Threatened Waters

Turning the tide on pesticide contamination

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All forms of life need water to survive. Clean water is essential for human health, wildlife, and a sustainable environment. Yet, surface water (rivers, lakes, streams, bays, and oceans) and underground water supplies (groundwater, wells, and aquifers) are being polluted at unprecedented rates with pesticides, nutrients, metals, and other toxic chemicals. This contamination threatens human health and the environment.

Did You Know?

- Human health effects, including low birth weights, breast cancer, and low sperm counts are linked to herbicide-contaminated water;
- Frogs exhibit hermaphrodism when exposed to legally allowable levels of the herbicide atrazine in waterways;
- Dozens of pesticides and their degradation products contaminate waterways and escape regulatory oversight;
- Runoff from urban lawn pesticides contaminates local watersheds and stresses municipal water treatment; and,
- Children are not adequately protected by federal limits of pesticides in water.

Used to kill unwanted insects and plants, pesticides are widely applied to lawns and landscapes, playing fields and parks, home yards and schoolyards, gardens and farms, and sprayed over communities. The pesticides then run off or drift into surface water or move through soil (leach) into groundwater. Rain and snow melt washes pesticides into streets and gutters. From there, the pesticide-contaminated water makes its way to drains, which empty into water bodies. These chemicals can ultimately contaminate sources of drinking water. Federal and state standards allow contamination levels that have raised serious scientific controversy because of inadequate regulatory attention to: (i) mixtures of chemicals found in water; (ii) health impacts on especially sensitive population groups, such as children and the elderly, (iii) long-term low level exposure hazards; and, (iv) key possible health effects, such as adverse im-

pact on the body's endocrine system that controls normal development.

Pesticides are known to cause cancer, reproductive problems, birth defects, nervous and immune system disorders, and widespread wildlife impacts. The U.S. Environmental Protection Agency (EPA) states that, "By their very nature, most pesticides create some risk of harm to humans, animals, or the environment because they are designed to kill or otherwise adversely affect living organisms."

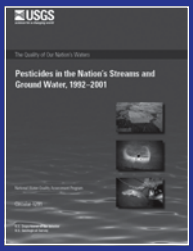
Studies of major rivers and streams document that 90 percent of all fish, 100 percent of all streams, 33 percent of major aquifers, and 50 percent of shallow wells contain one or more pesticides at detectable levels. Given known effects and deficiencies in the level of protection provided to the public, people and communities are shifting away from the use of toxic pesticides and adopting safer methods and materials.

Pesticide Contamination of Water

Results of the United States Geological Survey's (USGS) National Water-Quality Assessment (NAWQA) studies, from 1992-2001, show that pesticides are widespread in streams and groundwater throughout the country. USGS finds pesticides or pesticide degradates in one or more water samples from every stream sampled in the U.S. Not surprisingly, USGS also finds that the most heavily used pesticides are the ones found most often in streams and groundwater. The top 15 pesticides found in water are among those with the highest current usage today.

The amount of pesticides in water varies greatly, both geographically and seasonally, based on land use and pesticide use patterns. In agricultural areas, herbicides are the most frequently found type of pesticide in streams and groundwater. In urban areas, there is a greater prevalence of insecticides in streams than in agricultural areas. Pesticide concentrations also vary yearly, based on variations in rainfall, and seasonally, based on agricultural and residential practices. A 1991 study of watersheds in the cornbelt region found that concentrations of herbicides in the planting season are 10 times higher than levels before planting and after harvest. USGS finds that contamination of urban streams is more erratic than the seasonal variations in agricultural areas because homeowners apply pesticides throughout the year.

Pesticides in the Nation's Water



"At least one pesticide was detected in water from all streams studied and pesticide compounds were detected throughout most of the year in water from streams with agricultural (97 percent of the time), urban (97 percent), or mixed-land-use watersheds (94 percent)."

-USGS, 2006

Surface Water

Surface water, which sits above the surface of the earth, includes lakes, rivers, streams, ponds, and wetlands. Surface water is the drinking water source for approximately 47 percent of the U.S. population. Low levels of pesticides have been widespread in the nation's surface waters for several decades. More than 95 percent of samples collected from streams and rivers contain at least one pesticide. In a large sampling of streams throughout the country, USGS found 46 pesticides and pesticide degradation products in one or more samples.

