POISONED WATERS

Photos by Susan Zox

Discussion Guide

With Excerpts from the PBS FRONTLINE Broadcast

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POISONED WATERS

Welcome to POISONED WATERS

Photo by: Susan Zox

This discussion guide and DVD are drawn from the PBS FRONTLINE investigative report, POISONED WATERS with Hedrick Smith as correspondent. In that program, we showed the kinds of pollution now contaminating America's waterways, political obstacles blocking restoration of great estuaries like Chesapeake Bay and Puget Sound, and some local strategies that have scored successes.

We have designed this kit to stimulate public discussion of effective techniques and crucial issues of educational reform. It is intended for teachers, parents, principals, administrators and anyone interested in improving public schools.

How To Use This Guide

This guide can be used either with a DVD of the two-hour documentary, POISONED WATERS, or with the special DVD clip reel of program excerpts.

The guide is broken into several sections. On pages 1 and 22, you'll find a description of the main elements of the program. Pages 2-21 set out ten topics for discussion, selected to highlight important issues in protecting our waters. For example, stormwater runoff, agricultural pollution, new chemical contaminants, how grass-roots action can force a Superfund cleanup or control development. Each topic is covered by a two-page write-up and suggested questions. A matching video segment illustrates the issue.

Select a topic and read the summary. Watch the matching segment on the DVD of excerpts. If you have a DVD of the full program or a special DVD that contains additional Puget segments, the DVD is chaptered to make it easy for you to locate each video segment.

After reading the topic write-up and viewing the matching video clip, you can then read and discuss the related questions with your group. We hope the discussion and this program generate new ideas for effective environmental protection in your community.

Hedrick Smith

POISONED WATERS

The Challenge of "Poisoned Waters"

When Congress passed the Clean Water Act in 1972, it called for America's waterways to be swimmable and fishable again by 1983. But our great waterways are still in peril and they face new waves of pollution. "I would put Puget Sound in the intensive care unit — the situation is critical," asserts Kathy Fletcher, executive director of People for Puget Sound. The Chesapeake Bay gets a flunking grade every year in a report card compiled by environmentalists and scientists.

Much the same, experts tell us, could be said about the Florida Everglades, Great Lakes, Gulf of Mexico, San Francisco Bay, or America's great rivers. "There is no question that the condition of the Chesapeake Bay is like the canary in the coal mine," asserts Will Baker, president of the Chesapeake Bay Foundation. "It is a symbol, an indicator of what we are now learning to expect in any body of water nationwide and across the planet."

The danger signs are everywhere — dead zones doubling in size every decade around the globe; Orca whales in Puget Sound, dying at a young age and weakened by contaminating chemicals like PCBs; scientists discovering signs of sexual mutations in the male fish in the Potomac River; public health experts warning of serious health problems for humans like a rising risk of breast cancer

Photo by: Susan Zox

among women, lower sperm count among men and weird distortions in the urinary tracts of newborn babies.

For a decade or so after the Clean Water Act, tough enforcement by the Environmental Protection Agency made significant gains against smog in the skies, algae in our rivers and human waste in our big cities. The EPA sued big industrial polluters. It forced cities to upgrade outdated wastewater treatment plants. It launched Superfund cleanups of the nation's worst industrial sites that were poisoned by legacy chemicals from the post-World War II era. By targeting "point-source pollution" — pollution coming out of a pipe — the EPA repaired some of the worst damage.

But the challenge today is more complex, largely because today's pollution is nearly

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Why Are America's Waterways in Peril?

The Chesapeake Bay, an iconic waterway lying near the cradle of the nation, was an early target of the Environmental Protection Agency for a broad clean-up. An army of scientists have studied and scrutinized the Bay. In 1983, six state governors signed a compact with former EPA Administrator Bill Ruckelshaus, vowing to cut the Bay's most harmful pollution by 40 percent by the year 2000. It was to be a model for America.

Photo by: Susan Zox

But those were voluntary targets without the force of law. Governors came and went. Twice since then, those targets have been watered down and postponed — to 2010 and then 2025, and the Bay has suffered the consequences.

"Today we're at a point at which this system called the Chesapeake Bay may be on the verge of ceasing to function in its most basic capacities," asserts Will Baker, President of the nonprofit Chesapeake Bay Foundation. "All of those functions that we value could be lost to the next generation, unless we take dramatic and fundamental action today."

The symptoms of decline are everywhere. Oysters are a mere two percent of historic levels. Crab catches are only one-third of a decade ago. No longer are there shad, yellow perch or tarpon, complains commercial fisherman Larry Simns. Thousands of jobs have been lost. Old fishing towns have decayed. Billions of dollars of business have disappeared.

The Bay is acutely vulnerable to the human footprint. It is the receptacle for an enormous, heavily populated watershed that stretches from Upper New York State to southern Virginia. It is an ecological hothouse, a shallow body with 11,000 miles of shoreline, that absorbs the runoff from the sprawl of cities and suburbs across the entire mid-Atlantic region, and also from huge cattle farms in Pennsylvania and from industrial-scale chicken farms in Delaware, Maryland and Virginia.

