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THE HIGHLANDS VOICE

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WVHC Spring Review

The three day Spring Review was held at Blackwater Falls SP April 14, 15, 16. Bird walks, canoeing trip, Dolly Sods hike, Canaan Valley tour, Nature Skool sessions, acid rain forum, presentation by Concerned Citizens for Alderson/Glen Ray, and a Sunday Board meeting made for a full weekend. The Summer Board meeting is scheduled for Saturday, July 22 (10:30-3:30) at the Woodlands Institute.

Acid Rain Forum

As scheduled, Rick Webb and Ned Helme presented an audience of about thirty people with a technical explanation of acid deposition and the political fall out this pollution has created.

Working through the University of Virginia, Mr. Webb gave a preview of a study on Virginia streams to be released in May. The physiographic characteristic of the areas studied by Mr. Webb's research team emphasized the soil type, geological structure, and climatic conditions that compose the geophysiology and its relation to surface water resources examined in the study. Many areas now classified in the sensitive range will soon reach their capacity to buffer the sulfur deposits which acidify the surface water.

The geologic clock has yet to influence the political debate. Center for Clean Air Policy spokesman Ned Helme advised that successful legislation of the future will allow communities to determine their own schedules. Based upon evaluations of the existing technologies used in coal fired plants and proposed adjustments, the Center projects modest increases in the cost of power for plants that reduce emissions. Legislation that remains flexible on methods of reducing polluting emissions and provides a graduated phase in period is believed to have an implicit incentive for conservation. Mr. Helme is optimistic that legislation will be passed by the present administration.

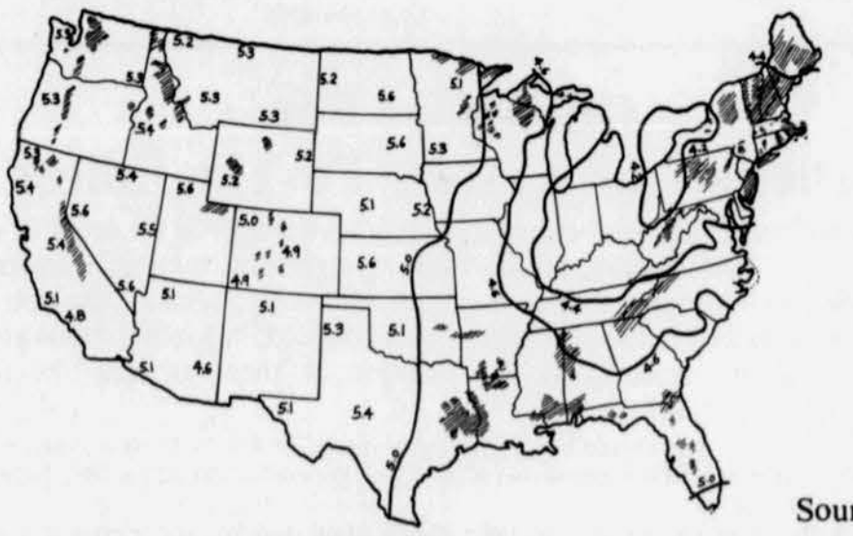
Concerned Citizens of Alderson/Glen Ray

The litigation team that has battled the Wood Guard treatment plant reviewed their struggle for the benefit of a small but intent group just before the dinner hour. The unsolved burden of extensive unpaid legal fees has not diminished the group's energy. Since early April, a temporary restraining order prevents the plant from operating.

Description of the toxicity of the chemicals involved — chormium cupric arsenate (CAC) dramatically underscored the importance for a permanent order to halt the plant's operation.

Many state news sources have carried the story of the Monroe County facility. Whatever the outcome of this particular permit process, exploration of the issues involved in DNR permitting provides insight into the operation of authoritative agencies and their response to citizen concerns.

A child's blue rain slicker (size 6) was left in the recreation room. Write Mary Moore Rieffenberger, Route 1 Box 253, Elkins, WV 26241.



Source: EPA

Areas Sensitive to Acid Rain

What happens to acids once they fall to earth depends on how strong the acids are and where they land. The average **pH** (chemical measure of acid strength) of *precipitation* is indicated on the map — the lower the pH, the stronger the acid. The **alkalinity** of the surface water is a key indicator of an aquatic ecosystem's *sensitivity* to acids — the darkened areas show regions where surface waters are most sensitive to acidity.

Canada

By Tom Agnew

A cursory look at global warming scenarios might seem to suggest that Canada, being a cold northern country, would emerge as a net winner from the Greenhouse Effect. Indeed, in many respects Canada will benefit. However, expected changes in global climate involve more than a simple rise in temperature. Global circulation models indicate that temperature increases will be accompanied by shifts in global wind and rain patterns. These changes could have major detrimental effects on Canadian agriculture and water resources.

In southern Canada, for instance, where most of the nation's fertile soils and population are located, severe droughts may well become more frequent, while increased flooding may occur in the north. And throughout the country, natural vegetation and forest stands are likely to become mismatched with ambient climate, making them ripe for stagnation and/or dieback.

Physical and Biological Impacts

Computer modeling studies of warming due to the Greenhouse Effect suggest that the future distribution of Canada's water resources will be significantly altered. If storm tracks and hence rainfall patterns move northward, as projected, water supplies in southern Canada are expected to decline significantly, due both to increased evaporation caused by warmer temperatures and to a possible decrease in precipitation during the summer months. Water levels in rivers, lakes, and reservoirs would be reduced.

Studies concerning the future Great Lakes water supply suggest that water levels may be considerably lower, with outflow through the St. Lawrence Seaway possibly decreased as much as 21 percent. Shipping on the Great Lakes would be adversely affected. Where water supplies are already contaminated, as in the Great Lakes, lower water levels would concentrate existing pollutants. Moreover, increased dredging of toxic-laden sediments in harbors and navigation channels would pose environmental problems.

Decreased water supplies generally mean increased competition for available water resources. In the populated region of southern Canada, heavy demands are already placed on our water supply for industrial, agricultural, and domestic needs. These demands are likely to increase substantially. In addition, lower water levels would seriously affect the generation of hydroelectric power. The shortfall would have to be made up through increased use of nuclear or thermal power generation, with its attendant increases in acidifying sulfur emissions.

Higher temperatures and longer growing seasons could significantly improve growing conditions for crops. The limits of northern agriculture, especially wheat production, are expected to expand considerably into areas such as the fertile river valleys of the Peace and MacKenzie Rivers in the Northwest Territories. However, in most of the north, soils are unsuitable for cultivation, and expansion of intensive agriculture will be limited for that reason.

(Continued on Page 7)

Groundwater Coalition

The legislative efforts of the Groundwater Coalition centered on the passage of two major environmental bills. These bills were H.B. 2200 the Groundwater Protection Act and S.B. 301, the Comprehensive Recycling Act. The Coalition, with major financial support from the Highlands Conservancy contracted with former state senator and gubernatorial candidate Mario Palumbo to act as its legislative coordinator.

The administration supported Recycling Act passed both houses and was signed into law by Governor Caperton. The Groundwater Protection Act supported only by the House of Delegates leadership suffered a much different fate.

An extensive 'state of the state' groundwater research project aimed at educating legislators, the media, and the general public was prepared by the Coalition. Each member of House and Senate was provided detailed information on groundwater usage, contamination and potential contamination in their own districts.

Speaker of the House Chuck Chambers (D-Cabell), Judiciary Chairman John Hatcher (D-Fayette) and Subcommittee Chairman Jim Humphreys (D-Kanawha) were instrumental in the passage of a strong groundwater bill in the House.

Speaker Chambers told the full

(Continued on Page 3)

LEGISLATIVE WRAP-UP

Part I
by Mario Palumbo

During the 1989 Legislative Session, West Virginia's environmental community was vitally interested in legislation proposing a comprehensive system of groundwater protection and legislation bringing recycling to West Virginia.

We failed on House Bill 2200 which would have brought to West Virginia strong, comprehensive program for the protection of our groundwater. The leadership of the House of Delegates was committed to a strong groundwater bill. Delegate James F. Humphreys was Chairman of the Subcommittee on HB 2200 and Delegate John W. Hatcher, Jr., was Chairman of the Judiciary Committee which considered HB 2200. Both of these Delegates and many others played key roles in attempting to bring strong groundwater protection to West Virginians. However, out of 134 legislators, Speaker Robert "Chuck" Chambers of the House of Delegates was our environmental hero. The remarks he made in support of HB 2200 on the floor of the House of Delegates were historic from an environmental standpoint. Speaker Chambers' leadership was critically important in causing the House of Delegates to pass HB 2200. That's the good news.