A number of studies show that pesticides applied to lawns and gardens contaminate local streams. In a King County, Washington study, USGS compared types of pesticides found in urban streams during rainstorms (times of high runoff) to sales data from nearby home and garden stores. The three most frequently

Pesticides Frequently Detected In U.S. Streams (USGS, 2006)		
Chemical	**Use**	**Health Effects**
Streams in Agricultural Areas		
Acetochlor	Herbicide	Carcinogenic, Irritant
Alachlor	Herbicide	Carcinogenic
Atrazine	Herbicide	Carcinogenic, Reproductive, Neurotoxic, Endocrine Disruptor, Irritant
Cyanazine	Herbicide	Teratogenic, Reproductive
Streams in Urban Areas		
Carbaryl	Insecticide	Reproductive, Neurotoxic, Endocrine Disruptor, Organ Damage
Chlorpyrifos	Insecticide	Reproductive, Neurotoxic, Teratogenic, Irritant
2,4-D	Herbicide	Reproductive, Neurotoxic, Endocrine Disruptor, Irritant
Diazinon	Insecticide	Neurotoxic, Teratogenic, Organ Damage
Diuron	Herbicide	Teratogenic, Organ Damage
Prometon	Herbicide	Irritant
Simazine	Herbicide	Organ Damage, Irritant
Tebuthiuron	Herbicide	Organ Damage

purchased pesticides —diazinon, 2,4-D, and MCPP, which are linked to health effects ranging from nervous system poisoning to cancer— were detected in water samples from all of the study sites. USGS also found that four of the five pesticides that exceed recommended maximum concentrations are purchased by residents and applied in homes and gardens.

Groundwater

Over 50 percent of the U.S. population draws its drinking water supply from groundwater, which includes sources below the earth's surface, including springs, wells, and aquifers. A 1989 study found residues of 39 pesticides and their degradation products in the groundwater of 34 states and Canadian provinces. In most cases, groundwater has a lower incidence of pesticide contamination than streams because the water gets filtered slowly through soil and rock, allowing for degradation and absorption of the chemicals out of the water and into the soil. Once groundwater has been contaminated, it takes many years or even decades to recover, while streams and shallow water sources can recover more rapidly.

Wells

Public and private well water is drawn from groundwater sources. USGS finds that around 50 percent of well samples (taken primarily from private domestic wells) contain one or more pesticides. Those wells that tap shallow groundwater beneath agricultural and urban areas have the highest detection frequencies of pesticides. A study in the mid-1980s of well water by the chemical company Monsanto found the herbicide alachlor in wells affecting 100,000 people in 89 counties across the country. The study also found that 12.95 percent of the wells sampled contained detectable residues of other herbicides. Additionally, the herbicide atrazine, an endocrine disruptor and carcinogen, was found in the highest percentage of wells and in the highest amounts.

One in five wells in Dakota County, Minnesota tested positive for elevated levels of pesticides and other harmful chemicals in a 2005 study. The research was part of a voluntary multi-year study to track underground water quality in the area. Researchers found levels of nitrates and pesticides that exceed state safety standards for drinking water in 14 of the 68 wells tested. Forty-two of the wells tested show lower levels of contamination, while only 12 wells exhibit no contamination at all.

Drinking Water, Exposure, and Effects

In a typical diet, more water is consumed per kilogram of body weight than any other item in the diet. In a 2006 study, the national environmental group Environmental Working Group (EWG) documents 260 contaminants in the tap water serving 231 million people, including over 77 pesticides and pesticide degradates. More than half of the total contaminants (141) are completely unregulated.

According to USGS, insecticides in urban streams are a concern for downstream water suppliers and recreational users. Similarly, the high levels of herbicides in water in agricultural areas are of concern to residents drinking the contaminated water, and have already caused health problems for some communities. For example, in Kentucky, researchers discovered that in counties where drinking water is contaminated with triazine herbicides, such as atrazine, there are increased numbers of breast cancer cases. In southern Iowa, researchers found that the number of babies with low birth weights is linked to herbicide-contaminated drinking water. Additionally, a study in Missouri found that men in rural areas have lower sperm counts and quality than men in urban areas. The men with lower sperm counts and quality have higher concentrations of metabolites of the pesticides alachlor, diazinon, and atrazine in their urine, and the researchers believe that, "[I]t is likely that men are ingesting these chemicals through their drinking water."

Exposure to Pesticides through Fish Consumption

People are exposed to pesticides by eating contaminated fish. In an extensive USGS study, pesticides show up more than 90 percent of the time in fish samples taken from agricultural, urban and mixed land-use areas. In the study, USGS only tested for mostly phased out organochlorine pesticides, which accumulate in stream and lake sediments and persist for long periods of time. Many of these pesticides have been banned or restricted, yet still pose a concern in terms of fish consumption. Although USGS only tested for these chemicals, current practices also lead to fish contamination with other pesticides. Commonly used pesticides found to bioaccumulate in fish include the synthetic pyrethroid deltamethrin, 2,4-D, carbaryl, and the antibacterial agent triclosan. (See box on page 7.)

A study done in the 1980s found that children born to mothers who ate chemically contaminated fish from the Great Lakes over a six-year period prior to birth have a five-point lower IQ than the average child. The affected children also had lower birth weights and significant cognitive impairment.

Rural areas are not the only areas at risk. Many big metropolitan areas, such as New York City, draw their drinking water from sources that may be miles away and drain primarily from agricultural and rural areas that have high levels of pesticide use.

