

## **GROUNDWATER: A PRECIOUS RESOURCE**

- **What Is Groundwater?**

Groundwater is water stored underground in cracks and pores of rock, sand or gravel. People use groundwater by pumping it up through wells or tapping it from springs.

Over 90% of the Earth's available fresh water is under the surface. Most of Oregon's high-quality groundwater is close to the surface and moves very slowly.

- **Who Needs Groundwater?**

You do. In Oregon, groundwater serves as or backs up the main source of water for 1.6 million people. That adds up to over one billion gallons of water everyday. And groundwater use will grow with Oregon's population and new industry.

Even though so many Oregonians depend on groundwater for drinking, irrigation, livestock watering and industry, many are unaware of how vulnerable this precious water resource is to pollution.

- **Where Does Groundwater Come From?**

Groundwater is a vital, hidden link in a constantly moving cycle of all the Earth's water.

In the "hydrologic cycle," the sun's heat evaporates water from oceans and other water bodies, releasing it into the atmosphere. The water returns to the earth as rain or snow. This rainfall may evaporate again, run into streams that eventually carry it back to the sea, or seep into the ground.

Much of the Earth's rain and snow filters down through the soil to become groundwater. This fresh water remains underground before reappearing in mountain springs, or seeping into lakes, streams, marshes and even the ocean itself.

Groundwater accounts for most of the summer flow in Oregon streams. Flow speed depends on the grade of the slope as well as the size of the pores and cracks the groundwater seeps through. In clay, groundwater may move only a few inches a year. In gravel, it may move about 3,000 feet a year.

- **Isn't Groundwater Pure?**

In its natural state, most of Oregon's groundwater is of high quality. Groundwater seeps through rock and sediment, starting at higher land and fording its way to lower valleys. This percolating process was once thought to filter out all pollutants. This concept no longer holds true, as contamination problems are being discovered around the world. Contamination of groundwater shows up in surface water and water wells. And because groundwater moves very slowly, contaminated groundwater may take many years to be flushed from a system.

All groundwater aquifers--the layers of earth that contain water--are vulnerable to pollution. But shallow unconfined aquifers, in the water table overlaid by porous soils, are more vulnerable than others. These aquifers generally contain large volumes of high quality water and are usually located along rivers.

Often industry, agriculture and communities build above productive, shallow aquifers. These human activities cause pollution problems. It is no surprise that most known areas of groundwater contamination in Oregon are in shallow unconfined aquifers along waterways.

Once contaminated, groundwater is difficult and sometimes impossible to clean up. If cleanup is possible, it can double or triple the cost of water to users, making it far better to prevent contamination in the first place.

- **An Ounce of Prevention**

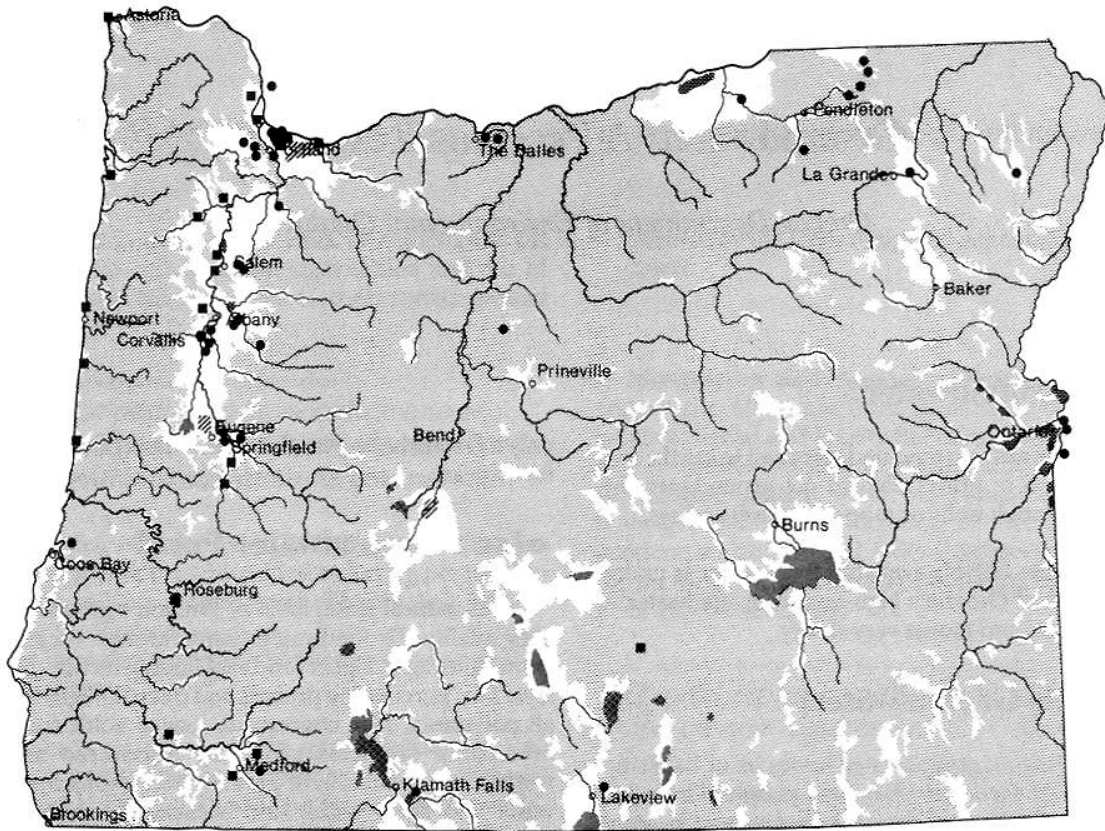
In the past, because we have not understood how vulnerable groundwater is, we have been careless. Now we know gasoline and other harmful liquids can leak from underground storage tanks into groundwater. Our waste from landfills and septic systems may pollute groundwater. Agriculture, mining, and industry all use chemicals that may find their way into the groundwater. Toxic household chemicals may poison the water if dumped onto the ground.