The bad news is that we hit a stone wall in the State Senate and were unable to even cause the Senate Energy, Industry and Mining Committee to place HB 2200 on the agenda for consideration. Accordingly, HB 2200 did not become law.

In 1988, the groundwater protection bill supported by the environmental community was not even reported out of committee. In 1989, the groundwater protection bill supported by the environmental community passed the House of Delegates. Therefore, with a little more effort by the environmental community, we may be able to bring a strong, comprehensive system of groundwater protection to West Virginia in 1990. The key in the future will be that public awareness of the importance of our environment is growing every day.

With respect to recycling, the Legislature passed, and the Governor signed, Senate Bill 301. SB 301 provides that a comprehensive recycling program for solid waste may be established in any county by the county commission. The bill further provides that if at least five percent of the voters file a written petition, a referendum will be held to determine whether the recycling program will be established in the county. From an environmental standpoint, having mandatory recycling in West Virginia on a county option basis is like hitting a home run. However, it is unfortunate that the bill does not apply to municipalities. Because of the support SB 301 had from Governor Caperton and his staff, the bill was enacted into law by the Legislature without any difficulty. Further, SB 301 contains a number of other provisions which will be of interest to environmentalists.

The 1990 regular Legislative Session is not far off. The environmental community must mobilize its supporters and the public and convince both the Governor and the Legislature that West Virginians demand and deserve a strong, comprehensive system of groundwater protection.

I want to express my sincere thanks to the many members of the environmental community with whom I worked in connection with the 1989 Legislative Session. It was both an honor and a privilege.

Part II
by Cindy Rank

In other legislative matters the Conservancy worked with the Department of Energy, newly appointed Commissioner Dials, and representatives of both the UMWA and the coal industry on the passage of Senate Bill 341 (a 200 page packet of surface mine regulations for the State of WV).

Although the regulatory package failed to remedy many of the major issues of our lawsuit against the WV DOE for failure to enforce the federal and state Surface Mine Acts, a few of our concerns were addressed by the final version of S.B. 341. Requirements for Inactive Site Status, Mandatory Enforcement, Ownership & Control Provisions and Bond Forfeiture were strengthened.

Perhaps most noteworthy is the section that requires the DOE to use forfeited bond money and the special reclamation fund to complete reclamation — including water problems — at forfeited mine sites. While this requirement may seem rudimentary (and, in fact, it's already explicitly included in the state Surface Mine Act), it has been and is being totally ignored. Neither forfeit bond monies nor the Special Reclamation Fund is being used for this purpose. Furthermore, it is clear that even if this provision of the law was properly implemented, the current bonding structure is totally inadequate for effective reclamation of either land or water problems at forfeited sites and the state has historically ignored its responsibility especially in acid producing areas where treatment of long term water problems is a costly venture.

This new section of the regulation will necessitate both a reappraisal of the present bonding system, and initiation of much needed change.

Ongoing negotiations with all parties have been scheduled and will attempt to deal with these inadequacies in the bonding system, and with the other unresolved issues both in the regulatory package and in the lawsuit.

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Guidelines For Articles And Letters To The Editor

The **Voice** welcomes any well-researched article or editorial on areas of concern, for example, river conservation, public land management, mining, Canaan Valley. General articles on outdoor activities — canoeing, hiking, caving, climbing — or on unusual places or special outdoor events are also needed. All submissions are subject to editing. To assure accuracy in the printing of these articles, the following guidelines have been established:

1) Whenever possible, articles should be typed, double spaced on 8½ by 11 inch paper, with at least one-inch margins on each side. If the submission is not typed, the author should use lined paper and write legibly on every other line.

2) Each article should be accompanied by the author's name, address, and telephone number. (Address and telephone numbers will not be printed with the article, but are needed so that the editor may contact the author for additional information, if necessary.) If the article is more than one page, the author's last name should be placed under the page number on each page.

3) Photographs related to the article are greatly appreciated. Black and white photographs reproduce best, but color photos can be used. Photographs will be returned, if the author requests them.

4) The last Friday of each month is the deadline for the issue published at the end of every month.

The **Voice** also welcomes letters to the editor expressing views on any of the topics covered in previous issues or on other environmental concerns. Letters to the editor should follow the guidelines for articles.

West Virginia Groundwater Overview

By Norm Steenstra
WV Groundwater Coalition

Water is our most fundamental resource. It affects every aspect of our daily lives. And yet, it is so easily taken for granted.

Nowhere is this most evident than in the case of groundwater. Simply defined, groundwater is that portion of our water taken from wells and springs. Groundwater supplies primary water needs to more than 53% of our state's population, yet no comprehensive laws protect this resource from abuse and contamination.

Thousands of state businesses ranging from Fortune 500 companies to "mom-and-pop" country stores utilize groundwater. Yet, we debate and eventually acquiesce to fears of economic impact by a few special interest groups. We acquiesce at the irrevocable expense of groundwater and a majority of West Virginians.

In rural areas of the state where the construction of surface water distribution systems are cost prohibitive, 95% of the population must depend upon pure and abundant groundwater. In addition to the more than 1,200 public water supplies that provide groundwater to large cities, small towns, trailer courts, businesses and schools, there are over 200,000 private wells dependent upon safe drinking water. Growing contamination of groundwater threatens safe use of this resource.

Current state health regulations require that public systems test for bacteria contamination on a quarterly basis and every three years for chemical contamination. NO TESTING REQUIREMENTS are in place for the more than 200,000 private well users in the State. As groundwater contamination increases, the public demand for expensive testing programs will result. Additional strain on our state budget will occur. Nevertheless, prevention will undoubtedly be cheaper than the consequences of neglect.

Groundwater contamination is caused by many factors; in reality, it may be said that nearly all forms of 20th century human activities are potential sources of groundwater contamination. An important fact to understand about groundwater is that unlike surface waters or air, groundwater, once contaminated cannot economically be returned to a naturally pure state. **We cannot clean up contaminated groundwater.** It is simply lost to further productive usage by our citizens and businesses. This will have a negative economic impact on our state.

Hazards to groundwater include chemical contamination from industrial and municipal landfills, mining, leaking underground storage tanks, oil and gas drilling, road deicing salts, sewage disposal systems and the excessive use of pesticides. The above is a pretty grim cross section of West Virginia life, however, there is some good news. Much of our state still retains the benefits of clean and abundant groundwater. And while much of the state has not reached crisis levels, several areas of acute concern exist. These areas in particular are the Ohio Valley, the Kanawha Valley, the Monongalia Valley and the ever growing Eastern Panhandle.

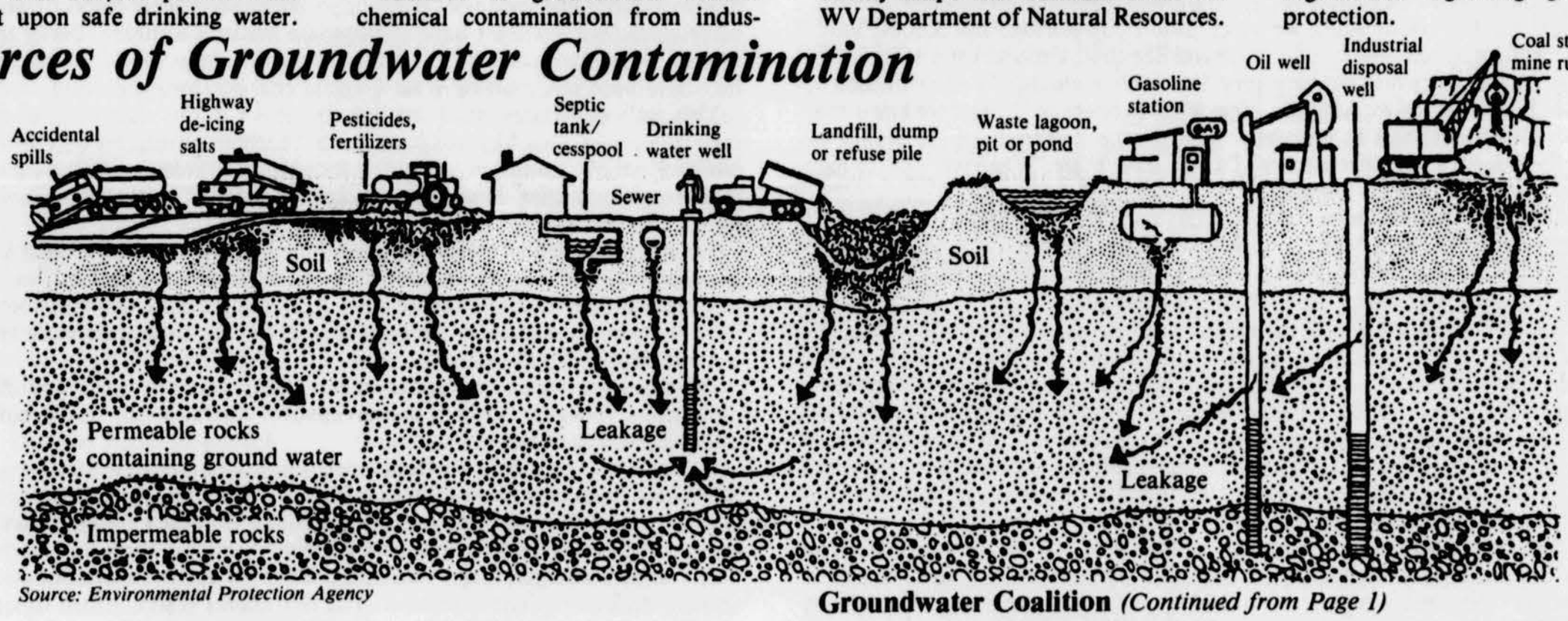
When the West Virginia Groundwater Coalition began its inquiry into the condition of the resource, we anticipated finding a few thousand potential sources of contamination throughout the State. Each member of the House and the Senate has been furnished with specific maps of their respective legislative districts. As new information was examined and various types of potential contaminators numbered, we continually revised our estimate upward to include over 100,000 significant potential contaminators of the state's groundwater. Over 99% of the data examined and plotted on the county maps was obtained from the WV Department of Natural Resources.