Antibacterial Agents Contaminate Waterways

Triclosan is a very common antimicrobial agent, linked to antibiotic resistance, that is used in a wide variety of antibacterial soaps, deodorants, toothpastes, cosmetics, fabrics, plastics, and other products. Most antibacterial liquid soaps contain triclosan, while antibacterial bar soaps often contain an analog, triclocarban. According to the U.S. Geological Survey (USGS), both triclosan and triclocarban have been found frequently to contaminate waterways, often in large quantities.

A 2006 study by researchers at the Johns Hopkins Bloomberg School of Public Health finds that after people flush antibacterial products down the drain, about 75 percent of triclocarban and 50 percent of triclosan survive treatment at sewage plants, ending up in waterways and sludge spread on agricultural fields. Lead author Rolf Halden, Ph.D. warns that the full life cycle of manufactured chemicals must be considered. The large quantities of triclosan effluents in waterways that do not get removed by wastewater treatment plants may cause a number of unforeseen hazards, such as production of dioxin when sunlight shines on the water, production of chloroform when mixed with chlorine from treatment plants, and production of resistant bacteria populations.

A number of studies have suggested that exposure to certain pesticides in drinking water is associated with immune dysfunction. A 1986 study found that women in Wisconsin who had chronically ingested groundwater contaminated with low levels of the insecticide aldicarb have significantly reduced immune response, despite the women not having any overt health problems. A 1999 animal study found that mixtures of three common groundwater contaminants —two pesticides and a fertilizer (aldicarb, atrazine, and nitrate)— at concentrations allowable by EPA, are capable of altering immune, endocrine, and nervous system functions in mice.

Environmental Problems Linked to Pesticides in Water

In addition to threatening human health, the widespread contamination of the nation's waterways with pesticides has pervasive environmental effects, some of which are only beginning to be understood. The following are a sampling of some of the documented detrimental effects of pesticides on aquatic ecosystems.

■ **Aquatic Microorganisms and Plants**: Herbicides have been shown to be especially toxic to certain aquatic microorganisms, disrupting the photosynthesis process necessary for ecosystem nutrition and survival. Microorganisms are very important in aquatic ecosystems, as they perform photosynthesis, cycle nutrients, and aid in decomposition. By negatively affecting microorganisms, pesticides in aquatic systems may wreak havoc on the balance of the ecosystem. Additionally, certain aquatic plants, especially algae (also a vital part of aquatic ecosystems), are highly vulnerable to the effects of pesticides in waterways.

■ **Pyrethroids and Stream Sediments**: A study of pesticides in bodies of water in the agriculture-dominated Central Valley in California found high levels of synthetic pyrethroid insecticides in stream sediments —levels toxic to freshwater bottom dwellers in almost half of the sampled locations. A follow-up study found high levels of pyrethroids in stream sediments in urban areas in California resulting from residential pesticide use. In the residential study, pyrethroids are found in every sediment sample, and in half of the samples they cause total or near-total mortality to *Hyalella azteca*, a small bottom-dwelling crustacean generally regarded as a sensitive "warning" species.

■ **Decline of Amphibians**: In an alarming trend worldwide, frog and salamander numbers are declining at a rapid pace, and many species are becoming endangered or extinct. In the U.S. alone, there are currently 21 amphibian species classified as endangered or threatened and 11 species waiting to be listed. Although the causes of the decline are not fully understood, scientists view pesticides as a likely culprit.

Atrazine: The Gender-Bender

The herbicide atrazine is the second most commonly used agricultural pesticide in the U.S. and a commonly used lawn herbicide. More than 76 million pounds of atrazine are applied in the U.S. annually. Atrazine persists in soils and moves with water, making it the most commonly detected pesticide in rivers, streams and wells. In a study of herbicides in surface waters in the midwest, atrazine exceeded EPA's maximum contaminant levels for drinking water in over 50 percent of the sites sampled.

Atrazine is an endocrine disruptor, which can interfere with hormone function and contribute to breast and testicular cancer, birth defects and learning problems. It can affect levels of testosterone, progesterone, estrogen and thyroid hormones. Studies show that exposure to atrazine, even at levels far below EPA's drinking water limits, demasculinizes tadpoles and turns developing frogs into hermaphrodites –animals with both male and female sexual characteristics. Several studies show that atrazine causes genetic damage, even at extremely low concentrations. A 2006 study finds atrazine mixed with other pesticides often found together in streams at ecologically relevant levels can retard development and growth, which can ultimately affect survivorship.

Scientists hypothesize that pesticides contribute to the decline in amphibian populations by altering their reproductive and endocrine systems. An endocrine disruptor is defined as a substance that causes an adverse health effect in an organism or its progeny consequent to changes in its endocrine function. Studies by researchers at the University of California Berkeley, led by Tyrone Hayes, Ph.D., show that atrazine levels in the environment, far below EPA's legal drinking water limits, demasculinize tadpoles and turn developing frogs into hermaphrodites —animals having both male and female sexual characteristics. (See discussion of regulatory standards on page 12.) The researchers state, "The current data raise the question of the threat of atrazine, in particular, and of pesticides, in general, to amphibians in the wild. Low-dose endocrine-disrupting effects, which have not been addressed extensively in amphibians, are of special concern in this regard."

