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Protections Asked For Ten West Virginia Rivers

by MAC THORNTON

A coalition of twenty-one organizations has asked the National Forest Service to study and to support designation of ten West Virginia whitewater rivers as "Wild and Scenic" Rivers. The ten rivers are within the Monongahela National Forest, which encompasses a huge, mostly wilderness area of the Allegheny Mountains of Eastern West Virginia.

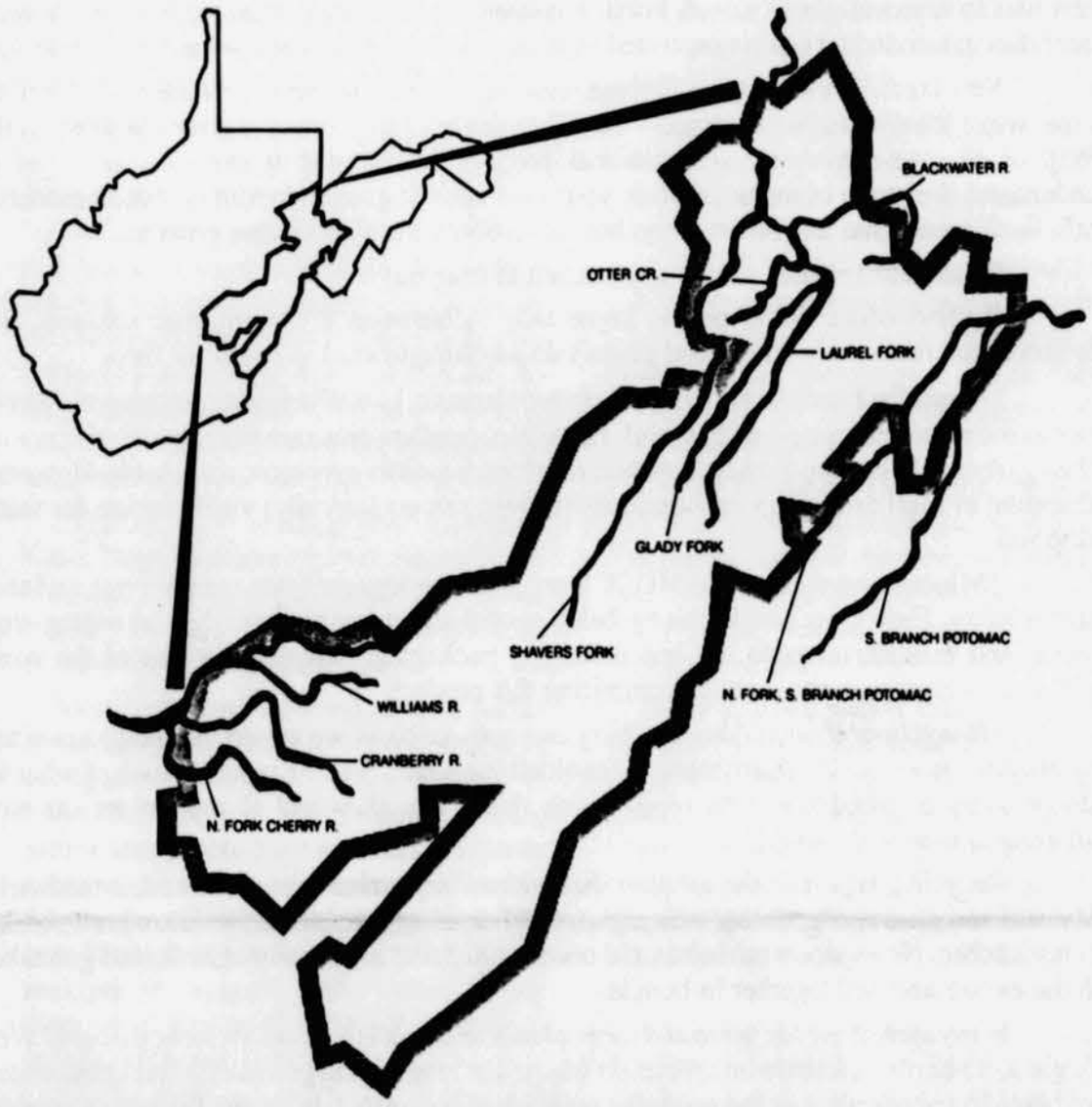
The request focuses on the remote, mostly uninhabited sections of the ten rivers. Included are two Potomac tributaries: the South Branch Potomac (Smoke Hole Canyon section) and North Fork, South Branch Potomac (Hopeville Canyon section). Also included are five tributaries of the Cheat River: Shavers Fork, Glady Fork, Laurel Fork, Otter Creek and the lower Blackwater River, and three tributaries of the Gauley River: Williams, Cranberry and North Fork Cherry Rivers.

All of the rivers have outstanding wilderness and scenic values, as well as adventure class whitewater recreation (Class III or better) and several have excellent fishing. Protection of the rivers under the Federal Wild and Scenic Rivers Act would require Congressional action, following appropriate studies and favorable recommendations by the National Forest Service. As of now, there is only one whitewater river designated as Wild and Scenic in the Middle Atlantic states: West Virginia's Bluestone River.

The coalition brings together a wide spectrum of conservation groups, including six national organizations: American Canoe Association, American Rivers, Inc., American Whitewater Affiliation, Izaak Walton League of America, National Wildlife Federation and the Wilderness Society. The leading environmental groups in West Virginia also support the petition: Sierra Club (West Virginia Chapter), Trout Unlimited (West Virginia Council), West Virginia Highlands Conservancy, and the West Virginia Wildwater Association. The other supporters include the large whitewater clubs in the Middle Atlantic states, notably the Canoe Cruisers Association of Greater Washington, which has provided the funding for the effort.