At this late date, there is very little we can realistically accomplish to clean up what is already seeping into the water table or what has been placed in the ground. Old landfills cannot be dug up and moved, chemical plants cannot be shut down and re-sited. Mining and petroleum activities must continue in order to help form our economic base. Yet the passage of a strong groundwater protection law that significantly minimizes degradation of our water quality must be accomplished to reduce the risk to our most fundamental resource. State government must provide effective, comprehensive protection and direction to safeguard the drinking water of a majority of its citizens by the passage of a strong Groundwater Protection Law. We have the rare opportunity to plan to avoid, rather than react to a crisis.

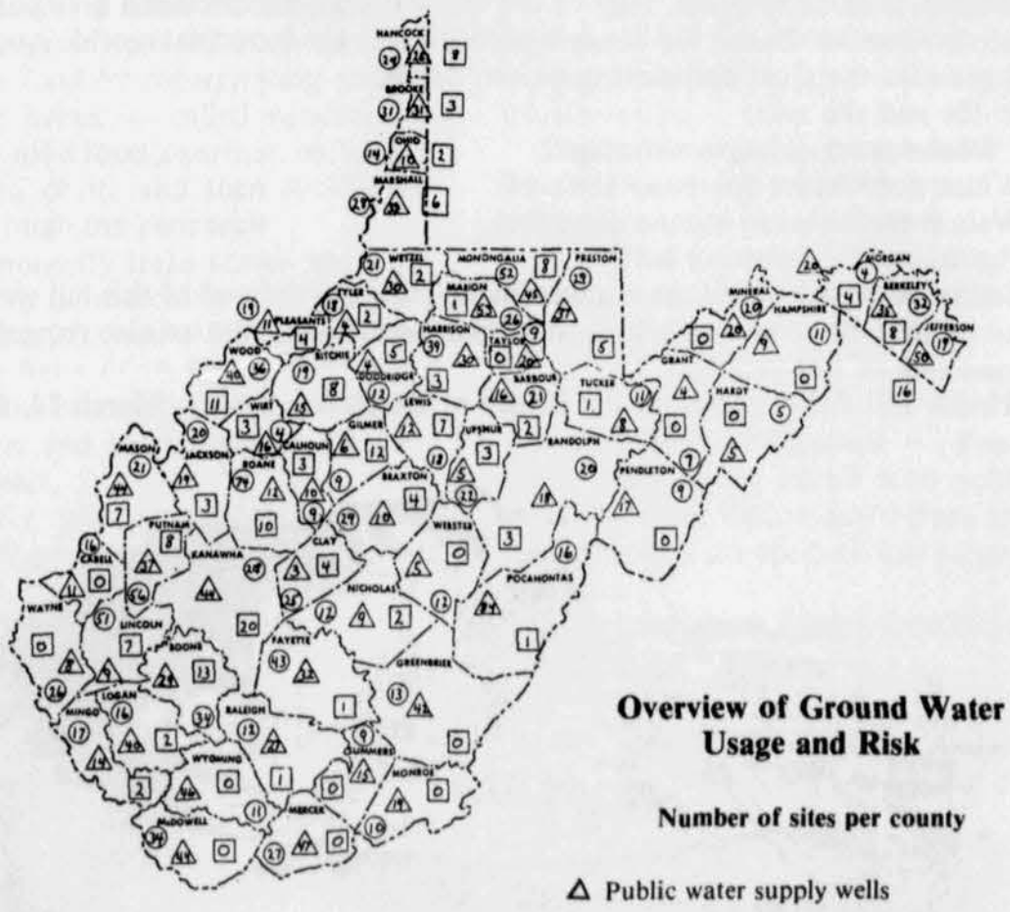
Such a law would require permitting agencies to carefully examine the effects of new landfills, industrial sites and other potential threats to our groundwater.

Responsibility is the operative word. Private citizens and industry must take the responsibility to construct facilities which safeguard the existing quality of surrounding groundwater and state government must begin to enforce the regulations regarding groundwater protection.

Sources of Groundwater Contamination



Source: Environmental Protection Agency



Overview of Ground Water Usage and Risk

Number of sites per county

△ Public water supply wells

○ Potential sources of ground water contamination

□ Confirmed ground water contamination

Groundwater Coalition *(Continued from Page 1)*

House that the Groundwater Protection Act was "perhaps one of the most important subjects that this body will address in the two years we will be here together." The day following those remarks the House passed the bill by a vote of 86-12.

The success in the House was not to be matched in the State Senate. Senate President Larry Tucker (D-Nicholas) double referenced the bill by assigning it to two committees — Energy Industry and Mining and the Senate Finance Committee. Although ample time remained (two weeks) for its consideration by the Senate there was no desire by the Senate leadership for its passage.

Negotiations continued throughout the remaining days of the session. Opponents of the bill led by the Coal Association arrogantly stated that they controlled the Senate and unless their version of the bill was agreed upon the bill was dead. The industry's version was an exact replica of the Moore Administration backed bill of 1988. This bill permitted groundwater contamination down to and in some cases, below the EPA minimum standards of drinking water. The bill also placed the burden of proof of contamination on the citizen rather than the polluter. Industry's bill contained no provisions for the protection of "existing" water quality or citizen suits.

The Coalition represented by Mario Palumbo, Cindy Rank (WVHC), Joyce Manyick (League of Women Voters) and Norm Steenstra (GC) could not agree to the Coal Industry's conditions. The Groundwater Protection Act died quietly in the Senate committees.

Great progress on meaningful groundwater protection was achieved during the session as evidenced by the passage of the bill in the House and a successful media and public awareness campaign. The progonosis of success in the 1990 legislative session is good. Our greatest asset remains the commitment and dedication of the House leadership with particular emphasis on Speaker Chambers obvious dedication to its success. Concentrated efforts on educating the Administration and the Senate leadership will be the major focus of the Groundwater Coalition for the 1990 Legislative Session.

Groundwater: H.B. 2200

The following is a transcript of a speech delivered by West Virginia House of Delegates President Chuck Chambers to the full House on Thursday, March 23, 1989. H.B. 2200 passed by a vote of 86-12. The bill later died in a Senate committee.

"Ladies and Gentlemen, I want to talk to you about the next bill we're taking up in second reading because I consider this to be perhaps one of the most important subjects that this legislature will address, perhaps in the two years we will be here together. This legislation is very important to me for two reasons. One perhaps isn't as significant as the other, but it's got my name on it. You've been here long enough — even you freshman — to know how tough it is to get a bill passed with your name on it. But obviously that is not the most important thing about this Groundwater Protection Bill. What is important about it is what it attempts to do.