It is contaminated by agricultural runoff — manure and fertilizer loaded with too much nitrogen and phosphorous — that spawns acres of algae and fuels the spread of dead zones where aquatic life cannot survive. In the heat of summer, dead zones devoid of oxygen and as barren as the moon, occupy 40 percent of the main stem of the Chesapeake. They are, moreover, a global problem, doubling in size worldwide every decade.

Efforts to curb pollution from farming and economic development have run into fierce opposition. Cities have fallen behind in upgrading sewage treatment plants. Regulators lack sufficient funds and authority to crack down on polluters.

Some question whether political leaders — or the public — cares enough to take strong action. "We know today precisely what is necessary to save the Chesapeake," asserts EPA strategist Chuck Fox. "It comes down to the question of political will."

Discussion Questions:

1. What are the main symptoms of decline in the Chesapeake Bay? Is the Bay's health a test case for other bodies of water? What makes the Chesapeake Bay so vulnerable to pollution?

2. What is a dead zone? How are dead zones formed? How serious a threat are they to marine and wildlife? Are they just a problem for Chesapeake Bay or do they afflict other bodies of water, too?

3. What are the most widespread pollutants on Chesapeake Bay? What are the sources of those pollutants? What is their impact on the Bay?

4. Is the failure to clean up Chesapeake Bay in the past three decades the fault of inadequate science? Insufficient money? Weak political leadership? Or by public ignorance and indifference?

"You know there's a tendency to blame it on lack of political will. Well, hell, who elects the politicians and who re-elects them? Last time I looked, it was us. We ran out of excuses for delaying many, many years ago around the Chesapeake. We can afford it. We don't necessarily want to pay for it but we can afford it, so I have to say that collectively we don't care enough."

—Tom Horton, Chesapeake Bay Author

What Warning Signals Does Nature Give Us?

Scientists are always looking for signals in nature that tell us about the human impact on the environment. They take measurements of water quality or air quality. They watch the fate of certain tell-tale species — the survival of polar bears, the changing migration of birds,

Photo by: Ken Balcomb

the reproduction of tiny benthic creatures in river bottoms. These are barometers of the health of our eco-system.

That's one reason why endangered species attract such attention — not just for their own survival but also because if they are in danger, that says something is wrong with the eco-system, something that may eventually come back to haunt human beings.

The Orca whales in Puget Sound are an endangered species. They an enormous tourist attraction because of their dramatic black and white coloring and their playful antics. But they are also a valuable scientific indicator. Like humans, they are at the top of the food chain and so they accumulate the contaminants that get into the environment.

These Orcas make Puget Sound their home. They're known as "residents." So they reflect the general health of Puget Sound. Their residence has enabled marine biologists to know them well, literally by name. Scientists have watched families of Orcas travel together, have charted family trees, and recorded babies being born and older whales dying off in their sixties or seventies, after a life-span much like humans.

What alarms specialists like Ken Balcomb, Director of the Center for Whale Research, is that younger whales are dying, too — "dying way before they even mature," says Balcomb. "The population is declining. Probably the next twenty years we'll be witnessing the departure of this population."

Scientists at NOAA, the National Atmospheric and Oceanic Administration, have been sampling Orca whales for clues to their increased vulnerability. NOAA has been shocked by the high levels of PCBs and other toxins found in young whales, passed along through

mother's milk. Other scientists have established that Puget Sound seals and King Salmon — a favorite diet of Orca whales and humans — are far more PCB-contaminated than elsewhere on the Pacific coast.

Although PCBs were banned by Congress in the 1970s, they persist in nature liked many other toxins. They can still cause cancer and interfere with the immune, development and reproduction systems of mammals — whether whales or humans. PCBs make whales more vulnerable to other illnesses. According to Canadian scientist Peter Ross, NOAA's tests have established Puget Sound Orcas as "the most PCB-contaminated marine mammals in the world."

"We need to pay attention to what's going on to these guys because if we don't, we're going to have the same problems coming back and affecting us," says NOAA scientist Brad Hanson. "These animals are eating wild fish we want to eat. Wild fish is good for us, too. But if there's contaminants in it, it's going to have an adverse impact on us."

Discussion Questions:

1. How do scientists and environmentalists gather information on the health of the eco-system and the impact of the human footprint? What is the importance of endangered species as environmental indicators?

2. Why are Orcas whales a good indicator of the health of the marine environment? What does it mean to be "at the top of the food chain?" Why is it important that the Puget Sound Orcas are known as "residents" of the Sound and home there?

3. Why are industrial chemicals such as PCBs such a threat to marine species? How do PCBs move through the food web of nature? Do PCBs affect human beings as well as whales? What kinds of harmful effects do PCBs cause?

4. Based on what you have learned about the contamination of Orca whales, what do you think is the health of the Puget Sound eco-system? Would you agree or disagree with the statement that Puget Sound is a "PCB hotspot"?

"There's a direct link between contaminated sediments in certain areas and contamination of the food web above those sediments. In fact, one might even think of the PCBs riding an elevator up from the sediments up into plankton, up into little fish, big fish, harbor seals, killer whales, eagles, humans."

— Peter Ross, Canadian Institute of Ocean Sciences

What Is the Biggest Polluter of Water?

Flying in a four-seat Cessna over the Eastern Shore of the Chesapeake Bay, Rick Dove sees a world unknown to most: mound upon mound of chicken manure. Dove, a pollution detective for the Waterkeeper Alliance, is keeping close tabs on those open mounds because when it rains, that manure has one place to go — downstream into the Bay that he's trying to protect.