Led by Mac Thornton, representatives of the groups personally presented the 115-page petition (complete with color photographs, maps and other supporting materials) to F. Dale Robertson, Chief of the National Forest Service, and to Jim Page, Forest Supervisor of the Monongahela National Forest. This National Forest is due to commence its long term planning for river studies and protections in September. The coalition asks for studies of the subject rivers to be completed, and favorable recommendations sent to Congress, no later than 1991. Chief Robertson is a well-known supporter of the Wild and Scenic Rivers Act, having committed his agency to sponsor 200 rivers for desgination by the year 1993.

Copies of the petition can be obtained on an at-cost basis for $12.00 from Mac Thornton, 322 Tenth St. SE, Washington, D.C. 20003. Make checks payable to the "Canoe Cruisers Association."



Greenbottom Society Announces Proposal For Controversial Swamp

by TGS

The Greenbottom Society, Inc. has submitted a proposal to the U. S. Army Corps of Engineers, West Virginia Department of Natural Resources, and West Virginia Department of Culture and History containing recommendations for management and development of the Greenbottom Wildlife Management Area.

The 838 acre Greenbottom tract is the mitigation site for the Gallipolis Locks and Dam Replacement Project. The third largest wetlands in West Virginia, Greenbottom is the site of the pre-Civil war home of Confederate General Albert G. Jenkins which is on the National Register of Historic Places. The Clover site, a Fort Ancient Indian village is one of several archeological areas in the swamp. The C.O.E. and WV-DNR propose to develop and manage the site as a public hunting and fishing area.

According to Janet Fletcher, Acting Chairperson for the Greenbottom Society, "It is our opinion that Greenbottom has considerable benefits to the general public, not just sportsmen. The unique historical and environmental aspects of the site would

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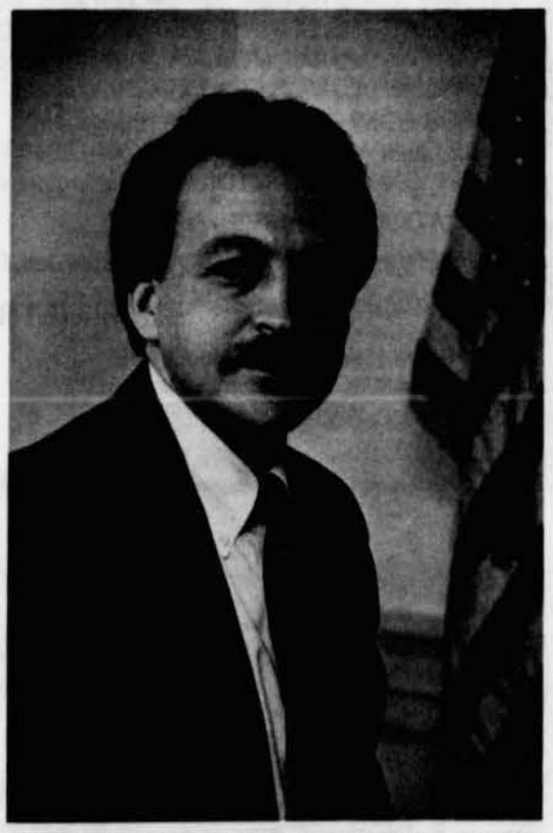

CHUCK CHAMBERS, Speaker of the House and member of the WVHC.

Statewide Goals

by NORM STEENSTRA

As expected, the 1st Statewide Environmental Convention held over the weekend of September 15-17 was a most historic occasion. 105 people, representing 52 groups from 40 counties and five neighboring states, met to arrive at a consensus of our state's environmental agenda for the 1990's.

A remarkable cross section of people attended the conference. Artists, teachers, government employees, farmers, sportsmen, scientists, nurses, social workers, students, miners, pipefitters, housewives, lawyers, politicans, carpenters, retired people, policemen and the unemployed were among the attendees. Each brought to the gathering their own unique perspective and concern.

Each participant was asked to view their own specific concerns as a symptom of a greater disease. The goal of the conference was to develop a state-wide perspective gleaned from many local issues and then to develop the environmental agenda.

Saturday, in what at times seemed like a marathon session, each individual or group representative was given time to air their own horror stories and concerns. A combination of anger, frustration and depression filled the room. People who had come to the conference thinking primarily of their own issues quickly identified with other frustrations.

The individual symptoms pointed to specific diseases. Common threads appeared with the presentation of each new concern. These threads included a strong dismay for the apparent lack of commitment and resources by state agencies to enforce existing laws and regulations and a critical need for a cohesive and comprehensive approach by state govenment to the environmental realities.

After the presentation of concerns, each participant chose a committee to join. These committees were Water, Solid Waste, Preservation and Protection, Land Use Planning, Mining, and Air Toxics. The working committees were charged with devloping priorities to present for consideration to the entire convention.

1990 Legislative Priorities

1. Passage of the WV Groundwater Protection Act.
2. Passage of a comprehensive Soil Erosion and Sediment Control Act.
3. Passage of a statewide Industrial Siting Law
4. Passage of admendments to Air Pollution Control Commission laws to permit State Regulations to be more stringent than federal standards.