I want to talk for just a few minutes because we've got amendments coming up. I'm not here to debate those amendments, but I want to make sure this house understands the importance of the judgments that we'll make today and tomorrow if this bill gets to third reading. I think this really is an important subject for all West Virginians.

First, let me tell you a little bit about what groundwater is. Groundwater is perhaps one of the most unique resources that we have in West Virginia of anywhere, for that matter, in the world. In West Virginia, we are tremendously dependant upon that groundwater. Consider the facts.

In West Virginia, over half of all our people and businesses depend upon groundwater for the water they use in their homes and in their work places. In rural West Virginia, 93% of our families depend directly on groundwater as the only dependable source of potable water that they have in their homes. They literally have no alternative. They don't have a water system, or anything else that will supply that need.

For most of them, we're talking about plain old well water. The kind of water that the generations of people who were here before us in West Virginia had to literally carve out of this rugged land by digging their wells deep within the earth to tap that resource. And now, many of our water systems today that are as modern as anything in the country, depend on groundwater as their primary source of water supply.

Groundwater is a bit unique; it not like some of the other resources that we talk about. You know, when we pollute the air, it blows away — it goes somewhere else. When we pollute the surface water, we watch it flow downstream and become someone else's problem. Groundwater doesn't travel like that. Groundwater stays under the earth in aquifers of which we have very little understanding. We can't watch it, we can't see how it flows; we can only guess what happens to it. And we know that because it stays there literally year after year in the hundreds or thousands or millions of years, we know that what we put in, stays there. When we contaminate it, that contamination has no place to go — it stays underground.

So what we do in establishing a policy for this resource is critical to the future of this country and to this state. Many states have already adopted legislation similar to that which you have before you. We've already taken this step of important standards for protecting groundwater in a variety of other areas.

For instance, when we adopted a hazardous waste program, one of the things this legislature approved four years ago was a standard for water quality, to in effect, prohibit the degradation of groundwater from hazardous waste sources. The same kind of protection now applies to solid waste and under the legislation that the previous legislature adopted, those standards are protecting the environment in West Virginia and we've got West Virginians all across the state who are reassured by knowing that this legislature took that step forward before to try to protect our environment and our health from the threat that solid waste poses.

One of the things I love most about being a West Virginian, is the way that we all profess to love and cherish the natural heritage that we were given. You know, we're not like people from other states or from the big cities. We take great pride in being able to take a walk in the mountains; to be able to talk about these beautiful streams that we have in our state; the wonderful forests; the way this land turns so lush and green in the summertime. The natural beauty of this state is something that we all love. We all profess that we want to protect us; that its a part of us.

We all know, probably more so than anyone else in this country that it was the natural environment of West Virginia that shaped the kind of character we have as a people. We have an independent spirit because the folks who came and settled this land had to struggle every day with the natural forces that we now ignore, for the most part, because we're in a modern society that controls so much of the environment.

When you look back at the history of this state, many of us have shared the sentiment that we've really been kind of a colony, perhaps like a third world country. Underdeveloped in terms of our own economy, but supplying raw materials of all kinds to make America what it is. And it troubles me a great deal that while we profess to have this tremendous love and respect for the natural environment, when you look at the history of West Virginia, we haven't kept that commitment. We haven't honored the land that we claim to love.

No doubt 80 or 90 years ago, someone stood on this house floor and complained that at the time huge mountains in West Virginia had all their timber stripped from them. Back at the turn of the century, this land that we call West Virginia, supplied the timber for a great deal of the industrial growth of the rest of this country. And in so doing, we literally stripped entire ridges of all the trees.

No doubt someone stood here and defended that practice and said, "You know if we didn't let them do that it will be bad for our business climate. It would cost us jobs if we require, as we do now, that clear-cutting be restricted to just a few acres at a time so that timber can grow again some day."

No doubt we watched the streams fill with siltation and erosion that occurred because the West Virginians who were here in that generation couldn't say no when the time came to regulate the practices in the timber industry.

Look at what has happened to this state with the previous generation's inability to deal effectively with the coal industry. Acid mine drainage; subsidence — we literally have places in West Virginia where people's homes are sinking because the people who were here before us making the decisions we make now didn't have the foresight to say "We expect more from those who want to profit from these natural resources."

We are paying a huge price today. In our budget this year, a good portion of the money in the Department of Resources is going to go to clean up the stream where someone else made money and left us with the problem.

The same has been true of heavy industry like the steel industry or the chemical industry. For years we allowed them to dump their chemicals or mixtures of chemicals into our streams, not understanding the profound effect that would have on the environment. And look at this state today — look at this valley today. We have one of the highest incidents of cancer anywhere in the country.

Look around this state at the number of toxic waste dumps that we have now discovered in a state that we all thought was clean and pure except for a little bit of trash along the roadside that we thought we could pick up anytime. Now we're faced with the monumental and horribly expensive task of cleaning up hazardous waste and toxic waste in this beautiful state.

Every generation has stood here, and by misperceiving, by misperceiving the cost they said they would rather pass the cost to the future in the name of a better business climate today. We don't want to lose jobs by passing legislation or regulations that make it difficult for people to come and do business in this state even when it means taking those resources.

Imagine where this state would be if two hundred years ago we had the foresight that we've had in the last two decades to manage those resources — to insist that as a part of the cost of doing business in West Virginia, for the protection of all of us, we want you to comply with some basic environmental and health regulations.

Can anyone imagine a state, a land anywhere with more wealth than West Virginia? Imagine two hundred years ago had we had the foresight in this country to protect those resources, how much of that wealth would still be here in West Virginia.

We wouldn't see huge tracts of land carved up as they were by the timber industry of previous decades leaving us with the social and economic costs of trying to restore our forests. We wouldn't have in this state millions of dollars being spent now to reclaim abandoned mine sites, while we watch the huge profits of many billionaires that have been made off of West Virginia coal go somewhere else.

This isn't an indictment of the industry that's in this state now, because I think they care about what happens here just as much as we do. But they suffer from the same misperception that we have too long suffered from in West Virginia and that misperception is that these problems can be avoided — that they can be put off. Folks, they can't.

What we decide here today will determine who pays that cost. Will it be the next generation — the kids sitting up in these galleries who will be here, we hope, in the next three decades trying to make a living, creating a place they call home. Will they have to be concerned about being able to get water from their wells or from their cisterns that isn't polluted?

What we are trying to decide, in my judgment, transcends any discussion of philosophy. There is nothing conservative or liberal about this debate; certainly nothing partisan about it.

In closing, I want to quote from a poem by a Republican whom I greatly admire. She's been an executive committee woman for probably 30 years in the west end of Huntington; she's a staunch conservative and as hard-core a Republican as I can imagine. But even more than that, she's a West Virginian through and through.

She understood years ago what this debate is about today. She wrote a poem about it and I can't recall all of it. The first time I read it which was probably 10 years ago, it stuck with me. Part of it I recall is that she discussed how puny man must continue to change his lifestyle according to the industrial world. And in the end she asks the most pertinent questions of all.

In the end she asks:

"What agency salvages wreckage?
Which accountant computes the cost?
Were it measured in human equations,
Has humanity gained or lost?"

Today as we talk about these amendments, and the passage of this bill tomorrow let us be sure that when we talk about the economic cost, that we also remember the human side of this equation."

(House Bill #2200 passed in the House of Delegates, Friday, March 24, 1989).

Food Safety

The Housefly — A Dirty Story But Someone Had To Tell It

By Arthur Whitmore

The housefly is such a familiar sight that you swat one away from your sandwich without a second thought. But while the fly looks innocuous, it is one of our most *dangerous* enemies.

Bacteriologists tell us the housefly's global distribution and disease-carrying capability make it a real international superpower when it comes to transmitting human illness. From time immemorial, says Dr. Bonnie Rose, a USDA bacteriologist in Beltsville, Md., the fly has transmitted a wide variety of disease around the world. In the category of foodborne illness, these include dysentary, salmonellosis, typhoid fever, cholera and some parasitic diseases.

The reason is simple. "The common housefly and a number of its 'cousins' are famous for their filthy habits," says Dr. Rose.

Born in Filth. A housefly begins its life in filth. An adult female seeks out fresh manure, garbage or fermenting vegetable waste in which to lay its eggs.

The female deposits a hundred or more eggs in one batch. She may lay two to 21 batches during her life, which could last a month or so.

Fly larvae — or maggots — hatch one or two days after the eggs are laid, and begin to feed on the material around them.

Within a week or two, the larvae have grown, shed their skins twice and burrowed into the earth beneath the garbage or manure. There they change into pupae, from which the adult flies emerge a few days later.

