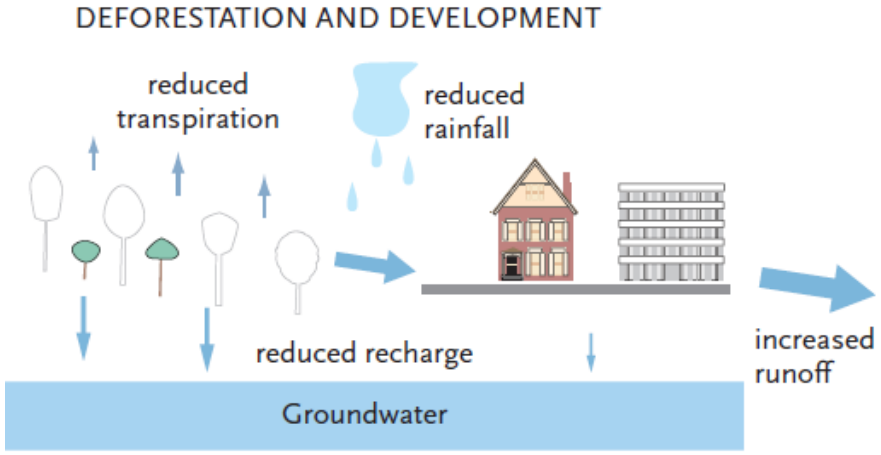
**Streams & Impervious Surfaces**

What happens when it rains? Where does the rain go? The water seeps into the ground or runs off into drains, where it is enters the storm drainage system. Water that does not become absorbed by the ground becomes runoff, rushing off roadways, sidewalks, bridges, parking lots, and other impervious (artificial, non-porous) surfaces very quickly. As impervious surface increases in urban areas, so does runoff.

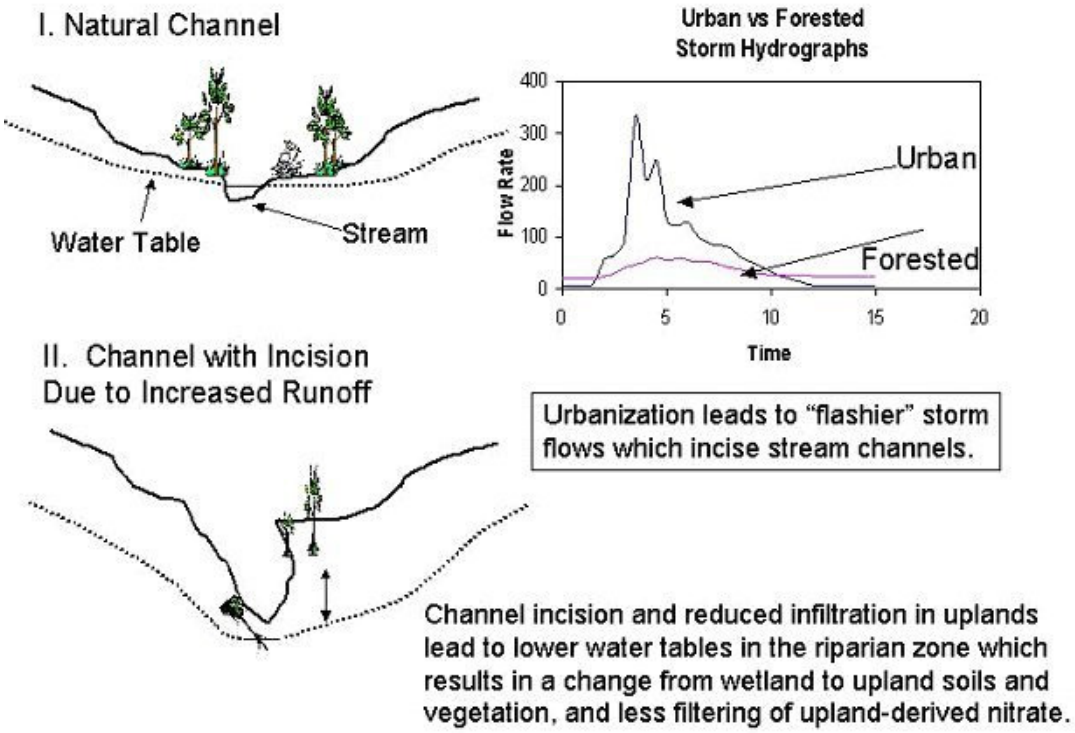



Urbanization can be a problem for various reasons, since impervious surfaces change the volume and the timing of runoff, and there may be contaminants in the water. In urban areas surface runoff carries pollutants from substances that have leaked or spilled onto the ground, such as oil or salt. People often throw trash on the ground, which is then washed into the streams and rivers during a storm. These pollutants are called non-point source pollution, which means pollution that isn't from one single source like a sewage pipe. The most recent *National Water Quality Inventory* reports that runoff from urban areas is the leading source of impairments to surveyed estuaries and the third largest source of water quality impairments to surveyed lakes. Although the federal government regulates point and non-point source pollution through the Clean Water Act, it is difficult to control non-point pollution in the environment. It is hard to make sure all the cars in a city don't leak oil, or to stop people from throwing litter on the ground.

In addition to contamination, the amount of runoff increases with urbanization. In many cities and towns, rainwater goes into a sewage treatment plant along with sewage. When there is a heavy storm, however, and the sewage system becomes overwhelmed, it cannot treat the water, and it often releases *all* the water into the nearest water body. This is called "combined sewage overflow" (CSO). Imagine hundreds of thousands of gallons of water all rushing through the sewage system at the same time, and then arriving at the water treatment plant. There's no way the plant can accept all the additional water! When this happens, a combination of lightly treated sewage and storm water runoff is released into streams and rivers. There are still hundreds of CSOs that discharge sewage

into rivers during storm events, especially along the East Coast, where storm water systems were designed before sewage treatment plants, so many pipes lead straight into the nearest stream or river.

Streams and rivers across the country have been artificially channeled, straightened, or otherwise altered. Construction or poor land planning causes excess sediment to wash into streams and rivers, causing them to fill up prematurely, which adds to the flood threat. Streams normally flood, so trying to stop them from flooding in one place can cause ecological damage as well as increase flood damage in another.




*Baltimore Ecosystem Study*

Streams that receive a large amount of water in a short amount of time during a storm are called "flashy" streams. During a normal storm, water that falls on pervious surfaces such as forests, meadows, and streamside wetlands has time to slowly sink into the ground instead of rushing across the surface. However, impervious surfaces do not allow water to be absorbed by the ground and flow quickly into the nearest waterway. If a stream or river receives more than a normal amount of water in a short amount of time, potentially severe erosion can occur and undercut stream banks, making them unstable and further damaging the ecosystem (see the figure above).

Many streams suffer from severe degradation as decades of poor water management has led to heavily eroded and unstable banks, along with contamination issues. Allowing streams to resume their natural pathways, planting along the banks in riparian zones, solving the CSO problem, and increasing pervious surfaces would enable the normal ecological patterns to return.