Adopt Design Principles that Retain, Restore the Natural Landscape

...by Promoting Infiltration

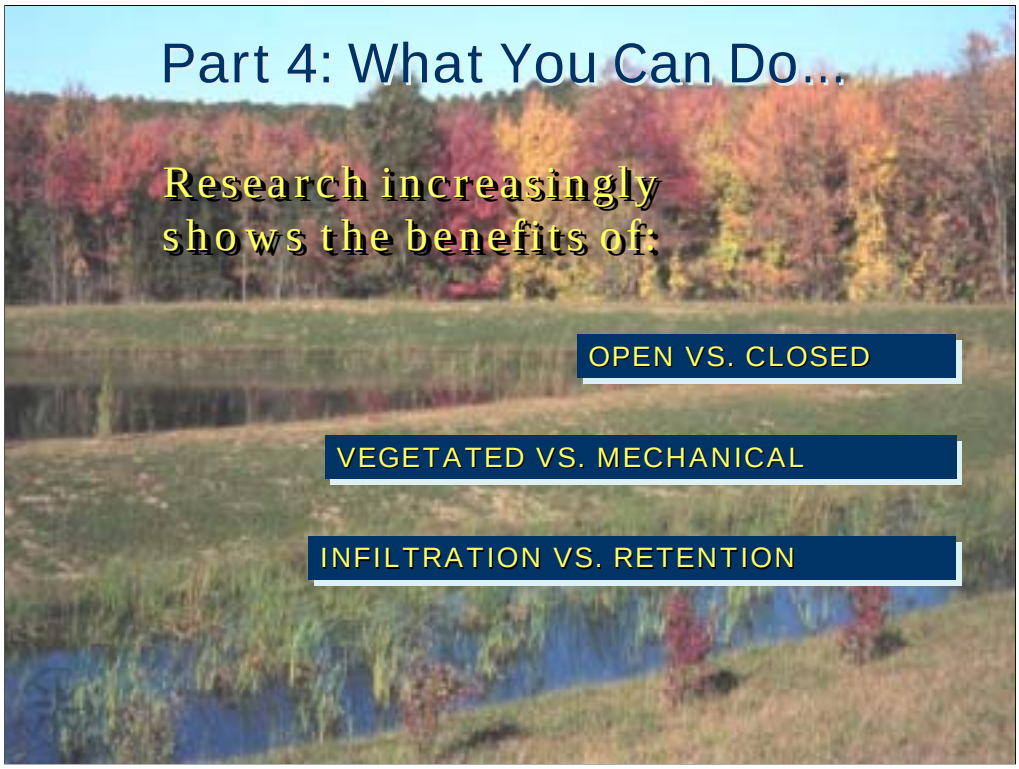
The second tier of NPS controls are site design, and we state the fundamental principle of all of these approaches: to preserve the original hydrology of the site by promoting infiltration wherever possible.

We present several examples of ways that site design can promote infiltration through the use of swales, green roofs, reduced road and driveway widths, and alternative pavements. The idea is not to give an exhaustive review of the site design options, but to give a flavor of some of the approaches.

Text from original slide:

Conventional Lot v. Turf Lot

Use of alternative surfaces can be explored, encouraged, and required, primarily for low traffic and overflow areas. The example here at a major mall in Connecticut which has recently expanded shows both the traditional paved parking area and the new turf parking area for overflow parking. The turf lot is not simply grass, but an engineered design including a proper subbase, an interlocking ring system for structural support, and turf grass. [Water infiltrates rapidly, so during dry periods the lot is irrigated with runoff from the paved areas that has been held in a preexisting detention basin.] Although the long-term effectiveness and integrity of the system--both in protecting water quality and meeting parking needs--has yet to be seen, this particular project is a good example of a an instance where the local land use boards had both ideas and regulations guiding what they wanted for their community and the developer and property owner were willing to take on some risks in experimenting with a new approach.



The third tier of the NEMO approach is to address stormwater runoff through the use of appropriate BMPs. The use of this approach is only after the first two steps have been tried.

It's up to you... It's your town! This is how we end most slide shows, reminding the audience that they are ultimately responsible and have tremendous flexibility in dealing with NPS.

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National NEMO Network Starter Kit