The Chesapeake's Eastern Shore is the site of massive industrial agriculture. It produces more than 570 million chickens a year that create 1.5 billion pounds of waste, more than the human waste from the cities of New York, Washington, San Francisco and Atlanta combined. "Agriculture is by far the largest source of pollution to the Chesapeake Bay and it is arguably the single biggest source of pollution to all the waters in the country," says Chuck Fox, the EPA's senior advisor on Chesapeake Bay.

While the Clean Water Act targeted pollution coming out of a pipe from city sewage and industrial plants, waste flowing off of farmland was left largely unregulated. Unlike industry, no specific pollution discharge limits were required. "The whole agricultural community has remained maybe the last big unregulated area of water pollution," says Tom Horton, author of several books on Chesapeake Bay. With the deregulation movement of the 1980s, the EPA and the rivershed states tried to combat farm pollution through voluntary programs — a solution that farmers advocated but environmentalists said lacked the teeth of enforcement.

Photo by: Susan Zox

What makes the problem acute is the concentration of agriculture waste. Tens of thousands of chickens are raised on one large shed; millions on one family farm. In Pennsylvania, cows per farm increased five-fold between 1954 and 1997. Nationwide, industrial agriculture now produces more than three times the raw waste of humans.

With falling meat prices and Americans' insatiable protein-rich appetite (we now consume three-times as much poultry as in the 1950s), pollution from animal waste has become a formidable problem. Explains Jim Perdue, CEO of Perdue Farms: "Things had to become bigger in order to keep costs lower."

But leading activists like Robert Kennedy Jr., chair of the Waterkeeper Alliance, say that companies like Perdue and Tysons are not paying their true costs of production. Kennedy argues that they have dumped the cost burden of cleaning up animal waste on taxpayers.

So activists like Dove and Kennedy are attempting to force a clean up through a provision in the Clean Water Act that allows citizens to sue polluters and the government. In 2003 and 2008, Waterkeeper Alliance filed suit against the EPA and Maryland, to try to toughen regulatory oversight. Lately, under President Obama, the EPA has begun to require pollution discharge permits for the large poultry farms.

Discussion Questions:

1. What's the connection between farm manure runoff and the decline in waterways like Chesapeake Bay? Using manure as fertilizer for crops used to be good for farms. Why has it become a problem now?

2. Why have CAFOs — concentrated animal feeding operations — become so widely used? Is industrial scale farming a good idea or should these farms be smaller? Are CAFOS inevitable?

3. Should big animal growing farms be regulated like industrial plants? Would the public be prepared to pay a few more cents per pound for chicken if companies like Perdue and Tysons charged more to cover the costs of cleaning up manure?

4. Can ordinary citizens like Rick Dove have an impact on the problem? Should citizens be given this ability to enforce the law? What can you do in your area?

"Now this industry says they're doing better and you know, I can't say if that's true or false. But I can tell you that what I'm seeing here on the ground right now is absolutely terrible. So if it was worse before, then I can understand why the Bay is in such bad trouble.

— Rick Dove, Waterkeeper Alliance

How Can Communities Fight Industrial Pollution?

The South Park section of Seattle is one of the least likely places you'd expect to find a grass roots environmental movement. It's a smoggy, low-income neighborhood of bars, burrito shops and squat match-box homes, all jammed among the cement plants, scrap metal operations and brawny factories of

Photo by: Susan Zox

Boeing, Jorgensen Forge and Rhone Poulenc along the Duwamish River, Seattle's industrial corridor.

For a century, South Park has served as a first stop for new immigrants — first, the Italians and Japanese who came to farm the mud flats along the river. Now, Mexicans, Cambodians, Vietnamese and other working poor. It is a basic subsistence place — no post office, no bank, no drugstore, and problems with drugs and gang violence. Its residents do much of the grubby unskilled work in the plants nearby.

Like Love Canal and the Hudson River, the lower Duwamish River has gained notoriety because it has been designated a Superfund site by the Environmental Protection Agency. Superfund is EPA's big stick for tackling the worst industrial pollution sites in America. In 2001, after years of studies exposed pervasive contamination in the muddy river bottom, EPA designated an entire five-mile stretch of the Duwamish River, with hundreds of businesses, a mega-pollution site.

One flagrant polluter was Malarkey Asphalt, a plant lying like an elongated football field along the riverbank at South Park. It made roofing tar out of used oils and chemicals. So high were the levels of PCBs found at Malarkey that EPA labeled it an "early action hotspot." Several years later, a partial cleanup was done by the Port of Seattle, which bought the property when Malarkey went broke.

"I think that this effort has been successful because this community has been uncompromising in speaking up for itself and in insisting that people listen. We essentially have a community here that has been on the fringes of any kind of economic or political power in the city of Seattle for many decades. So it's a community that has only recently re-found its voice."

— B.J. Cummings, Coordinator of the Duwamish River Cleanup Coalition

But South Park residents weren't satisfied. They were sure there were more toxins in the ground. Joining with other groups to form the Duwamish River Cleanup Coalition (DRCC), which got itself recognized as an official Superfund citizen's advisory group, they demanded — and got — more tests. The results were stunning — levels of "about 9,000 parts per million," admitted Doug Hotchkiss, the site manager for the Port of Seattle.