Spreading Disease. Adult houseflies begin their search for food within an hour or two after emerging from the pupal state. They are drawn by smell to human food and to garbage and feces.

A housefly eats using its proboscis — an elongated mouth organ which functions like a straw — to suck in liquified organic material. A fly can also eat solid food by regurgitating certain digestive juices — called vomitus — onto the solid food's surface, softening a portion of it, and then sucking it back through the proboscis.

As a housefly treks across waste or garbage in its search for food, it can pick up bacteria and other germs on its feet, the hairs of its legs and its probiscis. It can also ingest disease organisms and carry them in the digestive tract.

The fly can later deposit these organisms on human food, either from its feet, legs and mouth parts, or through its vomitus and feces.

Danger for Developing Nations. The housefly's disease-transmitting ability makes it an extraordinary public health hazard for many developing nations.

In countries where open sewers and privies are still common, houseflies and related flies continually infect the human population with disease.

The flies feed or breed in human feces, pick up disease organisms that have passed into the sewage from infected individuals, and then retransmit those disease organisms to local water and food supplies. Thus, the flies sustain an ongoing cycle of infection.

According to the U.S. Centers for Disease Control in Atlanta, much sickness in developing areas is due to flyborne bowel disease, as are a large number of deaths in children under two years of age.

Our Domestic Fly Problem. In the United States today, disease transmission by houseflies and related flies is limited in most areas by closed sewer systems and relatively good sanitary practices. Historically, though, we had our own problems.

In the horse-and-buggy era most Americans tolerated flies as an unavoidable nuisance. Why? Well, they were virtually inescapable. Many people had privies in the backyard, relied on horses for transportation and kept livestock.

Fly breeding was so intense in manure that ordinances were finally passed in urban areas prohibiting the use of privies or the keeping of livestock inside city limits.

Conditions improved for a time when automobiles replaced horses on the street, but the migration of people from rural areas and other countries to U.S. cities in the 1920s and 30s soon created new problems.

As urban living quarters became increasingly crowded, environmental sanitation reached a low ebb. Refuse accumulated and the fly problem again became acute.

Insecticides were then introduced to control flies, and worked fairly well for some years. But, as the insects developed resistance to the chemicals, it became increasingly obvious that sanitation and refuse control would remain the primary inhibitors.

Proper Refuse Disposal = Fewer Flies. It's now an axiom with public health workers that proper refuse and waste disposal are the best way to control flies.

In the past, open dumps contributed significantly to fly problems in the United States. Thanks to local and federal efforts over the past few decades, however, most U.S. towns and cities now dispose of refuse in sanitary landfills.

At a properly managed sanitary landfill, refuse is compacted and then covered with six or more inches of earth daily. This makes it impossible for flies to feed or deposit larvae in the refuse.

Refuse should also be collected from homes and other premises at regular intervals to prevent fly larvae in garbage cans and bulk containers from migrating out to pupate in the ground nearby. In general, garbage should be collected weekly from residences and daily from commercial establishments like hotels and restaurants.

Shoo Fly, Don't Bother Me. You can take steps to control houseflies in and around your home.

- **Use your garbage disposal for meat and vegetable waste.** A garbage compactor can help too. It packages garbage so as to reduce the fly's access to it.

- **Keep garbage and other refuse properly bagged and under cover.** Place all garbage in plastic bags. Cans should have tight-fitting lids. Keep the cans and the area where they're stored clean and tidy. And don't let garbage stand until it ferments. Ask for frequent pickups.

- **Disposal of animal excrement promptly and properly.** Bury or otherwise dispose of dog, cat and other animal feces. Don't leave pet food outside uneaten either.

- **Inspect your screens.** Both window and door screens should fit tightly. More tips: You need screens with at least 14 meshes per inch to stop houseflies, and screen doors should swing *out* so flies resting on the door don't automatically come in when you open the door.

- **Spraying.** To kill flies quickly inside the home, use a household aerosol insecticide spray. Buy a reputable brand and follow the directions carefully. Avoid prolonged exposure to skin or breathing large amounts of the mist. Don't spray near an open flame, and take care not to contaminate food, dishes and food-preparation utensils and surfaces with the insecticide.

- **Preparing food.** While fixing and serving meals, keep food covered or in the refrigerator. If you're serving outdoors, plastic wrap can protect your food. A screened-in porch or patio can also protect your meal from hungry flies.

If, despite your best efforts, you see a fly land on the potato salad, scoop out that portion and toss it in the trash.

When all else fails, that's one sure way of saying "buzz-off" to what the fly can do to you or your family's health.

Arthur Whitmore, who holds a B.S. in science writing from the University of Maryland, has served for two years as a public affairs specialist in USDA's news division.

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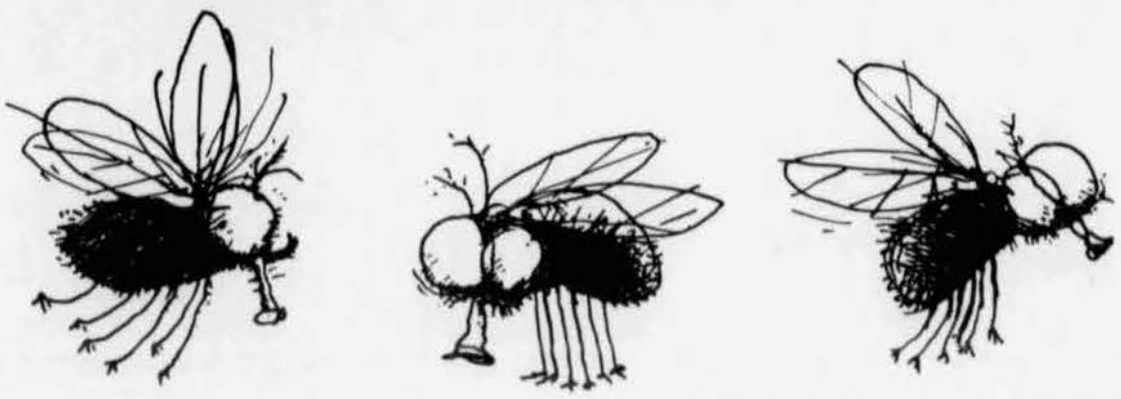

Monongahela National Forest Hiking Guide Now Out

Edition 5 of the WVHC **Monongahela National Forest Hiking Guide** is now available. This edition is bigger and better than ever, with 320 pages, 60 maps, 39 photographs, descriptions of 164 trails totalling 780 miles, a new section on ski-touring, and a full-color cover. The authors are Allen de Hart and Bruce Sundquist. Allen has hiked all the trails of the Monongahela National Forest over the past few years. Bruce edited Editions 1-4. The hiking community and the U.S. Forest Service provided the authors with trail reports and photographs.

In the U.S. Forest Service's planning process that led to the 1986 Land and Resource Management Plan, over 35,000 comments were received from the public. The gist of these comments is that the Monongahela is a "Special Place." And indeed it is. The hiking and backpacking opportunities it provides are among the best in the eastern U.S. The more outstanding areas are becoming known far and wide — Otter Creek Wilderness, Dolly Sods Wilderness, Flatrock Plains, Roaring Plains, Blackwater Canyon, Spruce Knob, North Fork Mountain, Shaver's Mountain, Laurel Fork Wilderness, Cranberry Back Country, Cranberry Wilderness, among others. This guide will help you get to know these and other special places in the forest.

Profits from the sale of these guides support a wide variety of worthy environmental projects in the West Virginia Highlands Conservancy.

To order your copy of **Monongahela National Forest Hiking Guide,** send $9.95 plus 6% sales tax for WV residents, plus $1.25 postage (book rate) to West Virginia Highlands Conservancy, P.O. Box 306, Charleston, WV 25321.

Proposing a Global Priority: Earth Day, 1990

By Denis Hayes

Earth Day — April 22, 1970 — was the largest organized demonstration in human history. An estimated 25 million Americans took part. Angry young women and men shut down 5th Avenue in New York, poured sewage on the carpets of corporate despoilers, pounded polluting automobiles apart with sledge hammers, and wore gas masks on the evening news. The U.S. Congress formally took the whole day off, as tens of thousands of schools and communities held environmental teach-ins and hosted other events across the land.

No town was too remote to be touched. No citizen was too timid or too radical, too sophisticated or too politically untutored, to find a role.