Additionally, scientists hypothesize that pesticides reduce the food supply of amphibians. A 2005 University of Georgia study on pesticides and salamanders found that carbaryl, a commonly used insecticide linked to cancer and endocrine disruption, reduces survival and affects metamorphosis in two species of salamanders. The effect is likely due to pesticide-induced reductions of food resources, such as zooplankton – which decreases by up to 97 percent following carbaryl application.

Furthermore, research shows that mixtures of pesticides may be affecting frogs at very low levels. Dr. Hayes found significant harmful effects of pesticide mixtures on frogs, even though levels of the individual pesticides were thought not to cause harm and were 10 to 100 times below EPA standards. This finding suggests that current efforts to assess health risks of chemicals in isolation significantly underestimates their danger.

■ **Fish and Endocrine Disruption**: According to the U.S. Fish and Wildlife Service (FWS), "Endocrine disruption has the potential to compromise proper development in organisms, leading to reproductive, behavioral, immune system, and neurological problems, as well as the development of cancer. Effects often do not show up until later in life." A study of sex hormones in carp indicates that pesticides may be affecting the ratio of estrogen to testosterone in both male and female fish. At stream sites with the highest concentrations of pesticides, the hormone ratio in the carp is significantly lower, indicating potential abnormalities in the endocrine system. The authors of the study conclude, "[A]ssessment of sex steroid hormones in carp from United States streams indicates that fish in some streams within all regions studied may be experiencing some degree of endocrine disruption."

■ **Fish Kills**: Sizeable fish kills have resulted from pesticide use, and have often made news headlines, including the 1991 death of over one million fish in Louisiana after aerial spraying of the highly toxic insecticide azinphos methyl (Guthion) on sugarcane fields. In 1995, toxic concentrations of the insecticides endosulfan and methyl parathion along a 16-mile stretch of the Tennessee River in Alabama resulted in over 240,000 fish killed. In 2005, 100,000 to 300,000 black crappie fish died suddenly in Minnesota. Water samples show the presence of permethrin, the insecticide that had been used two days prior for mosquito control. Many fish kills go unreported or do not make headlines. Low-level pesticide poisonings of fish are rarely dramatic enough to be discovered, although they are more frequent and widespread than the larger fish kills. In 20 percent of fish kills, no estimate is made of the number of fish killed. In many cases, fish kills cannot be investigated quickly enough to determine the cause.

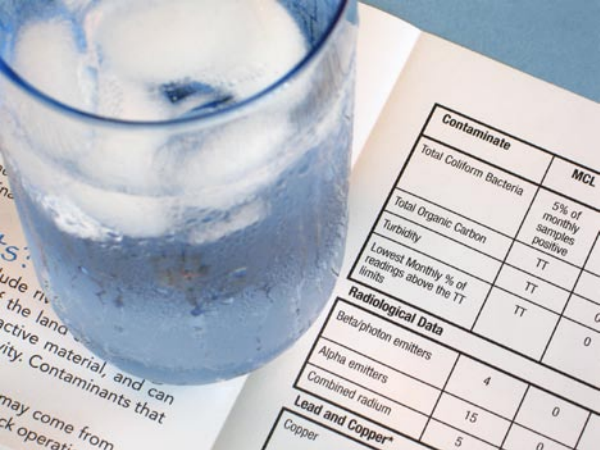
How Are Water Pollutants Regulated?

EPA has developed water quality standards and guidelines for pesticides that have been the subject of much criticism and scientific concern about their adequacy in protecting human health and the environment. There are two major laws that specifically regulate water quality: the *Safe Drinking Water Act* (SDWA) and the *Clean Water Act* (CWA). SDWA regulates water that is withdrawn from water bodies and CWA limits the pollution that is going into bodies of water. A third major law, the *Federal Insecticide, Fungicide, and Rodenticide Act* (FIFRA), regulates pesticide use and disposal.

■ ***Safe Drinking Water Act***: Passed by Congress in 1974, the purpose of the *Safe Drinking Water Act* (SDWA) is to protect the quality of drinking water in the United States, including all waters actually or potentially designated for public drinking water use, whether from above ground or underground sources. SDWA gives EPA the authority to regulate contaminants that "may have an adverse effect on the health of persons" and if "there is a substantial likelihood that the contaminant will occur in public water systems with a frequency and at levels of public health concern."

Specifically, SDWA authorizes EPA to establish maximum contaminant levels (MCLs) for water pollutants. MCLs are the maximum permissible level of a pollutant in water delivered to users of a public water system. In addition to MCLs, EPA sets non-enforceable maximum contaminant level goals (MCLG) for some pesticides.