It was a bombshell. Federal law allows only 25 parts per million for industrial sites; Washington state law, only one part per million for residential areas. When the City of Seattle tested nearby residential areas, it found PCBs in the streets, sidewalks and people's yards, evidently having dripped off Malarkey's tar trucks. Residents were up in arms.

Eventually, the Port of Seattle announced a plan to clean up the Malarkey contamination to the industrial level of 25. But South Park residents, by now inflamed and organized, demanded a level of one. They lobbied the Port Commission and the City Council. Bowing to public pressure, the authorities agreed to start a residential-level cleanup in 2010 — a concrete illustration of how vocal community activists can push the EPA and industrial polluters into action.

Discussion Questions:

1. What is the mission of EPA's Superfund? What kinds of pollution sites does it target? Why was the lower Duwamish River in Seattle declared a Superfund site? When Superfund designates an industrial site as an "early action hot spot," how fast is action taken sometimes?

2. Can grass roots community groups participate in the cleanup process of polluted sites being supervised by the EPA? Does Superfund recognize grass roots organizations formally, as advisory groups, that can influence how environmental cleanups are done?

3. How serious was the contamination problem at Malarkey Asphalt? When things started out, did the EPA and the Port of Seattle recognize the severity and extent of the pollution at Malarkey? What pushed them to look for more pollution through more testing? How did they respond to the new tests?

4. One big issue in environmental clean-ups is "How Clean Is Clean." That is, how clean does the site have to be after the cleanup? Are there different legal standards? How is the cleanup standard determined? How can citizens groups influence that process?

How Can We Save Habitat for Endangered Species?

For generations, the tribes in southern Puget Sound have fished along the Nisqually River. Their leader, Billy Frank Jr., has spent a lifetime protesting for Native American rights. Decades ago, as a young man, Frank was thrown in jail more than 50 times, even shot at by game wardens as he fought for the Indians' fair share of the devastated salmon catch.

For decades, almost every man-made development had ravaged the wild salmon. Dams and culverts blocked their passage upstream to spawning grounds. Logging destroyed trees and bushes, whose shade kept the river cool for salmon. Cattle fouled the waters with their dung. Farmers diked in tidal wetlands where juvenile salmon need to grow. Everyone overfished the precious king salmon.

In 1974, a decision by Federal District Judge George Boldt created a sea change for the tribes. In an historic ruling, Boldt ruled Native Americans were entitled to half of the salmon catch — ten times their previous allotment. Plus Boldt gave them power to co-manage the local fisheries and watersheds with the state of Washington. That gave Billy Frank a shot of momentum and new responsibilities for protecting his cherished watershed.

Still, in the 1970s, the runs of salmon continued to nose dive. King salmon were wiped out. To try to recover the rivershed, the state legislature set up the Nisqually River Task Force in the mid-80s to bring together all local stakeholders.

But the issues were thorny and the parties clashed. Large economic interests like Weyerhaeuser Timber, Wilcox Farms,

Photo by: Susan Zox

Tacoma Power and the Army's Fort Lewis feared being forced to change. The tribe and environmentalists wanted natural buffers along the Nisqually's banks to protect the river and the salmon — a zone with no logging, no clearing, no cows.

The task force was deadlocked for months. One rancorous night, Billy Frank rose to speak. "I'll never forget this," recalls farmer Jim Wilcox. "Billy said, 'We've got to stop this right now. I want everybody to know

that we want Weyerhaeuser Timber Company to continue to operate and own the land along the river. We want Wilcox Farms to keep farming. We don't want to do anything that's going to put them out of business."

People listened. Tempers subsided. The deadlock thawed. Frank asked them all to work together to save their river. He suggested a compromise on the buffers. Cooperation began to blossom. The Army base offered a site for a tribal fish hatchery. Tacoma Power provided funds to run it. But the key for Billy Frank was recovering wetlands from farmers to nurture the baby salmon.

Successes were slow, but stunning. Today, 70 percent of the Nisqually corridor is permanently protected. Salmon are on the rebound. "The eagles, the habitat, the beavers are coming back," says Billy Frank. "The little animals that lived on this watershed, they're coming back. You know, these are very important life on the estuary and the ecosystem of a watershed."

Discussion Questions:

1. What is so important about unspoiled natural habitat for a region's flora and fauna? What do salmon need on a watershed to survive and grow?

2. What caused the dramatic decrease in the salmon population? How did the river and its marine life get so devastated? Is destruction of a rivershed inevitable?

3. Why were the early months of the Nisqually River Task force deadlocked? Was mistrust a problem among the stakeholders in the task force? What enabled the Nisqually Task Force to score a breakthrough? How did the diverse Nisqually stakeholders achieve progress to save the river and its wildlife?

4. What does Billy Frank's life experience on the Nisqually River watershed demonstrate about grass roots civic action? Can the Nisqually River model be transferred to other watersheds?

"What we really need to do is sort of re-institute a Jeffersonian barn-raising kind of philosophy about people who are living in an eco-system that hasn't been taken care of for many decades, often by them, and figure out what's wrong here. What's the problem? What do we need to do to solve it? And once they decide that and once they decide they're going to bring everybody else in that area together to try to solve it with them, it just breaks all kinds of barriers and all kinds of things can happen that are good."