In the supercharged months that followed, the born-again environmental movement grounded the SST and passed a tough new Clean Air Act with only a handful of dissenting votes in both houses of Congress. Feeling its muscle, the movement defeated seven of a "dirty dozen" Congressmen, forced the military to halt the use of mutagenic defoliants in Southeast Asia, and helped pass a federal occupational health and safety act aimed at "in-plant pollution." On Earth Day 1970, the modern environmental movement leaped onto the national stage, grabbed the microphone, and demanded sweeping changes. The movement was, for a while, an unstoppable force. It helped to shape the values and priorities of a whole generation, and it fundamentally altered American politics.

Eighteen years now have passed since Earth Day, and much of the original vigor has faded. Environmental activists, scholars, lobbyists, and lawyers have achieved some wonderful victories during the past two decades, often against overwhelming odds. The world is a better, more healthy place than it otherwise would have been. Yet, few environmental victories can be viewed as permanent, and too many "solutions" have been piecemeal and ineffective.

Hundreds of local, state, and federal environmental laws have been passed. Tens of thousands of pages of regulations have been issued. Millions of pages of environmental impact reports have been prepared. Huge environmental bureaucracies have been established and institutionalized. But it cannot be seriously argued that the nation, or the world, is in better shape today than it was in 1970.

The 20th anniversary of the original Earth Day provides a superb opportunity to sum up all that we have learned in the last 20 years. It provides an opportunity to explore the ecological implications of new developments, from Star Wars defense to an information-based economy. It will offer a framework in which to reexamine the wisdom of past eras, and of diverse cultures.

Earth Day 1990 offers an opportunity to reach out to new constituencies; to build alliances that transcend boundaries — reaching across countries, cultures, and continents; to carry the environmental agenda to the far corners of the planet. Recent reforms in the Soviet Union and China have left these lands more open to environmental concerns. Numerous leaders in Africa and South America have begun to resist the use of their lands as open pit mines and toxic waste dumps.

The most critical environmental issues cannot be solved by any single country acting by itself. Even where the United States is the largest single source of a problem, such as oil depletion, carbon dioxide production, or ozone-destroying emissions of CFCs, America's contribution remains only a fraction of the global problem.

Japan, for example, ranks fourth in the world in carbon dioxide emissions, but less than one-third of the Japanese public is concerned about the greenhouse effect. Japan experienced the Minimata disaster, and it suffers much of the world's worst air pollution. Japan produces 10 percent of the world's CFCs, imports a huge quantity of exotic hardwoods from Southeast Asia, and continues to harvest whales and dolphins with little regard for international opinion. Internationally, Japan is about to become the world's largest donor of non-military foreign aid, yet it seldom takes into careful consideration the environmental effects of the projects it funds.

Environmental concerns are viewed as having little political significance by Japan's leaders, much as they were viewed by American officials in the late 1960s. A Japanese Earth Day — organized and controlled by the Japanese and geared to address their principal concerns — could fundamentally alter both the perception and the reality of environmental politics in that country. Japan's Environmental Agency recently issued a manifesto urging the nation to take a leadership position in international environmental protection commensurate with the nation's economic strength. The manifesto stated that "it is necessary to inculcate people from their childhood with knowledge and consciousness about the relationship of the environment with daily life."

Similar cases could be made for boosting emerging environmental movements in numerous other countries, including the newly industralized countries of East Asia, much of the European Community, India, the Soviet Union, Brazil, China, and Egypt. Of course, none of these lands would countenance the United States telling them what to do on environmental issues. But the mere existence of an international Earth Day might catalyze or strengthen effective indigenous organizations in these and scores of other countries in which environmental concerns still have limited impact.

Global solutions may require global cooperation. Past international agreements, such as those governing whaling, atmospheric nuclear testing, emissions of CFCs, suggest that there exists some capacity for nations to set aside parochial concerns and act on behalf of the global commons, once an issue generates a sufficient measure of international foreboding. A global Earth Day would be designed to create a context conducive to ecological statesmanship.

The Issues

Most of the fundamental problems of 1970 still plague us. Moreover, we now face a huge array of new, complex, seemingly intractable ills: Greenhouse gases heat up the atmosphere. The ozone layer becomes thinner. Deserts expand. Rain forests shrink. Oil usage skyrockets. Solar stock portfolios plummet. Agricultural pests become resistant to modern chemistry. Garbage barges navigate the world's oceans, searching in vain for a welcoming harbor. Beaches clog with styrofoam and lethal medical waste. Aquifers fall ever lower. Ground water reeks of industrial waste. Endangered species disappear — forever — at the rate of one per hour. Human populations explode, while urban slums implode. And the image of nuclear winter, with its concomitant extinction of vertebrate life, has left its indelible mark on the public consciousness.

Viewed properly, environmental concerns are gut issues: survival issues. *Homo sapiens* is uniquely of this world. We are designed for it, and are inextricably linked to it. As the Earth sickens, we are afflicted. If it dies, so will we.

The greatest strength, and perhaps the greatest weakness, of the Earth Day concept lies with the multifaceted nature of our environmental problems. This complexity is a source of strength because every community on Earth has some environmental problem — e.g. toxic wastes, firewood shortages, asbestos, pesticides, dam inundation, lead paint, surfeits of garbage, or desertification — in its own backyard. Organizers can more easily stir people to get involved in issues that affect them so directly, and which they can directly influence.

At the same time, these dozens of local issues can lead to a diffuseness that could dilute the impact of a global event. It is critically important that narrow issues are linked to broader concerns. For example, concerns over a local garbage dump should be linked to resources policy, recycling, and toxic wastes. People must understand that chlorofluorocarbons (CFCs), manufactured in the United States, that later escape from a junked refrigerator in Brazil, are destroying the ozone layer over Antarctica. Unless the context is carefully structured, participants and media alike may fail to communicate a coherent message.

Public Support

Public opinion polls find the average American places an extremely high value on environmental protection. Indeed, the average man-on-the-street appears to hold far stronger views than do many so-called environmental "leaders."

- Fifty-eight percent of the public thinks we spend too little on the environment; six percent thinks we spend too much.
- Fifty-nine percent thinks there is too little environmental regulation; seven percent thinks there is too much.
- And — according to a New York Times/CBS Poll conducted in July 1988 — 65 percent of the American public believes that environmental protection standards "cannot be too high" and that environmental improvement should be made "regardless of costs." Only 22 percent disagreed with this "Earth First/Deep Ecology" sentiment. When this "cannot be too high" question was first asked in 1981, 45 percent agreed with the statement and 42 percent disagreed.

Earth Day: 1990

The time has come to galvanize a new outpouring of public support for environmental values, and to enlist a new generation of activists in the environmental struggle. Toward that end, we should organize a *global Earth Day,* to be held the week of April 22, 1990, on the 20th anniversary of the original.

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Cheat River Run in the Rain

By Jean Rodman

We got a call about 10 minutes before we were to leave the house to drive down to Blackwater Falls for the Spring Review. Others were planning to bring along canoes and try a run somewhere. So we ran down and threw in the boating gear and jammed the canoe on the car and started.

The sunny weather didn't hold. By morning there was heavy mist and rain. We talked ourselves into doing a flatwater run on the Cheat, putting in at St. George and going downstream about nine miles. Everyone had good raingear. We stopped for lunch after seeing a Great Blue Heron and some ducks. By now it had stopped raining.

There are still signs of the great flood of 85 — cloth and metal in the trees, and old car carcasses on the banks. But the canoeing is very nice and the river moved along well. We saw no fish.

We actually got back in time to hear some of the afternoon talk and to get a hot shower and warm, dry clothes before dinner. Almost a first for Sayre.

Canada

(Continued from Page 1)

Alterations in regional and seasonal rainfall and evaporation are expected to have major effects on agriculture, particularly in the mid-latitudes, where soils may become drier and severe droughts more frequent. The grain-producing areas in the southern prairie provinces are especially vulnerable. The increased severity and frequency of drought, such as the ones experienced during 1986-87 and 1987-88, will pose the largest threat to Canadian agriculture.

Gradual changes in forest cover are also expected as the climate warms. In the Arctic, the tree line is expected to move slowly northward at the rate of approximately 100 kilometers per degree Centigrade of warming. The mixed temperate forests of the east are expected to expand, replacing boreal forests as far north as James Bay.

However, because of the slow process of forest succession, many existing stands of trees, including those now being planted under the reforestation program, will gradually be left outside their optimum temperature range, stunting their growth and inducing major diebacks. This problem may exacerbate the current dieback problems associated with acid rain, ozone, and other manmade pollutants.