(Continued on Page 6)

Recycling: Do It Now!

by JOYCE COOPER

Take a moment to think about your trash. Take a mental trip through your house and visualize each waste basket and garbage can. Now—imagine what you'll do this week if "they" don't pick it up and carry it "away".

"OK, I guess I could bury the worst of it at the back of my yard. I do have a low place in the flower garden where I could put the extra dirt." How about next week; and the next? Most of us would run out of space before we ran out of garbage. This is what is happening at landfills all over America!

In the northeastern United States, the average landfill life is only 5 years! New landfills are going to be hard to open. We're all more resistant to having one near us and laws regulating new sites have recently been passed. Public sentiment is on the side of these regulations; we want our future groundwater quality protected from seepage from who-knows-what in these dumps.

New landfills will have to be lined with impervious clay and vinyl liners. This will be expensive!! It's time to pay the price—literally—for our throw-away society. Progress, in the form of an ever-increasing gross national product, has caught up with us. To begin to understand the scope of the problem in your own county, give your county commissioners a call. Each county has a different story, but each county has this massive problem.

Waste management can be approached in four ways:

***Incineration:** Some people argue that incineration is the ultimate solution. But incineration creates toxic fumes and doesn't do anything toward saving fossil fuels.

***Landfills:** Landfills are increasingly problematic. Landfills pollute our groundwater—not to mention destroying tracts of land. Large metropolitan areas are running out of space for their garbage. As dumping space dimishes; recylcing becomes ever more reasonable. However, dumping in rural areas is an economically (though not ecologically) viable option for waste disposal.

***Minimizing waste:** We MUST learn to create less stuff that we use once and then throw away. Each of us can do this by being careful about our buying AND by asking retail stores and manufacturers to use less damaging packaging. Styrofoam is one of the worst offenders—please get vocal about minimizing this product.

***Recycling:** If we did have to bury our own garbage, we would use things again and again. And, if we could sell anything we couldn't use again, we sure would. Much of what we throw away is valuable and by reprocessing things like glass and aluminum we can save amazing amounts of energy.

Recycling is part of the solution that we can implement personally and immediately! My cans and glass and flexible plastic jugs (soft drink, detergent, bleach) go into a pretty basket in my kitchen. Newspapers go into an old cooper tub in the living room. Cardboard gets taken to the garage and tied together in bundles.

In my area, there are more and more places to take all this stuff. In some places in West Virginia, it's harder. I know some recyclers who make long trips to get rid of it. But I guarantee if we begin to recycle all over the state, the network of recyclers will grow! The new American Dream is garbage.

The West Virginia Recycling Act of 1989 has provided for recycling in each county if the citizens vote to implement it. Once petitions have been signed and the issue is put on the ballot and approved, the county Solid Waste Authority will put into effect a recycling plan which will include separation of at least three items from garbage.

Each county will have different ways to approach recycling, depending on their own needs and resources. It can be very simple to start with, but the ultimate goal will be county-wide pickup of trash and recyclables on a regular basis. There are many questions to be answered and logistics to be worked out, but one fact is clear: trash disposal will get more and more expensive.

Last year 50% of aluminum cans were turned in for reuse. 90% less energy is required to recycle aluminum than to process virgin ore. And at 53¢/lb. you can also recover "cash from trash!"

Old glass melts at a lower temperature than new ingredients for glass. So energy is saved by adding old to the new.

Plastic bottles have recently been added to recyclables in some areas. These throwaways are transformed into fiberfill (5 soft drink bottles make the fill for a ski jacket) and into resin for fiberglass products.

Old newspaper makes up a great amount of trash. Right now, there is more newspaper than people able to use it—but someone will develop a market. Encourage them to use recycled newsprint. One editor told us "We'll use recycled paper if they make us." Encourage your senators and delegates to draft a bill to that effect.

Rubber tires are another problem for landfills. But when shredded and added to ashpalt they make the roads last longer.

During last summer and fall, 1/4 of the waste going to landfills is yard waste (grass clippings, leaves, branches) which should be composted and returned to the earth. This is a project many of us can take on for ourselves. Compost bins can be erected in almost any yard and some towns have compost landfills, dedicated to organic waste.

The list goes on and on. Disposable diapers are causing great concern, not only because of the volume, but also because of possible bacteria contamination. Styrofoam trays and cups will last hundreds of years in a landfill. They are toxic to make and toxic to incinerate. We MUST reduce our use of styrofoam! Each of us should make this a personal goal.

Recycling is not the complete solution. But it is an important part of the way we will face the garbage problem in the coming years. And its like an exercise program, or eating right or stopping smoking. The first step is the hardest, but putting it off will not make it any easier and procrastination will not make the problem go away.

Recycle something today!