—Bill Ruckelshaus, Chair, Puget Sound Partnership

Why Is Stormwater Runoff a Major New Threat?

In the1960s, water pollution assaulted our senses. Ohio's Cuyahoga River was so loaded with toxins that it caught on fire. The Potomac River near Washington was so coated with slimy sewage that officials posted health warnings. Armed with the Clean Water Act of 1972, the

Photo by: Susan Zox

EPA fought the most obvious pollution — pollution spilling from drainage pipes at industrial and waste treatment plants. The worst got cleaned up.

Today, a new pollution threat has emerged — stormwater runoff. Stormwater is the rain showers that hit rooftops, streets, sidewalks, driveways, parking lots and hard surfaces and that wash man-made chemicals into nature: oil, gas, tiny bits of ground metals from cars and trucks, herbicides, pesticides, PCBs, and industrial toxins. Stormwater carries this deadly mix into storm drains or into neighborhood streams and then out into major rivers, lakes and coastal bays.

What makes stormwater runoff so hard to control is that it doesn't look dangerous. It accumulates a toxic load from millions of home lawns, highways and farm fields. It's everywhere, but it's hard to see. Take Puget Sound, for example — its waves glisten at sunset. But dive below with scuba diver Mike Racine and you see another world: underwater pipes spewing filthy clouds of stormwater runoff from Seattle. "This is sick," says Racine. "Doesn't look sick, but it is sick."

"We put in about 150,000 pounds a day of untreated toxics into Puget Sound," says Governor Chris Gregoire of Washington State. Add up just the oil spill and in two years, says Jay Manning, Director of Washington's Department of Ecology, "the volume of oil that is carried into Puget Sound by stormwater runoff is equal to the Exxon Valdez spill."

"The '70s were a lot about 'We're the good guys. We're the environmentalists. We're going to go after the polluters.' And it's not really about that any more. It's about the way we all live. And unfortunately we are all polluters. I am. You are. All of us are."

—Jay Manning, Director, Washington State Department of Ecology

That constant flow of chemical pollutants is going on all over the nation, a major cause for the increased closing of park beaches, for health warnings from state and local governments telling people to limit consumption of local fish, and for new dangers that scientists have spotted in our drinking water systems.

As one way to cope with stormwater runoff, experts have developed several strategies. One is called Low Impact Development (LID). The basic idea is to let more rain water sink into the ground where it falls. The High Point area of West Seattle is a showcase for LID.

In place of standard impervious concrete or asphalt surfaces, High Point's designers used porous surfaces for sidewalks and gravel for driveways. Downspouts from condo buildings spill into beds of stones that allow rainwater to sink in. Neighborhood streets are sloped toward one side, with gaps in curbing to let street water run into grassy swales beside sidewalks, instead of gushing down the curb-line. To handle really heavy rains, High Point community has built a large retention pond, which serves as the centerpiece of a park with walking trails, wildlife and a children's playground.

For broader strategies, see the following sections.

Discussion Questions:

1. What is stormwater runoff? How is it different from traditional sources of pollution? Why is stormwater runoff so difficult to detect and regulate?

2. Describe any experiences you've had with water pollution? Have any beaches that you like to use been closed to swimming at times? Do you know which fish from nearby waterways are safe to eat and which are not? Have you ever gone to your state government Web site to check on health advisories on fish or water bodies?

3. Do you know whether your state or local government has policies or regulation designed to limit stormwater runoff? What can state and local governments do to reduce pollution from stormwater runoff? Are new policies or regulations needed?

4. What can you do in your household to reduce contaminants in stormwater runoff? Does your household employ alternative methods to increase rainwater infiltration, such as collecting rainwater to water plants? What can your neighbrhood do?

What's in Your Drinking Water?

In 2003, Vicki Blazer, a fish pathologist at the U.S. Geological Survey, spliced open a smallmouth bass from the Potomac River and unleashed a controversy that made headlines across the nation. What caused alarm was her discovery that male fish in the Potomac, the river that supplies drinking water to the nation's capital, were producing female eggs.

Blazer's worry was that whatever man-made chemicals in the river water were bending the gender of fish could also pose a danger to humans. "If it's hurting the fish," asks Blazer, "what is it doing to us?"

It's a concern shared by other scientists, because studies from New Hampshire to Florida and California have linked abnormal mutations such as six-legged frogs and alligators with small penises to what scientists call "emerging contaminants" from industry, agriculture and consumer products.

Few of us may realize it, but most rivers across America, like the Potomac, serve both as dumping grounds for our wastewater and the source for our drinking water. It's one big recycling operation. Drinking water utilities clean out most traditional contaminants. But there's a constant flow of thousands of new chemicals that are unregulated, many from everyday consumer products, such as pharmaceuticals, antibacterial soaps, home cleaners, pesticides, herbicides and personal care products.

After Blazer's discovery, the USGS launched a nationwide survey of rivers and streams to find out what is in our waterways. The results were alarming. "The broad mixtures we're finding —

Photo by: Susan Zox

antibiotics, antidepressants, fragrances, detergents — it's a toxic cocktail," says Dana Kolpin, a USGS research hydrologist who led the study.