■ ***The Clean Water Act***: The federal *Clean Water Act* (CWA), originally passed by Congress in 1972 as the *Federal Water Pollution Control Act* Amendments, establishes the basic structure for regulating discharges of pollutants into water bodies. Under CWA, EPA has broad authority to adopt standards "to



restore and maintain the chemical, physical, and biological integrity of the Nation's waters." Water Quality Standards promulgated under CWA protect all uses of the water— recreation, food procurement, groundwater recharge, aquatic life support, and domestic drinking water supply. The Water Quality Standards set under CWA pertain to discharges of pollution into the water—including point sources such as factories and sewage treatment plants, which are controlled through permits, as well as non-point sources, through total maximum daily loads (TMDLs). CWA also sets aquatic life support standards, which are set at levels that protect the biological integrity of all bodies of water—including rivers, lakes, streams, and wetlands. Under CWA, the National Pollutant Discharge Elimination System (NPDES) requires those spraying pesticides in a manner that discharges directly into water to obtain a permit. This requirement was upheld in a landmark ruling, *Headwaters v. Talent* (2001), but is targeted for repeal by federal lawmakers.

■ ***The Federal Insecticide, Fungicide, and Rodenticide Act***: The *Federal Insecticide, Fungicide, and Rodenticide Act* (FIFRA) of 1972 set up the basic system of federal regulation of pesticide distribution, sale, and use. FIFRA requires commercial users (farmers, utility companies, and others) to register when purchasing pesticides. FIFRA also authorizes EPA to conduct a pesticide re-registration program —a reassessment of the human health and environmental effects of pesticides on the market. The results of EPA's reviews are summarized in Reregistration Eligibility Decision (RED) documents. Part of the reregistration process requires EPA to evaluate the ecological effects of each pesticide, including the aquatic toxicity and effects on aquatic organisms. In 1996, Congress amended FIFRA and the *Federal Food, Drug and Cosmetic Act* with the *Food Quality Protection Act* (FQPA), which requires EPA to reregister and reassess tolerances (allowable pesticide residues in food) for food use pesticides. As part of FQPA, EPA must evaluate human exposure to pesticides through water in combination with all dietary and non-dietary pesticide exposure.

Failures in the Regulatory System

Despite the regulations under SDWA, CWA, FIFRA, and FPQA, there are many deficiencies and uncertainties that call into question the protection provided by the standards set under these acts. The following failures in the regulatory system threaten both public health and environmental integrity:

■ EPA has not established drinking water standards for all the pesticides found in water. Of the hundreds of pesticide active ingredients it registers, EPA (balancing consumer risk against water supplier cost) has established MCLs for only 24 pesticides. Of 76 pesticides analyzed under the National Water-Quality Assessment (NAWQA), human health criteria are available for only 42 pesticides and four degradation products. In USGS's 10-year study of pesticides in streams and groundwater, only 47 of 83 pesticides detected have established human health benchmarks.

■ Mixtures, synergisms, and breakdown products are not considered or being studied. Yet, pesticides in water usually occur in mixtures of several compounds rather than individually. More than 50 percent of all stream samples reviewed by USGS contain five or more pesticides, and nearly 25 percent of all groundwater samples contain two or more pesticides. Studies indicate that combinations of pesticides, which are not currently regulated, may exhibit additive or, in some cases, synergistic effects. Synergism results in a combined effect that is worse than the additive effect of single compounds. While the effects of a single pesticide in water may be known, the effects of that pesticide combined with other pesticides is unknown and virtually unstudied. Initial research has found that neurological, endocrine, immune, and developmental effects may show up only when pesticides are tested in combination, not individually.

■ Combinations of pesticides with other contaminants in water have not been taken into account. Combinations with nitrates and with disinfection by-products may have adverse synergistic health effects, including miscarriages and birth defects.

■ Certain effects, such as endocrine disruption and responses of sensitive individuals, have not been considered.

■ The effects of seasonally high concentrations have not been evaluated.

■ Breakdown products and contaminants in pesticide products are not typically factored into safety reviews. Breakdown products are compounds that result from pesticides undergoing changes while in the environment. There are thousands of possible breakdown products for pesticides, and only a few of these have been assessed in streams or groundwater. Some breakdown products are as, or more, toxic than their parent pesticides.

■ Research suggests that some pesticides may cause health and environmental effects at levels determined allowable by current standards. For example, when exposed to atrazine at concentrations considered acceptable by EPA and found in public water supplies, hamster ovary cells exhibit chromosome damage. Additionally, tadpoles exposed to below-allowable levels of atrazine develop sexual abnormalities including hermaphrodism. (See box on page 9.) EPA testing has failed to detect the significance of sublethal doses and has downplayed and dismissed studies that look at these impacts.