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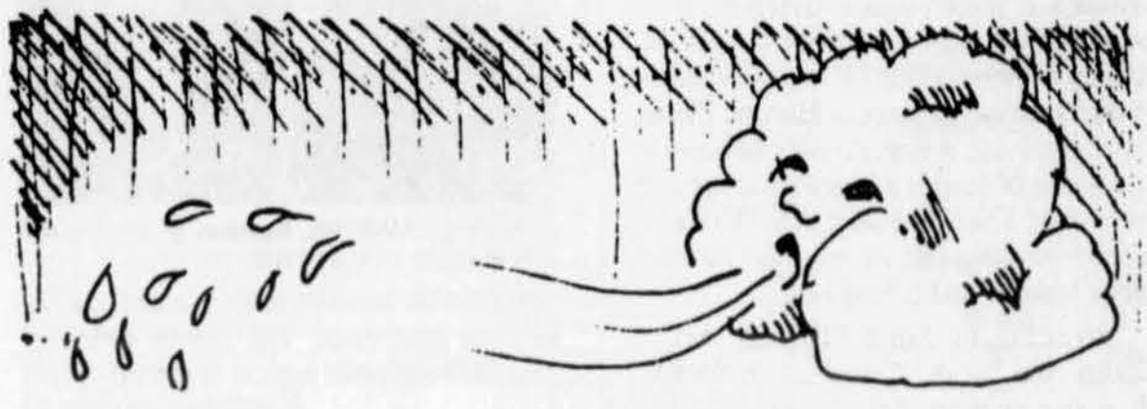


How Wild Is Today's World?

For 18 months, environmental policy analyst J. Michael McCloskey and geographer Heather Spalding pored over aerial navigation charts from the U. S. Defense Mapping Agency, scouting for what navigators abhor—the absence of landmarks. Focusing on areas they describe as "affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable," they ignored regions showing roads, settlements, buildings, airports, railroads, pipelines, power lines, dams, reservoirs and oil wells. Their labors yielded what they now term the first global wilderness inventory.

Constrained by time and the degree of resolution in the charts, McCloskey and Spalding, both with the Sierra Club in Washington, D. C., limited their tally to land tracts including at least 1 million acres. Even so, they found that roughly 18.56 million square miles—about a third of the planet's land mass—remain wild.

Antarctica, totally wilderness, leads the list. Following it are North America (37.5 percent wilderness), the Soviet Union (33.6 percent), Australasia, which includes islands in the southwest Pacific (27.9 percent), Africa (27.5 percent), South America (20.8 percent), Asia (13.6 percent) and Europe (2.8 percent). In general, the qualifying tracts form several broad bands: one sweeping across northern Alaska, Canada and the northernmost part of the Soviet Union; another running southwest from the far eastern Soviet Union through Tibet, Afghanistan and Saudi Arabia into Africa; an east-west belt through the Sahara; and another running north-south through the center of Australia. Wild patches appear in Africa, around the Amazon and along the Andes.

Warm deserts and temperate regions each account for 20 percent of the identified wildlands, tropics for 11 percent, mixed mountain systems for almost 4 percent and cold deserts for another 3 percent.

Less than 20 percent of the identified wilderness is legally protected from exploitation. Morever, report the researchers in the latest *Ambio* (Vol. 18, No. 4), "at least half of the remaining stock of wilderness is not self-protecting by virtue of its forbidding nature. It can slip away easily with little notice of encroachment as billions more are added to the human population." Other analysts have called for roughly tripling the areas protected in nature reserves. "The new inventory shows it's still not too late to accomplish this," says McCloskey.

Aquatic Viruses Unexpectedly Abundant

Using a high-speed centrifuge and a sensitive electron microscope, scientists have discovered that even pristine marine and freshwater environments harbor astonishing numbers of aquatic viruses.

The newly discovered viral concentrations exceed by up to 10 million times those previously recorded in aquatic environments, suggesting these minuscule microbes—some as small as 60 nanometers—represent a much bigger piece of the ecological puzzle than scientists believed. Moreover, although the viruses themselves appear incapable of infecting humans, they may create a health threat by injecting disease-causing genes into common bacteria.

Gunnar Bratbak and his colleagues at the University of Bergen in Norway subjected filtered water samples to 100,000 times the force of gravity and analyzed the resulting sediment. Among other findings, they determined that 1 teaspoon of North Atlantic seawater taken from 10 meters below the surface contained 75 million individual viruses. More than 1 billion virsuses appeared in a teaspoon of water from a nutrient-rich lake, they report in the Aug. 10 *Nature.*

"This is very exciting and important work," says biologist Mary E. Silver of the University of California, Santa Cruz. "With so many [viruses] there, it raises the question of what they are all doing."

Most seem busy infecting aquatic bacteria, possibly accounting for the immense and unexplained bacterial turnover rates in water, Bratbak says. Every minute, grazing protozoans gobble huge numbers of aquatic bacteria, yet studies indicate bacterial reproduction far exceeds these grazing rates. The new findings suggest that viruses, which can multiply in bacterial cells before killing them, may account for a third or more of aquatic bacterial mortality.

The implications of this covert infection frenzy are many, says Evelyn B. Sherr of the University of Georgia Marine Institute on Sapolo Island. For ecologists, it suggests that a surprisingly vast majority of the energy exchange in the aquatic food web occurs among organisms small enough to pass right through the sieves of the smallest filter-feeding animals. This could radically alter current models of aquatic nutrient cycles, which have focused on larger plankton as the food chain's first significant link (SN: 7/30/88, p. 68).

Sherr adds that high rates of virus-induced bacterial rupture might account for much of the free DNA found in seawater—scraps previously attributed to "sloppy feeding" by protozoan grazers.

Moreover, high viral concentrations might result in unusually high rates of bacterial evolution, since viruses can carry bits of bacterial DNA from one bacterium to another. On a positive note, this could result in the rapid emergence of bacteria capable of digesting toxic wastes after a spill. "On the other hand," Sherr says, some bacteria "might develop enzymes that degrade things like boat bottoms."

More worrisome, she says, is the possibility that genes for antibiotic resistance or increased bacterial virulence—common in the raw sewage flushed into waterways—may rapidly spread via viruses to benign bacterial strains.