Drier climates in southern Canada could also reduce tree growth and significantly increase the risk of forest fires. Warmer winters may seriously affect the stability of winter logging roads.

Greenhouse warming is expected to have a substantial and largely beneficial effect on northern Canada. Higher temperatures would greatly improve shipping conditions in the far north by reducing the amount of floating ice and lengthening the short summer season. Warmer temperatures would also be a boon to tourism and settlement.

Rainfall patterns are expected to shift northward, bringing significantly increased precipitation in some areas. Despite warmer winters, snow depths may be greater — bringing an increased threat of extensive flooding with the spring run-off. Storms could be more frequent and more severe.

There is also concern that slow but widespread melting of the permafrost will create an unstable foundation for roads, buildings, pipelines, and other structures. In addition, melting of the permafrost is likely to release significant amounts of the greenhouse gases carbon dioxide (CO_2) and methane to the atmosphere. And while snow depths may be greater, snow will cover less area for shorter durations, resulting in increased absorption of incoming solar radiation. Considered together, these two factors constitute a probable "positive feedback" mechanism which would reinforce the warming effect.

The anticipated warming would mean less ice cover on navigable waters, and this would substantially benefit shipping and the offshore resource industry in Arctic and coastal waters. However, there is concern that icebergs could increase as much as 300 percent, posing a major threat to offshore activities in the eastern Arctic and Labrador.

In the Great Lakes, reduced winter ice would extend the shipping season. However, this advantage is expected to be outweighed by the previously noted problems associated with lower water levels.

The Canadian Climate Program

Recognizing the potential impacts of climatic fluctuations and climate change on Canadian Society, Canada established, over a decade ago, the Canadian Climate Program (CCP) to integrate the efforts of various federal and provincial agencies as well as universities and the private sector in the field of climatology. The program is steered by a Climate Program Board, which provides guidance and coordination on a wide spectrum of international and national climate-related activities. The lead agency for this national program is the Atmospheric Environment Service (AES) of Environment Canada.

CCP climate impacts studies are being carried out to assess the potential social and economic repercussions of climate warming expected under a scenario in which atmospheric CO_2 levels are doubled over pre-industrial levels. Thirteen major studies have now been completed, and others are in progress. This work has identified specific areas of sensitivity in agriculture, forestry, navigation, power generation, fisheries, recreation, and tourism.

One noteworthy study examined the impact of climate change on agriculture in Saskatchewan. This work was done as part of a joint project with IIASA/UNEP (International Institute for Applied Systems Analysis/United Nations Environment Program/me). The study found that Saskatchewan could expect occasional drought years like that of 1961, with losses to the agricultural economy exceeding $1.8 billion and 8,000 person years. A shift to a warmer long-term climate would cause reduced spring wheat yields with losses of $160 million and 700 person years.

As a possible premonition to the most recent 1988 severe drought, the same study also indicated that there would be a major increase in the frequency and severity of droughts. Warmer climates would conceivably allow northward expansion of prairie agriculture. However, soils in this northern area are suitable only for marginal crops such as forage, and the potential economic benefits of such expansion are questionable.

Results of these studies are now being disseminated to the Canadian public through the *Climate Change Digest,* a new publication series initiated in 1987. Press releases announcing each issue have attracted considerable media attention.

The CCP also provides support for impacts workshops such as the joint U.S.-Canada Symposium on the Impacts of Climate Change in the Great Lakes Basin, held in Chicago in September 1988.

Canadian Research Activities

Numerous research projects are being pursued at Canadian universities and government agencies with resources provided by funds from various federal departments, from the Natural Sciences and Engineering Research Council of Canada (NSERC), which gives grants to universities, and from the CCP for research directed at improved climate monitoring and prediction. Recently, a climate research chair at McGill University has been funded jointly by the NSERC and the AES, and a chair will also be funded at Dalhousie.

Some of the more notable research activites are:

- Canada operates continuous air sampling stations at Sable Island (Nova Scotia), Cape St. James (British Columbia), and Alert (Northwest Territories) as part of the global monitoring of background atmospheric CO_2 concentrations being coordinated by the World Meteorological Organization (WMO). Samples are also collected at Mould Bay, Northwest Territories, for analysis by the National Oceanic and Atmospheric Administration (NOAA) as part of its program for Geophysical Monitoring of Climate Change. The CO_2 concentration measurements obtained from the analysis of the air samples are quality-controlled and added to the existing station data bases, with copies forwarded to WMO. These data bases are used for trend analysis and studies into regional and long-range sources of CO_2.
- Central to Canadian research into climate change is the ongoing development of an atmospheric general circulation model (GCM) at AES's Canadian Climate Centre. By early 1989, the first enhanced Greenhouse Effect experiment with this model should be complete.
- Scientists in Canada's Department of Fisheries and Oceans (DFO) are working with Swedish scientists to study the uptake of atmospheric CO_2 in Arctic waters and the uptake of freon gases in the Labrador Sea. DFO is actively involved in investigations of air-sea climate interactions in cooperation with various international programs.
- Research into past changes in the earth's climate is diverse and widely distributed among universities and government agencies across the country. The National Museum of Sciences has brought some of these study results together in joint publications on climate change in Canada since the last glaciation.

International Activities

Canada has long been an active participant in international activities related to climate change, both through its WMO and United Nations Environment Programme memberships and through major contributions to international meetings. Perhaps Canada's most notable role was hosting and organizing the International Conference on "The Changing Atmosphere: Implications for Global Security," held in Toronto June 27-30, 1988. This meeting attracted more than 340 participants from 46 countries, United Nations organizations, other international bodies, and non-government groups representing diverse sectors of society.

The conference called on the United Nations and its special agencies, governments, industry, educational institutions, non-government organizations, and individuals to take action to reduce the impending crisis caused by pollution of the atmosphere. It recommended an Action Plan for the Protection of the Atmosphere, which would be financed by a World Atmosphere Fund generated in part by taxes on fossil fuel consumption in industrial countries. Specific recommendations of the plan included:

- Ratifying of the Montreal Protocol on substances that deplete the ozone layer.
- Developing energy policies which will reduce emissions of CO_2 and other greenhouse gases.
- Collectively reducing CO_2 emissions by 20 percent of 1988 levels by 2005, through energy-efficiency and conservation measures and through use of cleaner energy sources.
- Increasing research funding directed to low-CO_2 and non-CO_2 emitting energy options including advanced biomass conversion technologies and revisiting the nuclear power option.
- Vigorously applying existing technologies to reduce emissions of acidifying substances, of substances which are precursors to tropospheric ozone, and of other non-CO_2 greenhouse gases.
- Introducing product labelling that will allow consumers to judge the contamination of the atmosphere resulting from the manufacture and use of specific commodities.

Conclusions

Predicted changes to Canada's climate due to global warming involve changes in wind and precipitation patterns as well as temperature. This complicates any attempt to assess impacts and reinforces existing doubts that Canada would be a winner from such warming. Although the exact details of these climate changes are not fully known, studies to date suggest that there will be major impacts on Canada's natural, economic, and social systems. In anticipation of these impacts, Canada has instituted a broad climate program to evaluate potential impacts and promote public awareness and discussion in Canada and internationally.

(Agnew is Acting Head, Canadian Climate Program Office.)

Earth Day, 1990

(Continued from Page 6)

The Agenda

At the core of the environmental agenda are some very basic values that seem to transcend cultures, ideologies, and politics. Aldo Leopold summarized his "land ethic" as follows:

> A thing is right when it tends to preserve the integrity of the biotic community. It is wrong when it tends otherwise . . . We abuse the land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect.

The environmental ethic must be understood to include not just land but also the air, the water, other species, and the interrelationships between and among them all. It must assume some specific goals, including:

- A sustainable society, built upon the efficient use of renewable energy and recycled resources.
- Human health, dignity, and freedom.
- Peace and social justice.
- Biological diversity.
- Respect for nature.

Actions should be evaluated not just in terms of their impact on this quarter's bot-

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NEWS BRIEFS

Wildlife Reels Under Oil's Impact

Biologist say spill could set records for loss of birds, fish and mammals.

By Malcolm W. Browne

As a vast sheet of oil soaks into the shorelines of Prince William Sound, scientists are staggered by the variety of animals placed at risk and fear the destruction may continue for years.

The oil tanker Exxon Valdez ran aground March 24 in the midst of one of the richest concentrations of animals in North America. For many of the species that pass through here, the Sound is crucial, and for many it came at the worst possible time.