■ Violations of the Unregulated Contaminant Monitoring Rule (UCMR), which requires utility companies to monitor and report on the contaminants in their water, are considered "technical violations." National data monitoring

requirements fail to take into account those municipalities that do not report or monitor contaminants; therefore, current national figures are likely incorrect or skewed. Municipalities can also choose to only monitor at certain times, such as during low, rather than peak, flow, which skews the data further.

Fighting Preemption, Protecting Water Locally

To improve lake water quality and aquatic ecosystems, the Dane County, Wisconsin Board of Supervisors, which oversees 61 villages, towns and cities including Madison, passed a local ban on the use of lawn fertilizers containing phosphorus, including weed and feed products that contain fertilizers and herbicides, that went into effect January 1, 2005. The lawn chemical industry struck back with an unsuccessful federal lawsuit against the county, alleging that the ordinance is preempted by federal and state laws and violates the equal protection and free speech clauses of the U.S. and Wisconsin constitutions. The court, citing local authority to restrict fertilizers and protect local water quality, upheld the phosphorous ban.

Preemption refers to the ability of one level of government to override the laws of a lower level. In this case, it means that local authorities are prohibited from implementing environmental or health regulations that are stricter than state or federal laws. Currently, 41 states have pesticide preemption laws in place: only nine states and the District of Columbia uphold the rights of localities to restrict pesticides. Legislation similar to the Dane County ban has been introduced in municipalities in New York, Montana, Vermont, Rhode Island, and Connecticut. In Sarasota, Florida, town officials passed a resolution declaring a commitment to reduce pollutants from fertilizer use because of concerns about red tide in the Gulf.

Moreover, the UCMR does not include all unregulated contaminants, leaving out some pesticides that currently have no requirements to be monitored or reported. According to EPA, in 1996 almost 10 percent of municipal tap water systems (serving 14 percent of the U.S. population) violated federal EPA tap water treatment or contaminant standards, and 28 percent of those tap water systems violated significant water quality monitoring or reporting requirements.

Turning the Tide

Recommendations for change and what you can do to take action and protect your family

There are a plethora of studies documenting known contamination of waterways with hazardous pesticides linked to serious immediate and chronic health and environmental effects. At the same time, a review of the current situation related to water contamination finds that there is a regulatory failure to account for the full environmental and health impact of pesticide use patterns. Finally, as government focuses on health and environmental risk mitigation measures that allow uses based on false assumptions, no serious federal government effort is being put into curtailing pesticide use and assisting with the adoption of practices that do not pollute.

Key to effecting change in response to water contamination are community-based programs that replace toxic pesticides with safe and effective alternative non-chemical practices and products. Communities should adopt no-pesticide policies and practices that incorporate approaches to land management that are safe for the environment and public health. While government regulatory agencies tinker with acceptable levels of pesticides in water, based on inadequate information, communities can lead the nation in rejecting the ongoing contamination and support environmental and public health protection. Institutions in the community, such as schools, hospitals, and office parks, should adopt similar policies and practices. In addition, local communities should develop outreach programs and educate community members on the adoption of practices that eliminate toxic chemical use on their property.

Educate Yourself

The first step toward clean water is finding out what chemicals are on tap in your home. Here are some suggestions on how to find out whether there are pesticides in your family's drinking water and local waterways.

■ **Contact state and local agencies**. Ask your municipal water superintendent for the latest test results of your public water supply. If you use well water, ask your local or state health department if it offers free water testing. Call on your county or city to test local waterways for pesticides.

■ **Do online research**. In January 2006, the Environmental Working Group (EWG) created the National Tap Water Assessment Database, which includes a report analyzing more than 22 million tap water quality tests acquired from nearly 40,000 water utilities, serving people in 42 states across the country. Check out the database at www.ewg.org/sites/tapwater to find out what contaminants are in your community's water.

■ **Home pesticide water testing kits**. Test tap water for pesticides by purchasing home testing kits, found in home and garden stores or online. These tests are cheap, easy, and fast, and can alert you to the presence of certain pesticides. However, the panel of chemicals tested is fairly limited and not extremely accurate. Rarely can they tell you how much of a chemical is in the water, but they may be a good first step.

Home Water Testing Kits

■ PurTest® Pesticide Test Kit tests for atrazine and simazine, two herbicides that are very common water pollutants. $14.25, www.freshwatersystems.com or call 800-788-4825.

■ Pro-Lab Pesticides in Water Test Kit tests for atrazine and simazine. $9.95. www.safebeginnings.com or call 800-598-8911.

■ **Send water samples to a lab to be tested**. Some labs will test your water if you send them a sample. Look up labs in your local phonebook, and check out the box below.

Water Testing Labs

■ National Testing Laboratories, Ltd. The National Testing Laboratories offers a WaterCheck Water Quality Test with Pesticide Option, which tests for bacteria, heavy metals, inorganic chemicals, volatile organic chemicals, plus 20 additional pesticides, herbicides and PCB's. You collect water samples, ship them overnight to the lab, and they return the results. The kit can be ordered online at www.ntllabs.com/homeowner/index.html.