And Bratbak warns that if laboratory-engineered bacteria make their way into waters teeming with viruses, they may be more likely to pass their altered genes to native bacteria. So far, scientists have looked only on land for such DNA donations and have used the negative findings to justify further releases.

— R. Weiss

A Grain To Weather Climate Change

Over the past 30 years, the world's "breadbasket" nations have helped feed an ever-growing number of mouths by using crop genetics, fertilizers and modern agricultural techniques such as soil drainage and pesticides. But the dramatic crop increases stemming from these measures "seem to be reaching their limits," according to a new report by the National Research Council in Washington, D. C. The planet's expanding population is moving onto former croplands, while crop soils themselves are eroding, salting out and acidifying (SN: 8/20/83, p. 127; 10/6/84, p. 212; 11/10/84, p. 298; 9/24/88, p. 204). Moreover, signs of a greenhouse warming point to greater climate variability in the future.

"Because of the limits to intensive agriculture and the probable climate changes," the report says, "arable cropping will have to expand onto increasingly marginal lands." And the best cereal for meeting this challenge, says the council's board on science and technology for international development, is a wheat-rye hybrid called triticale (tri-i-KAY-lee).

Though plant breeders hybridized this grain more than 100 years ago, it went generally unrecognized—and unused—until about the 1960s. By that time, cereal scientists had conquered its seed sterility and much of its disease vulnerability. Subsequent wide-scale testing and commercial introductions identified new problems: a tendency for low yields, shrieveled grain, poor adaptability to new geographic conditions, premature sprouting, late maturity (often after killing frosts) and poor baking quality (dough from triticale flour didn't rise well).

Further development through the '80s has improved the grain considerably, the new report says. Today, triticale appears "notably more resistant" than wheat to a number of major cereal scourges—including leaf blotch, powdery mildew, smuts, bunts and other fungal infections. Tough outer seed husks and bristles discourage bird predation. Yields match wheat's on good soil and can outperform the best wheats by 20 to 30 percent on marginal soils. Reserachers have developed varieties that mature over a range of season and day lengths. But triticale's biggest advantage may lie in its abilitiy to thrive where most cereals founder—on soils that contain otherwise toxic levels of boron or are saline, sandy, acidic, alkaline, cold, infertile, dry or mineral-deficient.

Although much of the triticale currently under cultivation goes for livestock feed or testing, this crop ultimately "could become a major staple" in kitchens throughout the world, the new report says. Researchers have already developed new lines that produce doughs that rise as well as those made from wheat flour.

Baby Bee Odor Lures Cradle-Robbing Mites

French researchers have identified a compound tempting to a troublesome bee parasite. One whiff of this scent, emitted by honeybee larvae, sends a female bee mite scurrying toward it. The team suggests the chemical "could become the basis of new approaches" to controlling the tiny pest.

When female mites finish dining on an adult bee, they follow their "noses" to a honeycomb cell housing a bee larva, preferably a drone (male). There they find male mites, which spend their entire lives in the cells. The mites mate, and both adults and offspring feed on the body fluids of the bee larva. Feeding mites disrupt the larva's growth, sometimes sucking it dry and killing it. And in adult bees, mite bites invite secondary viral infections.

Researchers hold the mite responsible for the loss of hundreds of thousands of hives in Europe and Asia. It has yet to cause significant damage in the United States, where it first appeared in 1987. U. S. beekeepers control the intruders with pesticides, but biologists worry the species might develop resistance.

The mite, *Varroa jacobsoni,* attacks worker bees as well as drones of the *Apis mellifera* species, commonly called the European honeybee. Some researchers question whether the compound would serve as an effective bait to trap mites. Bee experts agree, however, that chemical baits hold promise.

The French team made extracts from whole drone and worker larvae and identified 10 potential attractants in them. They then placed female bee mites in the center of an X-shaped chamber. Each arm of the chamber wafted either plain air or one of three types of fragrance sources: live drone larvae, the larval extracts or commercial versions of the 10 compounds. Testing each mite individually and observing which arm it entered, the researchers found that plain air and seven of the compounds held no attraction. Many mites homed in on the live drone larvae and the extracts, preferring drone over worker extract. But the winner was an ester called methyl palmitate, the team reports in the Aug. 11 *Science.*

While the researchers have yet to field-test the alluring ester, they have set simple traps in laboratory hives, says coauthor Guy Ourisson of the Institut de Chimie des Substances Naturelles, in Gifsur-Yvette. "A piece of blotting paper impregnated [with methyl palmitate] and placed at the bottom of the beehive will attract mites," he told **Science News.**

— S. Hart

BIOTECHNOLOGY

One of the driving forces of the legislation of the sixties and seventies came from concerns about the effects of mankind's activities on surrounding life and habitat. Without sporadic media treatment; little, if any thing at all, expresses the legal or moral implications of creating life. The ecological aspects of introducing new varieties is as unclear and difficult to predict as the economic aspects of biotechnology.

Undefined and unexplored by public policy, definitions of biotechnology vary with each agency and private enterprise. Available documents show the federal government, as opposed to industry, committed to basic research; applied research beign the realm of industry.

Governing laws applicable to genetic engineering and manufacturing are those that are designed for any product. The federal statutes applicable are the Plant Patent Act of 1930 and the Plant Variety Protection Act of 1970. Utility patents and trade secrets may also represent categories of governing law.