Next, USGS teams checked rivers from North Carolina and Indiana to Colorado and Oregon, to see if any of that toxic cocktail was getting into our drinking water systems. They found that about two-thirds of a watch list of about 280 contaminants was, in fact, getting through into our taps. The main worry was so-called endocrine disrupters — that disrupt the way the body normally functions.

"I was surprised by the number of different compounds that were detectable," says Robert Lawrence, a Johns Hopkins University medical professor who reviewed the results. "I knew we were swimming in a sea of chemical soup but I didn't realize the soup was quite as concentrated as it is." Lawrence and Linda Birnbaum, director of the National Institute of Environmental Health Sciences, say that the kinds of endocrine disrupters found by the USGS can raise the risk of breast cancer, birth defects and lower sperm counts among men.

So does that mean it's unsafe to drink the water? Scientists disagree. Blazer says she would not risk drinking water from the Potomac. Birnbaum says "at this point the levels are very, very low so I don't have a great deal of concern that something needs to be done imminently — but it would certainly be nice to reduce what's getting into the water."

Discussion Questions:

1. Where does waste from our toilets and sinks wind up? What about chemicals that we use to clean our homes, wash our cars, fertilize our lawns? What happens to our makeup, deodorant, shampoos and other personal care items when we take a shower? What about pharmaceuticals tossed in the toilet?

2. Where does your drinking water come from? Can you think of anything that might pollute that source of water?

3. What problems have scientists detected in nature that they believe are caused by "emerging contaminants"? Are humans potentially vulnerable to some of these same chemicals?

4. What should the government and/or industry do about these emerging contaminants? What can you do to make water safer for yourself, your community and the fish?

"There are five million people being exposed to endocrine disruptors, just in the mid-Atlantic region, and yet we don't know precisely how many of them are going to develop premature breast cancer, going to have problems with reproduction, going to have all kinds of congenital anomalies of the male genitalia, things that are happening, we know they're happening, but they're happening at a broad low level so that they don't raise the alarm in the general public."

—Dr. Robert Lawrence, Johns Hopkins University School of Public Health

How Does Land Use Affect Water Quality?

In America, we've always felt we had enough space to use land any way we wanted. Homesteaders planted their stakes in the virgin heartland. Post-war America built Levitt towns. Developers made fortunes converting farmland into

Photo by: Susan Zox

suburban tracts. Dallas, Minneapolis, Las Vegas and other cities vied to create the nation's biggest mall.

But lately, so many millions have crowded into areas along our coastlines, lakes and rivers that three-fourths of Americans now live within 50 miles of a major body of water. That trend focuses new attention on the loss of open land near our waterways and on how land use affects water quality. Scientists and regulators tell us, for example, that controlling land use is the key to reducing stormwater runoff and its harmful pollution.

States from Florida and Maryland to Oregon and California have passed growth management laws. The law passed in Washington State requires county governments to concentrate development in established urban areas, to impose strict zoning, and to protect environmentally critical areas such as forests, streams, shorelines and wetlands.

King County (the Seattle area) has become a laboratory for testing the politics of land use. It's an area bigger than Rhode Island — home not just to Seattle and 1.8 million people, but two-thirds of the county is still forest. It's an area where the state seeks to control the pace of development.

Ron Sims, county chief executive from 1995-2009, has been on a mission to save Puget Sound by managing land use with a three-pronged strategy: "We're encouraging active land use in urban areas," he says. "We're discouraging it in our agricultural areas, and we are now buying the land in our forest areas."

With $22 million in taxpayer money, Sims bought development rights on 90,000 acres of timberland to block development in a huge area high above Seattle. He passed a zoning measure 20 years ago setting a minimum of five acres per home in rural areas, stopping most subdivisions. In 2004, with a Critical Areas Ordinance (CAO), Sims limited

landowners on the amount of land they could clear — one-third of ten-acre plots, one-half of five acre plots; the rest had to remain in woods and natural growth.

That caused an uproar. Property owners said they were being stripped of their rights unfairly and without reason. Sims replied the limits were scientifically set. Studies showed that to control stormwater runoff, two-thirds of rural areas had to remain under vegetation. Some property owners complained the new CAO had cost them money because they couldn't subdivide land. Sims replied that the zoning law had blocked subdividing much earlier and no one had lost use of their land.

The battle landed in the courts, with both Sims and Governor Chris Gregoire warning that if Washington's supreme court struck down the ordinance, it would undermine the state's whole environmental strategy. Said Sims: "It'll be the abandonment of everything that this state has voted on consistently, which is they want environmental protection here."

Discussion Questions:

1. Think about where you live. Do you notice many people wanting to live near the water? Do you see that trend across America generally? What problems does it pose for the environment to have millions of people crowding near major waterways?

2. Why do regulators concerned with water quality — with protecting lakes, rivers and estuaries — worry about how land is used? How does land use affect water quality?

3. What's the connection between land use and stormwater runoff? In King County, how much rural land did scientific studies say needed to be kept in vegetation to control stormwater runoff? Why is it worth taxpayer dollar to keep some land in virgin forests? How does that protect the water quality?

4. State and local government pass growth management laws and zoning regulations. Are those necessary policies for protecting the environment? Are such policies being applied in your area? How do political leaders and the general public reconcile the common need to protect the environment with the private rights of property owners?