■ If you have a private well or use community well water, you can call your state Department of Natural Resources or your local or state health department and ask to have your well tested for pesticides, or for a list of local testing labs. Many health departments offer free water testing.

Protect Yourself

If you discover that your house's tap water is contaminated with pesticides, certain filters can be installed in your house to remove pesticides. The most cost-effective and efficient way to purify your home's water is to treat only the water you plan to consume. This is known as a point-of-use water treatment system. Many different devices for point-of-use water treatment are available. Some systems only improve the taste and odor of water, while others reduce pesticides and other contaminants. When considering a treatment device, always make sure to pay careful attention to the independent documentation on the performance of the device for the contaminants of concern. Make sure to carefully read the data sheets provided by the manufacturer. Many companies are certified with the National Sanitation Foundation (NSF), whose logo should appear on their data sheets. Examples of point-of-use water treatment systems that remove pesticides include:

■ **Reverse osmosis filters (also called ultrafiltration)**. Reverse osmosis filters are said to remove 99 percent of the toxic chemicals in water, including some pesticides. Reverse osmosis utilizes normal household water pressure

to force water through a selective semi-permeable membrane that separates contaminants from the water. Treated water emerges from the other side of the membrane, and the accumulated impurities left behind are washed away. However, the downside of reverse osmosis filters is that they use a great deal of energy and water. Reverse osmosis filters generally can be purchased for $300 to $600.

■ **Distillers**. Another device that will remove almost everything from water is a distiller. Distillers electrically heat water until it turns to steam; the steam then condenses and turns back into water in a separate chamber, leaving behind 99 percent of the contaminants. The disadvantage of distillers is that countertop models must be filled manually and they use a lot of electricity and may take several hours to produce one gallon of water. Distillers also do not remove metals such as lead and copper from the water. Distillers are relatively inexpensive, ranging from $100 to $300.

■ **Activated carbon (AC) filters**. Many AC filters remove pesticides in addition to chlorine, radon, trihalomethanes, and some inorganic chemicals. Check before buying to find out exactly what is removed. It is very important to be vigilant about replacing the filter cartridge because it will accumulate the contaminants it cleans from water and bacteria may breed in it. Effectiveness of a particular carbon unit is directly related to the amount of activated carbon it contains. Beneath-the-counter systems with dual filters typically cost from $100 to $200. The cheaper faucet-attachment models are only somewhat effective, so the extra money is worth it. Whole house systems can be installed as well as showerhead models, both of which will also decontaminate water used for bathing. Powdered activated carbon (PAC) filters are similar to AC filters.

Start Local

■ **Grow a natural, non-toxic lawn or landscape and get your town to do the same**. One of the most important steps toward reducing pesticide pollution of water starts with your own family lawn. If you elect to use a professional lawn care service to care for your lawn or landscape, select a company that employs trained technicians and follows organic practices designed to eliminate toxic fertilizers and pesticides. Beyond Pesticides has created a national database, Safety Source for Pest Management, of landscapers and service providers offering least toxic options. Go to www.safetysource.org to find providers in your state. Make sure to question the company on its practices, with specific attention to products used. If you decide to care for your lawn yourself, Beyond Pesticides offers a plethora of factsheets, articles, and information on least-toxic alternatives to help you learn easy ways to maintain a healthy, non-toxic lawn. Go to www.beyondpesticides.org/lawn/factsheets/ or call 202-543-5450.

Using Fertilizer: Less is more

Fertilize sparingly and wisely. Like pesticides, nutrients such as nitrogen and phosphorus are common pollutants of water. Studies show that nitrates combined with pesticides can have effects far more potent than the effects of the individual chemicals. Avoid synthetic, quick release fertilizers that are high in nitrogen. They weaken the grass, alter the pH, and promote disease, insects, and thatch build-up. Be sure to test the soil's pH and nutrient content to determine nutrient needs. For best results, use a slow release, organic fertilizer or compost once a year, usually in the fall, to increase the efficiency of nutrient uptake and reduce nutrient runoff and leaching. Compost is an ideal soil amendment, adding needed organic content to soil and suppressing many turf pathogens. Do not be misled by only the word "organic"—organic fertilizers can leach into water too. Look for the words "slow release" or "insoluble," or certification by the Organic Materials Review Institute (OMRI) on the label. Be aware of local phosphorus or nitrogen loading concerns.

■ **Eat organic food and push for organic food in your local schools and community programs**. When you buy certified organic food, you are supporting non-toxic agriculture, and therefore you are contributing to cleaner water. Organic food can be purchased at local farmers markets, organic and health food stores, and supermarkets. Look for the USDA organic label when purchasing food or buy directly from farmers who use organic practices. If you are interested in working to get organic food at your local schools, contact Beyond Pesticides for resources to help you get started.