Selective methods in agriculture, animal husbandry and brewery processes have been practiced by the earliest civilizations. A clear goal of an improved stock or product was anticipated by manipulating, the diversity of plants and animals. The broadest definition of biotechnology, from the Office of Technology Assessment (OTA), encompasses these past activities; any techniques that use living organisms or parts of organisms to make or modify products, to improve plants or animals or to develop microorganisms for specific uses.

The activity consituting the "develop" of the latter part of this definition form the basis for specialized technology. Discussions of gene splicing and replicating DNA are generally left to the professional journal. Nevertheless, legalities governing the recipe for Classic Coke and experimentation with human DNA are the same. Such incongruity is partially compensated for by safeguards on the process of experimentation.

It is important to begin to understand the vocabularly of biotechnology. It has enabled the mapping of the complete human genome and other important research projects undertaken by universities in the U. S. where government funding has been critical and substantial.

Increased responsibility should be a serious burden for the newly emerging consortiums that have become typical of the successful entrepreneurial ventures into gene splicing and virus creation. The potential for advanced biotechnology to help repair and prevent destruction caused by other technologies ought to be a goal of the applied research that creates the new age conundrums of shrinking natural diversity and laboratory fertility.

Much in the environment is now eliciting concerned responses from those being directly affected. Increased awareness is as important as developing a sound appreciation of this technology. While the individual citizen may not achieve a technical expertise sufficient for critical analysis of sophisticated technoactivities, the scientist cannot be required to manufacture public policy or apply it.

National Institutes Of Health

Biotechnology is the application of biological systems and organisms to technical and industrial processes. The technologies employed in this area include: classical genetic selection and-/or breeding for purposes such as developing baker's yeast, conventional fermentation, and vaccine development; the direct in vitro modification of genetic material, e.g., recombinant DNA, or gene splicing, and other novel techniques for modifying genetic material of living organisms, e.g., all fusion and hybridoma technology.

National Science Foundation

Work categorized as research related to biotechnology includes activities in fundamental genetics, cell physiology, cell culture biology, basic biochemistry and enzymology, and bioprocessing engineering, which are generally regarded as being directly related to the further development of biotechnology.

Department of Defense

Biotechnolgy is defined as any technique that uses living organisms (or parts of organisms) to make or modify products, to improve plants, or to develop micro-organisms for specific uses. The technologies specifically included in this definition are recombinant DNA, novel bioprocessing techniques, cell fusion technology including hybridomas, and somatic cell genetics (generations involving any cell in the body except reproductive cells and their precursors).

Department of Energy

Biotechnology related research is defined as research information and methodologies that could be used by industrial scientists to develop the products and processes of biotechnology, and includes research needed as the scientific base to develop that information.

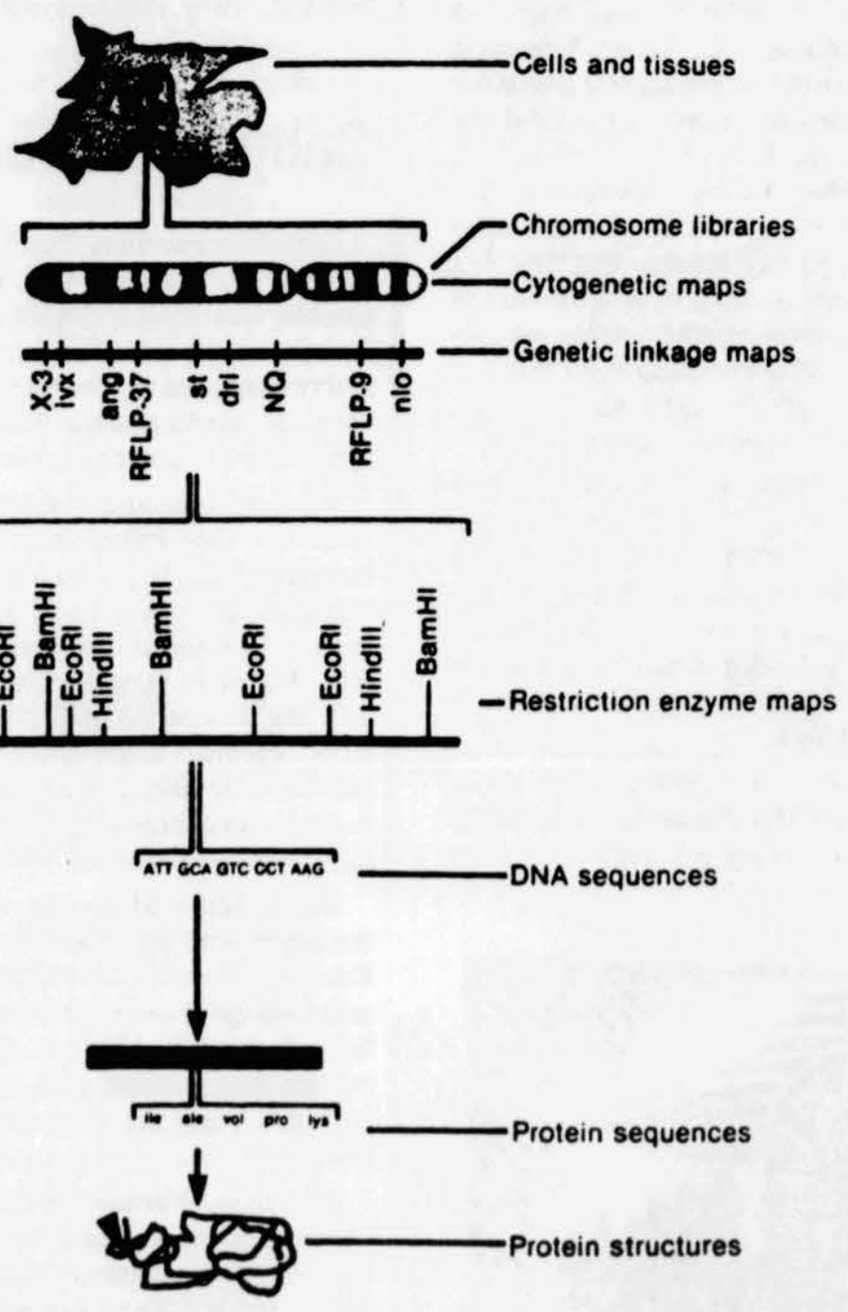
US Department of Agriculture
Cooperative State Research Service