"We need pristine waters coming from this timberland into the Puget Sound …and, remember, the property was going to be developed, so we would literally change the water quality here. We'd find oil in it because of cars and tires. There would be more fertilizers, insecticides and pesticides. So it's really important to take this 90,000 acres of forest which was going to be developed and say No!"

— Ron Sims, King County Executive, 1996-2009

What Are the Costs of Sprawl?

The ethic of growth is written into America's DNA, from the westward migrations of early pioneers to the endless suburban subdivisions that have mushroomed around America's cities. But as our population soars over 300 million, the luster of growth is losing its sheen. Even some business leaders are having second thoughts. They worry that uncontrolled growth is neither profitable nor sustainable.

They point to places like Tysons Corner, a commercial hub in the Washington, D.C. suburbs. Once a national model of economic success, it is now a cautionary tale of disastrous sprawl. Over 50 years, developers transformed Tysons from a rural crossroads with a country store to an "edge city" larger than downtown Phoenix, packed with mega-malls and office parks totaling 46 million square feet of space and 40 million square feet of parking lots — enough for 170,000 cars.

All that concrete and asphalt wreak havoc on water quality in local streams, the Potomac River and Chesapeake Bay. Nearly 1,000 acres of hard surfaces

Photo by: Susan Zox

translate into contaminated stormwater washing out streambeds and killing aquatic life. On land, Tysons began choking on armies of automobiles that were once the engine of its growth.

Tysons is a textbook story of American sprawl, the epitome of what has happened from Boston and New York to Los Angeles, from Minneapolis-St. Paul to Houston and Miami. Development has gobbled up nature. During the 1990s in the Chesapeake watershed, hard surfaces grew far faster (41 percent) than population (nine percent).

Sprawl recognizes no limits. When Tysons ran out of land, developers targeted neighboring Loudoun County, already one

One acre of a parking lot, or any other hard surface impenetrable by water, produces 40 times the stormwater runoff than normally comes from an acre of mature woods. Once impervious, hard surfaces blanket 10 percent of a watershed, stream life seriously deteriorates. Once impervious surfaces reach 25 percent, nearby streams are nearly dead.

—Chesapeake Bay Watershed Blue Ribbon Finance Panel

of America's fastest growing counties. They funded the election of a pro-development county board that approved plans for 33,000 more homes. But they got push back from people who had moved to Loudoun to enjoy the green.

"The 33,000 homes meant an additional 300,000 car trips on the local roads. It meant higher taxes, 77,000 new people moving into Loudon County, the schools that had to be built, the roads that needed to be built," objected housewife-activist Cheryl Hutchison. "It was suburbanizing an area that was never meant to be suburban."

Mobilized by issues such as traffic, taxes, schools and the turmoil of growth, citizen activists turned back the tide of development. They protected their own quality of life, and in doing so, protected water quality from local streams to Chesapeake Bay.

"The public actually gets what's going on — 85 percent of people in Northern Virginia will tell you that the cause of traffic congestion is indiscriminate land use," says Chris Miller, President of the Piedmont Environmental Council. In fact, the public response was so strong that the pro-development county board ended up rejecting its own proposals for faster growth. And then, all those board members were defeated in the next election by an active and informed electorate.

Discussion Questions:

1. What is sprawl and why do environmentalists consider it such a nightmare for the environment? How does sprawl affect water quality? What role do impervious surfaces play in this impact? What role does traffic play in this impact?

2. How is Tysons Corner a case study in the harmful impact of sprawl? Why are business leaders having second thoughts about sprawl as a development and business model?

3. What issues mobilized Loudoun County residents to fight against the same type of sprawl that plagued Tysons Corner? What role did developers and lawmakers play in this fight? What other issues could mobilize citizens against sprawl?

4. Where do you see sprawl in your area? How can you and your neighbors lessen the spread and impact of sprawl in your area? What laws and strategies have been used to fight sprawl successfully? Is sprawl a local issue or a national issue? Why?

Is There a Smarter Way to Grow?

For Chris Miller, the choice for communities all across America is not whether to grow, but how. "We have a dramatic choice," says Miller, president of the Piedmont Environmental Council, an environmental nonprofit. "If we do it right, the effects on the environment are reduced by half or more. If we do it wrong, the possibility of actually losing [waterways like] the Chesapeake Bay goes up dramatically."

Photo by: Susan Zox

Miller points to the stark contrast between two communities in the D.C. suburbs of northern Virginia that took two very different paths to development and got drastically different results. One is Tysons Corner in Fairfax County, widely considered a textbook case of uncontrolled growth. At Tysons, a landscape of woods and dairy farms was bulldozed to make way for nearly 1,000 acres of parking lots; local streams have been gutted by runoff; and people are trapped in endless traffic jams and congestion.

By contrast, nearby Arlington County chose to build for people rather than for cars. Instead of erecting a maze of highways, parking lots and sprawling malls, it concentrated growth around five rapid rail stations. It built up, not out, and gave growth a human face. It reserved land for parks, put in bike lanes and installed attractive pedestrian sidewalks. Today, Arlington is a showcase for "smart growth."