Spread the Word

Once you have armed yourself with knowledge, take action! If you discover that your tap water is contaminated with pesticides, your neighbors will likely have the same problem. Bring along this brochure, water quality test results, statistics on your local watershed, information on filters, and action strategies. Consider creating a neighborhood coalition to work toward clean water and starting a letter-writing campaign to EPA, your state health department, and elected officials.

Now that you have made your lawn non-toxic, let the world know! Order a Pesticide-Free Zone sign from Beyond Pesticides and post it in your yard for all to see. If your neighbors are using toxic pesticides on their lawns, talk to them about the hazards of lawn chemicals and the availability of safe alternatives. Try a casual approach that does not make them defensive. For tips on how to effectively talk to your neighbors, go to www.beyondpesticides.org/how-to. Pesticide-Free Zone signs, as well as healthy lawn door-hangers (see at left), are available at www.pesticidefreelawns.org.

Take Action and Get Involved

■ **Join your local watershed association**. Many regions have watershed associations that work on stream testing and neighborhood stream clean-ups. They may already be working on pesticide issues, but if not, they may be willing to start, with your help. Suggest starting a committee that works on pesticides, and reach out to interested people in the community. The Clean Water Network (www.cwn.org), the River Network (www.rivernetwork.org), and the Campaign for Safe and Affordable Drinking Water (www.safe-drinking-water.org) all have local chapters that may be a good place to start.

■ **Join Clean Water Action (CWA)**. Clean Water Action is a national citizens' organization working for clean, safe and affordable water through prevention of health-threatening pollution. CWA has offices in 17 states and the District of Columbia. Visit www.cleanwateraction.org to learn more about clean water campaigns in your state and what you can do to get involved.

■ **Join local pesticide groups**. Beyond Pesticides maintains a national directory of groups working on pesticide issues at www.beyondpesticides.org/states. Not all areas have a local pesticide group, and some may not be working on water issues. Know that if you work on reducing pesticides in your community, it will ultimately help make the water cleaner and safer. Groups may be open to begin working on water issues if given data on local contamination.

■ **Join the National Coalition for Pesticide-Free Lawns**. Suburban lawns and gardens receive far heavier pesticide applications per acre than most other land areas in the U.S., including agricultural areas, making them a major

source of water pollution. Go to www.pesticidefreelawns.org to sign the *National Declaration on the Use of Toxic Lawn Pesticides* and join with others, including health care providers and elected officials.

■ **Start your own group**. If pesticide-related groups do not exist in your area, start your own! Work with concerned neighbors, parents, and community members and form your own group to work on local water and pesticides issues. Contact Beyond Pesticides for tips and factsheets on organizing at www.beyondpesticides.org/how-to/index.htm.

■ **Work to get your town to pass policies reducing pesticide use**. Work with your local government to adopt non-chemical practices on city land, and in and around schools, libraries, hospitals and buildings. Ally with water suppliers, who will reduce treatment costs with pesticide reductions. Examples of local pesticide reduction ordinances that have been passed in localities in California, Massachusetts, New York and Washington, as well as laws banning pesticides throughout Canada, can be found at www.beyondpesticides.org/lawn/activist/index.htm.

■ **Voice your opinion to EPA and elected officials**. Tell EPA that you want safe, healthy tap water that does not have any pesticides in it, and that you are concerned about the effect of pesticides in tap water on the health of you and your family. Contact the EPA administrator at www.epa.gov/adminweb/comments.htm or by calling 202-564-4700 with the message that every person deserves clean, pesticide-free water.

Contact your federal elected officials with your concerns about pesticides and drinking water. (U.S. Senators, www.senate.gov, and U.S. House of Representatives, www.house.gov.)

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Threatened Waters

Water is the most basic building block of life. Clean water is essential for human health, wildlife, and a balanced environment. Yet, water is being polluted at unprecedented rates, with pesticides, industrial chemicals, nutrients, metals, and other contaminants. Studies of major rivers and streams find that 96% of fish, 100% of surface water samples, and 33% of major aquifers contain one or more pesticides at detectable levels. As a result of pesticide contamination of streams, rivers, lakes and underground water supplies, drinking water is also widely contaminated. With a crisis in safety looming, steps can and must be taken to curtail pesticide use and adopt alternative practices and products to protect the nation's waterways.

Beyond Pesticides, working with allies to protect public health and the environment, is leading the transition to a world free of toxic pesticides. The organization is a national, community-based coalition of grassroots groups and individuals, bridging environmental and health concerns to: (i) stimulate widespread education on the hazards of toxic pesticides, and the availability of effective alternative pest management approaches; (ii) influence decision makers responsible for pest management to use safe methods through grassroots action; and, (iii) encourage the adoption of local, state, and national polices that stringently restrict pesticide use and promote alternative approaches that respect health and the environment.

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For more information to help stop pesticide contamination of waterways, or to request a fully cited version of this brochure, contact Beyond Pesticides at 202-543-5450, www.beyondpesticides.org/water. Or contact:

 100% post-consumer waste, union bug