Biotechnology refers to the improved or modified organism, microbe, plant or animal and 'new research techniques' or 'technology' refers to contemporary 'tools' available to scientists for the purpose of biotechnology development.

Agriculture Research Service

Biotechnology includes projects that use techniques such as gene cloning in micro-orgnisms, nucleic acid hybridization, biological and biochemical synthesis of nucleic acids and proteins, use of monoclonal antibodies, affinity column separation of antigens, use of immobilized enzymes and cells, protoplast fusion, regeneration of plants from tissue culture, transfer of embroys, gene mapping, and synthesis of peptide neurohormones.

Databases in Biotechnology



SOURCE: The National Library of Medicine and Office of Technology Assessment, 1988

Environmental Protection Agency

Biotechnology is defined generally as the use of living organisms to produce products beneficial to mankind. It is the application of biological organisms to technical and industrial processes. It involves the use of 'novel' microbes, which have been altered or manipulated by humans through techniques of genetic engineering.

Food and Drug Administration

Biotechnology is the application of biological systems and organisms to technical and industrial processes.

Department of Commerce
National Oceanic and Atmospheric Administration and National Bureau of Standards

Biotechnology is the application of scientific and engineering principles to the processing of materials by biological agents to provide goods and services.

Agency for International Development

Biotechnology broadly defined, includes any technique that uses living organisms (or parts of organisms) to make or modify products, to improve plants or animals, or to develop microorganisms (or parts of organisms) to make or modify products, to improve plants or animals, or to develop microorganisms for specific uses.

Veterans Administration

The VA adopted the OTA definition of biotechnology for the purpose of accounting. Specifically, funding data were provided for projects involving cell fusion, gene splicing, monoclonal antibodies, and recombinant DNA.

National Aeronautics and Space Administration

Space biotechnology includes natural and manipulative processes involving biological materials, such as cells and proteins. The changes that occur in these processes in the reduced gravity environment are dependent on the relationship of the forces involved in the process and in the techniques used.

Biotechnology is the application of biological systems and organisms to technical and industrial processes.

Small Business Innovation Research Program

Biotechnology is a broad term that includes a number of techniques, such as genetic engineering, protein engineering, processes for making monoclonal antibodies, and other molecular biological techniques to carry out such techniques is also included in the broad definition of biotechnology research and development.

Chemicals and Health

Are health dangers from chemicals being exaggerated? EPA Journal has asked observers and participants in the national debate now under way about these cruical concerns. The same question was asked of each person:

"More and more chemicals are being labeled hazardous to health. Is the danger being exaggerted?

U. S. Rep. George E. Brown, Jr. (D-Calif.)
Chairman, House Subcommittee on Environment and the Atmoshpere

The simple, honest answer to your question is, we don't know. The numerous cases of documented hazards from new and old chemical compounds are cause for genuine concern. The Congress, largely in response to these real hazards, has enacted a variety of laws aimed at identifying existing hazards, and preventing future chemical disasters from occurring.

The danger may very well be exaggerated, especially in the minds of individuals. On the other hand, we may only be seeing the tip of the iceberg of the adverse effects of the chemical revolution. We can't afford to be complacent in any case, and prudence dictates that we approach this subject with the worst case situation in mind.

The Federal Government has a clear responsibility to guarantee the health and safety of the American people with all the authority at its disposal. It further has the responsibility to identify what the nature of those threats to our Nation are. The chemical threat is one area where the Federal Government has generally done too little, too late.

My colleagues in the Congress and I will be watching the implementation of the basic environmental laws very carefully. We all hope that the chemical threat is exaggerated, and future disasters will be nonexistent. Until we know if that state of perfection has arrived, much more information must be gathered and much more work will need to be done.

Dr. Elizabeth M. Whelan
Research Associate, Harvard School of Public Health; Executive Director, American Council on Science and Health

In many instances, the health hazards posed by chemicals *are* overstated to the point where many people apparently believe that we are living in a sea of toxic and carcinogenic substances, paying for the benefits of technology with poor health.

Today, even the word "chemical" conjures up a negative image. The average consumer has a poor understanding of chemicals as fundamental units of life, and hears substantially more about the relatively few cases of chemical-related tragedies than he does about the essential and beneficial chemicals occurring in the natural food supply and in the forms of food additives, pesticides, drugs, in the occupational setting and general environment.

The fact that some chemicals in the environment have caused illness and death in unique circumstances should not mean that all chemicals are suspect or that there are no ways of using potentially unsafe materials. Our goal in regulating the chemicals around us and indeed in making judgments about all aspects of our environment, is to minimize the potential for harm and maximize technological and cultural advances and the quality of life for our country.