As a result, the toll of fish, marine mammals, birds and even land animals that may result from the oil spill could eventually set a record. It is also possible, biologists say, that many species will get off lightly, and that a few, notably bears, which feed on carcasses of animals that may be among the spill's victims, may even benefit.

But the scientists gathered to study the disaster acknowledge that their experience with previous oil spills ill equips them to make predictions here. Some important factors in the current environmental emergency have not been encountered before, and few of the hundreds of specialists on the scene are willing to make predictions.

Although other spills have been larger than this one, none occurred in a body of water ringed by islands and relatively isolated from the open sea. The island enclosure has delayed dissipation of the spill, exposing animals to oil for a long period of time and allowing oil to soak deeply into beaches and sediments.

Chemists here reported last week that the crude oil in the spill, which came from Prudhoe Bay on Alaska's North Slope, has some characteristics that are particularly destructive to a marine environment. Several components of the oil are both toxic and long-lasting, and even after the oil has "weathered" in ocean water, it remains thick and resistant to bacterial or chemical degradation for years.

The Sound has a particularly diverse population of birds, fish and other animals, a result of the special subarctic habitat here that includes fresh water from melting glaciers and salt water, rocky coasts and sandy beaches, sheltered marshland and pine forests.

In the first week after the spill few dead animals were observed in the region.

By Sunday, an improvished animal hospital set up here to clean and care for oiled sea otters and birds was working around the clock.

Animals Most at Risk

But biologists say such rescue efforts can only save a minute proportion of the animals at risk.

Sea otters and diving birds, which live throughout the Sound, were the first casualties to attract notice, party because they are the most vulnerable.

At least 1,000 birds are already dead or dying. Of the many species of diving birds that inhabit Prince William Sound, all are at risk and two rare species, the yellow-billed loon and the merlet, a relative of the puffin, may have been dealt a heavy blow, ornithologists say.

The Sound is also home to about 15,00 sea otters, about 10 percent of the Alaska population, said Bob Hoffman of the Marine Mammal Commission, a Federal agency.

Since the otters have no blubber they rely on their fur as insulation against the frigid water. Even a small patch of oil on the animal's fur destroys its insulating quality and the otter soon dies of cold.

Sea otters have already begun to die; a dozen or more dead animals have already been gathered by scientists. Meanwhile, near the islands that dot the sound, doomed otters paddle listlessly. Their bodies will probably never be found, biologists said.

The same killing mechanism also operates against the ducks, loons, cormorants and other diving birds that have already died by the hundreds.

Bald and golden eagles feasted on the oil-soaked carcasses of birds, dooming themselves as well. When eagles and other birds eat oil-tainted food, their intestines become coated and can no longer absorb water or nutrients. The birds die of dehydration or starvation. After previous oil spills, the starved and dehydrated bodies of such birds have often been found to have stomachs full of food that could not be metabolized.

Threat to Herring

According to Dennis G. Haanpaa, a senior biologist of Alaska's Department of Fish and Game, the spring spawning of herring has just begun, and the oil may severely reduce this year's production.

Herring deposit their eggs in shoreline kelp beds and patches of eel grass exposed at low tide and therefore in the path of oil washing ashore. Oil kills eggs, and some of the most productive herring spawning areas are along coasts of islands like Knight and Montague that have been badly oiled.

Last year local fishermen harvested 9,625 tons of herring from the Sound. They earned about $12 million from the herring and herring roe, sold mainly to Japan, and the prospect of losing this year's income had aroused anxiety in communities bordering the Sound.

Immersed in Oil

Two types of commercially valuable salmon, "pinks" and "chums," are also at risk. Their larvae, which have been developing since last fall in tidal sediments, will emerge in the next few weeks, and many may find themselves immersed in oil. Salmon fishermen in Prince William Sound earned $70 million last year from a harvest of 14.9 million salmon. That is about 15 percent of the statewide harvest.

Some of the light components of crude oil, including benzene, dissolve in sea water fairly readily, poisoning the water. Among the many animals that may be affected are king crabs and shrimp. Fishermen harvested 48,422 pounds of king crabs from the Sound last year and 178,000 pounds of shrimp.

Oil poisons animals in a variety of ways, causing some to die of asphyxiation, some to starve and some to die by poisoning.

Ornithologists are appalled by the possibility of losing bald eagles and peregrine falcons. Both are endangered, and 5,000 of Alaska's bald eagles, the largest remaining group of these birds in the world, are concentrated in the Prince William Sound area.

Ornithologists are also concerned that the oil spill came just weeks before the peak migration period of late April and early May of huge flocks of hundreds of bird species. Two hundred nineteen separate species of birds have been recorded in the North Gulf Coast-Prince William Sound area, which is along the main Pacific route of northern-latitude breeders migrating to the northwestern limits of North America.

Of these species, 72 have been recorded in numbers exceeding tens of thousands, and 10 species number in the millions. And though the species have a high seasonal turnover, 181 have been recorded in the spring.

Death caused by oil could also await Sitka black-tailed deer, which inhabit the coasts of the Sound and many of the islands in the path of the oil slick. The deer may already be in trouble, said Keith Giezentanner, a wildlife biologist of the United States Forest Service.

Heavy snow late in the winter covered the forested feeding grounds of these deer on Montague and other islands, Mr. Giezentanner said, forcing the deer to live on kelp and other tidal vegetation. The snow cover in shaded parts of the islands is heavier this spring than normal making the deer especially dependent on kelp, and oil has swept over many of these kelp beds.

Mr. Giezentanner said the effect of this could not be predicted. But deer depend on bacteria living in their stomachs to initiate digestion of their food. Oil could easily kill these bacteria. Mr. Giezentanner said, in which case the deer would starve, even if they had plenty to eat.

Bears May Benefit

Ironically, there are some animals that might benefit from the deer's plight, Bears on the islands of Prince William Sound are just beginning to emerge from hibernation, and hungry bears relish deer carcasses when they can find them.

Some of the Sound's inhabitants will be spared because of natural resistance to oil, and others because they frequent areas unlikely to be contaminated by the oil spill, experts say.

The many species of whales that are beginning to arrive in the Sound with the coming of spring are believed to be generally immune to oil spills, as are porpoises, seals and sea lions.

Northbound migrating birds, including swans and geese, are expected to pass near the eastern edge of the Sound soon, but their normal paths take them well to the east of the contaminated region. Ornithologists believe these birds are probably out of danger.

But no one here can guess how severely the lingering effects of the spill may impair animal populations in the years ahead.

Tar balls and thickened oil are already working their way into marshes, ocean sediments and the deep layers of gravel along beaches. In the cold water, this residue is expected to decompose slowly, allowing it time to enter the food chain through plankton, crustaceans, molluscs and other organisms.

New York Times 4-4-89.

M.U. study center to be asked to study Greenbottom area

A Marshall University study center will be asked to study the Gen. Albert Gallatin Jenkins home and surrounding Greenbottom swamp to help a citizens group create a management plan for the site in Cabell County.

Members of the Greenbottom Society met Wednesday night in the President's Room at Marshall and voted to ask the Marshall University Center for Regional Progress to study the area, especially with an eye toward developing tourism, according to Clarence Moran, a board of directors member. Moran said he felt the chance the center will conduct the study is good.

Moran said the area, along the Ohio River, makes it a natural as an educational and cultural and nature conservatory which would give it considerable value as a tourist attraction. He also said the society recognizes the site has multi-use possibilities which are likely to include hunting, despite the society's opposition to it.

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tom line, or this year's financial statements. Rather, they must be judged on whether they are moving the world toward, or away from, these widely shared goals.

It should be possible to organize a massive worldwide event, perhaps enlisting hundreds of millions of people, in activities demonstrating widespread support for such values and objectives.

Earth Day 1990 should make it inescapably clear to the world's leaders that their "followers" are running out of patience.

If You Want To Get Involved

Earth Day 1990 is currently just an idea. If it finds fertile soil, it will take root and evolve organically. Ultimately, I would expect it to assemble a diverse international board of sponsors and largely autonomous organizations in scores of countries.

The central coordinating role might best be performed by an *ad hoc* group set up to catalyze the event and then dissolve. This would eliminate potential jealousies and turf wars with powerful existing environmental organizations.

If you would like to be informed as plans unfold, write to:

Earth Day 1990, P.O. Box AA
Stanford University, Stanford, California 94305

(Hayes, Chairman of Renew America and an attorney with Cooley, Castro, Huddleson & Tatum in San Francisco, was the National Coordinator of Earth Day 1970.)

EPA Journal Nov./Dec. 1988