By focusing development around Metro, Washington D.C.'s commuter rail system, Arlington was able to grow while preserving green spaces, which are a key to mitigating pollution. It went for mixed use — retail, commercial and residential all together. So its hub areas thrive. Pedestrians and bikers mingle along wide, tree-lined sidewalks lined with markets, outdoor cafés and small

"We can't continue to accommodate the number of cars we have in the past. The choice moving forward is do you do more of the same and get what you got? Or do you change what you did and build to a new goal—a new culture?"

— Bill Lecos, Fairfax Chamber of Commerce

neighborhood parks — a stark contrast to the fortress-like profile of Tysons.

"They've had an explosion of development in the [Arlington] corridor over the last 30 years," says Stewart Schwartz, president of the Coalition for Smarter Growth. "They've had tripling and quadrupling of the number of residents, the number of jobs in the corridor, and it's all been achieved without an increase in traffic."

By building up rather than out, smart growth reduces the amount of land that we pave, thereby preserving forests and farms. With fewer hard surfaces, there's less stormwater runoff. Water can seep into the ground, filtering out contaminants before it reaches streams and rivers.

Today, places like Tysons are rethinking their growth strategy. They're turning to smart growth with its focus on rapid transit, green spaces and compact development. "Two-thirds of the people prefer the new, more compact model of development," says Bill Lecos, CEO of the local Chamber of Commerce. "When we asked them why they liked it better than the old suburban model, it came down to a matter of how they moved around [and] what they did when they got there."

Discussion Questions:

1. What are the characteristics of smart growth? People talk about "high-density living" and "mixed-use development" as key traits of smart growth. Expand on what those ideas mean. Can you cite examples of these traits in your own community?

2. Arlington County used mass transit as its "spine for development." Why is it smarter to grow communities around mass transit rather than around cars and highways? Who benefits from this change?

3. What problems emerged from unplanned growth at Tysons Corner? Why have business leaders at Tysons Corner chosen a new development strategy?

4. Compare and contrast your community with Arlington's smart growth and the uncontrolled growth at Tysons Corner. How does your community compare? What steps could be taken in your community to organize its development to reduce conjestion and to protect the environment? What can you do and who can you contact to start making those changes happen?

The Challenge of "Poisoned Waters" —continued from page 1

invisible. Contaminants pervade our lives. Harmful chemicals exist in everyday consumer products from home cleaning agents to the pesticides and herbicides that we use on our lawns, to personal care products like toothpaste, deodorants, shampoos, certain soaps and discarded pharmaceuticals. When it rains, stormwater runoff from roads and highways carries a toxic cocktail from our trucks and cars, our farms and rooftops, our driveways and parking lots into our rivers, streams, lakes and bays.

Add to that the enormously damaging runoff from agricultural operations across the country, primarily massive industrial-scale cattle, hog and chicken-raising operations from the Atlantic Coast to the Midwest, from the Rust Belt to the Sun Belt. The runoff from manure piles carries not only bacteria and e coli into our waterways, but also excess nitrogen and phosphorous, and they spawn the dead zones which suffocate crabs, oysters, fish and other species. Some experts call agriculture the largest single source of polluted waters in America.

The third major challenge comes from economic growth and the sprawl of development — millions of people crowding into the land that lies close to our major waterways and paving over thousands of acres of forest and farmland. Three quarters of America's population live within 50 miles of some shoreline. That concentration not only causes gridlock and ugly sprawl, but it spells disaster for Mother Nature and the quality of our water, unless we learn how to mitigate the impact of so much unchecked growth.

Solutions do exist. Local communities have forced cleanups at old industrial sites. Rivershed coalitions are recovering natural habitat for endangered species. Grass-roots groups have curbed uncontrolled growth. Suburban counties have adopted Smart Growth strategies to reduce gridlock and pollution. Others have tackled the difficult issue of better land use to protect the environment. Scientists are probing new chemicals to add to the list of banned toxins. So steps can be taken. Each of us has an important role.

But the message is clear: Time for action is urgent. We risk our health and our future survival if we continue to delay on controlling pollution and restoring our waterways. We cannot simply push this issue to the back burner. The EPA's Chuck Fox warns: "The decisions we make in the next 10-15 years are going to have a profound effect as to our planet's future over the next hundred years."

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For More Information

This discussion guide is available on www.hedricksmith.com and may be duplicated.

To watch Poisoned Waters Online and to obtain multiple other resources about the program and what you can do, visit www.pbs.org/frontline/poisonedwaters

To obtain a DVD copy of the program, contact PBS at 1-800-531-4727, or visit www.shoppbs.org

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POISONED WATERS

Photo by: Susan Zox

America's great waterways are in peril, facing a new wave of pollution that is killing fish, causing mutations in frogs and threatening human health. Our waters were supposed to be cleaned up by 1983, but they're still polluted by industrial-scale animal waste; legacy pollutants like PCBs; and a toxic brew of new compounds from our modern lifestyle. Join Correspondent Hedrick Smith from Chesapeake Bay to Puget Sound and find out who's responsible for the new pollution and what you can do about it.

The material in this discussion guide and companion DVD of video clips are drawn from the PBS FRONTLINE broadcast of "Poisoned Waters" on the evening of April 21, 2009. The ten topics described in this guide are intended to provide educational material and stimulate debate on critical challenges facing all regions of America today in cleaning up and protecting our precious waterways. If you want to see the entire "Poisoned Waters" documentary, please visit the website at www.pbs.org/frontline/poisonedwaters.

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