- **Are These Pollutants Harmful?**

Groundwater pollution and its relationship to health is difficult to pinpoint. Bacteria, gasoline and oil may harm humans. The thousands of new chemicals being introduced by humans complicate things even more.

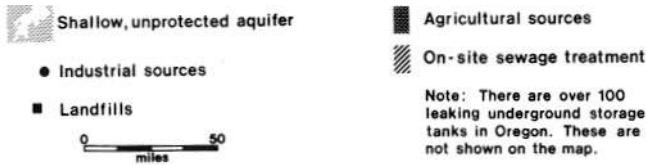
There is increasing suspicion that cases of nervousness, rashes, headaches, cancer, birth defects, infertility, nerve damage and fatigue, that may have gone undetected for decades, are connected to groundwater contamination.

Nitrates contamination, one of the most common groundwater problems found in Oregon's groundwater, comes from improper disposal of human and animal wastes and overuse of fertilizers. "Blue baby syndrome" and miscarriages have been linked to high levels of nitrates in drinking water.



### Existing and potential sources of groundwater contamination

**Key**



- How Can You Tell If Groundwater Is Contaminated?**

Sometimes you can smell or taste contaminated groundwater. But most of the time, pollution can only be discovered through sophisticated tests. Chemicals may be present in amounts so small that only expensive equipment can detect it. But these tiny levels of contamination may still be harmful to people who drink groundwater.

DEQ may sample private wells in a contaminated area to better understand a particular contamination problem. But the wells are selected on a scientific basis and not by request. To

have a private well tested, contact a private environmental laboratory. You should choose which pollutants you are most concerned about to limit the cost of the testing.

- **Is It too Late to Protect Groundwater?**

Oregon and other states around the nation are beginning to realize that our precious resource of groundwater must be protected. Limited studies of Oregon's groundwater have found an alarming number of groundwater contamination problems. Many areas where contamination may exist have not been investigated. Much more research is needed to adequately understand the size and nature of groundwater pollution.

- **Solutions**

Although groundwater pollution is a serious problem, it is not too late to find solutions. It will take:

- **Research**--To adequately address the problem, we must first determine the size and nature of what Oregon is up against. Once we know how contamination occurs, we must develop and test alternatives to the actions that caused the problem.
- **Prevention**--Once contaminated, groundwater is almost impossible to clean up. Groundwater should be protected before contamination occurs. To do this, we must provide alternatives to polluting practices through public education and technical assistance.
- **Planning**--As we continue to study and better understand groundwater, we can develop ways to protect this valuable resource. We must look into new rules, policies, standards and strategies.

Groundwater is a renewable supply of clean water, as long as it remains unpolluted. We have a responsibility to stop careless practices that can prevent its many uses and threaten public health. The key to protecting this critical resource lies in better knowledge, wise management and a realization of responsibility for the future.

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