Pierce County
Public Works & Utilities
Water Programs Division

How Science Benefits Our Community

Science Applications in Surface Water Management

Pierce County's Department of Public Works and Utilities has a Water Programs Division that manages flood control, water quality and the preservation of natural drainage systems in unincorporated Pierce County (those areas not part of any city). Water Programs engineers, environmental scientists and planners use a variety of scientific tools and methods to collect and analyze data about water. They perform assessments of specific areas and look for any problems revealed or confirmed by the data. This information is used to design solutions and prioritize which problems need attention first. The unincorporated county is divided into drainage units called basins, and each basin gets to prioritize its own projects based on unique needs through a public planning process.

Some of the scientific tools used by Water Programs are as follows.

Water Quality Monitoring

Water quality samples are collected from ditches and culverts, creeks, streams, lakes and wells. The samples are tested immediately in the field for temperature, pH and dissolved oxygen, then sent to an accredited laboratory for other tests such as turbidity, fecal coliform bacteria and nitrates. When lab data indicate a violation or other problem, the information is verified and corrective steps are taken as much as possible. In order for government water quality protection efforts to be successful, the most current scientific methods must be applied to data gathering, management, and assessment. Any actions taken to address water quality issues must be supported by the data and understandable to gain the support of the public and elected officials.

Channel Migration Zone Mapping

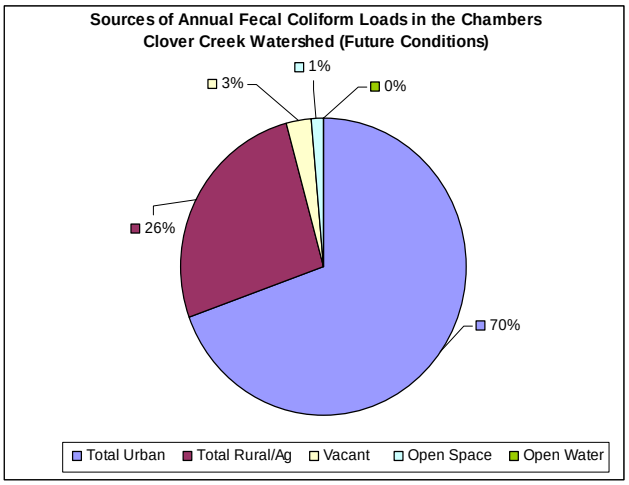
River channels tend to change location, or migrate over time, sometimes with destructive consequences to people and property. Channel Migration Zone mapping (CMZ) is an effort to scientifically predict the potential destructive path of the county's major river systems. County hydrologists, geomorphologists and geologists assess historic river paths and determine what factors control its channel location, such as bedrock, flow, sediment load, and slope. They use this information to predict where the river is likely to move to within the next decade. Fact gathering includes looking at historic aerial photographs, field investigations and interviewing local residents. The study data is then used to ensure that new construction is done outside of the high probability zone.

A migrating river channel at South Prairie Creek, 1996

Watershed Treatment Model

Water Programs recently commissioned a study of nonpoint-source pollution loads and treatment options on a countywide, watershed scale. Actions listed in four watershed plans were modeled to determine which ones had the best potential to improve water quality. Nonpoint-source refers to water pollutants that have no known individual source, but are found in runoff collected over a wide area. The study applied a modified version of Watershed Treatment Model (WTM) Version 3.1, originally developed by the Center for Watershed

Protection under an EPA grant. At present, the WTM can address four pollutants: nitrogen, phosphorus, suspended solids, and fecal coliform bacteria.



The county study suggested that implementing specific best management practices can lead to reductions in future pollutant loads. The measures that appeared to provide the greatest reductions include:

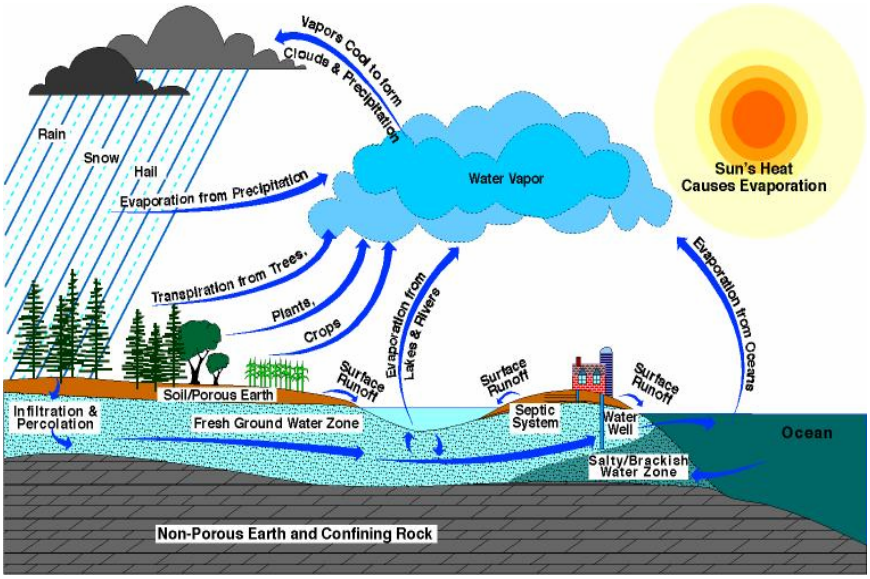
- Encourage retrofitting programs for existing storm drain systems to improve water quality and habitat;
- Institute an impervious cover management program;
- Establish land use design standards that reduce impervious surface area;
- Require maintenance of storm drainage/water quality facilities; and
- Survey areas potentially impacted by failing on-site sewage systems.

Hydrology and Hydraulics

Water Programs engineers use the science of hydrology to determine how much water flows in streams and rivers during a given storm event. Hydrology is the study of the cycle of water movement on, over and through the earth's surface and atmosphere and the science dealing with the properties, distribution, and circulation of water. Water quantity is essential information to have in order to determine what size storm water facilities, such as ponds, pipes, or ditches, need to be.

Hydraulics is the study of the mechanical properties and effects of water flow. Following an assessment of hydrology, the science of hydraulics is applied to determine how high and how fast the water will rise and flow during a given flood event.

Hydrology and hydraulics data are crucial when Water Programs engineers design and build storm water facilities. Without it, reducing or preventing flood impacts would be very difficult and more costly.



Hydrology – the study of the water cycle

For more information, contact Water Programs at 253-798-2725 or www.piercecountywa.org/water