For example, in assessing the use of a potentially cancer-causing chemical in the production of a useful product, we should be guided by reasonable judgments, setting levels of exposure which pose no known hazards to workers yet still allow efficient production of this product. If the scientific consensus is that workers can be protected from the effects of the chemical in question by means of an efficient ventilation system costing $5,000, there is no purpose in exaggerating the risk to the point that $2,000,000 is spent to totally redesign the workplace in an effort to reach the same end, and it becomes no longer cost-efficient for the plant to operate.

In making judgments of this type, we are *not* saying, "If you want a product you must assume that people will die." (Indeed that is exactly the type of tradeoff we willingly make using automobiles, airplanes and swimming pools.) It is possible to set levels of chemical exposure which according to all scientific evidence do not significantly raise anyone's disease probability.

Recent overstatements on risks posed by environmental chemicals have served only to distract Americans from real environmental health threats like cigarette smoking, have led to bannings of items that make our life easier and more pleasurable, and have contributed to higher prices for those goods and services that do remain.

Eula Bingham
Assistant Secretary of Labor Occupational Safety and Health

No. Death can never be exaggerated. And death is exactly what the question is all about. No one knows the exact extent of death caused by workplace exposures to the thousands of toxic substances in common industrial use today. But we do know the toll is in the thousands—perhaps more than a hundred thousand per year becoming ill.

Those are people—not just numbers. They are our friends, brothers, uncles, cousins, mothers and fathers. Their loss is too real to too many of us to be concealed behind phony arguments that it costs too much to control the hazards that caused such tragedy.

Paradoxically, it seems that there isn't enough exaggeration. No one really gets concerned until a tower collapses and kills 51 men. Or until a pesticide makes walking zombies of a plant full of healthy workers. Or until a chemical previously thought to be harmless causes rare cancers twenty to forty years after exposure.

Total national concern about all harmful exposures, not just sporadic attention in a few isolated instances, is what will finally provide the impetus—and resources—needed to apply our collective effort to guarantee safe and healthful workplaces for all Americans.

Dr. Samuel S. Epstein
Author, "The Politics of Cancer," and Professor, Occupational and Environmental Medicine, University of Illinois School of Public Health

Exaggeration, no! Belated recognition of the problem, yes!

The recent identification of a wide range of hazardous chemicals reflects the fact that originally they were improperly or prematurely introduced into commerce. This occurred either without pre-testing or on the basis of test data, much of which has since been shown to be inadequate, manipulated, or suppressed.

Data on the costs of compliance have also been grossly distorted. Meanwhile, the fact has been overlooked that the full price tag for failure to regulate is far higher than the cost of regulation itself. The chemical industry for years blocked the passage of toxic substances legislation, which when it became law in 1976 finally gave the EPA Administrator a discretionary right to require premarket testing. Even in 1979 the industry still refuses to disclose the identity of toxic and carcinogenic chemicals in trade name products to which workers are exposed.

Such policies of the chemical industry have been directly responsible for an ever-growing litany of disasters. Consider the respiratory disease and cancer toll of asbestos workers which is anticipated to claim more than 50,000 annual victims over the next few decades. Industry had much evidence of these hazards as long ago as the 1930's which it suppressed and failed to act on. Or consider the neurological crippling of workers exposed to Leptophos at the Velsicol Plant in Bayport Tex. Information on the neurotoxicity of Leptophos had been withheld from exposed workers and Federal agencies. Or look at the neurological and other diseases induced in Life Sciences Product Corp. workers by Kepone in the early 1970's. Allied Chemical Co., the parent corporation, had information of such effects in the early 1950's.

There are innumerable other such examples. Consider the sterility in Dow Chemical Co. workers exposed to DBCP. Such toxicological effects had been recognized in the early 1950's without parallel protective measures. Or consider the administration of DES to pregnant women in clinical trials in the early 1950's. These women were told by their obstetricans, reflecting advice from the pharmaceutical industry, that there was no evidence that DES was harmful, although its carcinogenicity had been experimentally established by 1940.

Finally, consider the recent epidemic of uterine cancer in post-menopausal women given Premarin or other estrogen replacement therapy, particularly at high doses and for long periods. In spite of this the Pharmaceutical Manufacturers Association and the American College of Obstetricians and Gynecologists have filed an unsuccessful suit against the FDA requirement that women should be warned of such damages by appropriate labelling.

There is little doubt that we will experience a growing and ever wider range of such disasters. In all likelihood, they will impact most heavily on workers in the petrochemical and certain mining and processing industries. They will also impact, though to a lesser extent, on those living in the vicinity of such industries or their hazardous waste disposal sites scattered irresponsibly and randomly across the Nation and on a wide range of other consumer groups who have beome unknowning participants in mass human carcinogenicity tests as involuntary tradeoffs for improper marketing of hazardous but profitable chemicals.

Irving J. Selikoff, M.D.
Director of the Environmental Sciences Laboratory, Mount Sinai School of Medicine, City University of New York

It is presently impossible to answer the question with confidence, simply because we have little information about many of these chemicals, even about their acute or subacute effects. It is dismaying to realize that for the large majority, we know virtually nothing of the long term hazards.

What to do? The best we can, actively, vigorously. This speaks against stopping the world because we want to get off or for modern chemical Luddites. Chemicals are a broad class, good and bad. It is not beyond us to sort them out, recognizing that costly misjudgments can occur.

Finally, what to do until the information comes? Again, the best we can—use the most reliable information available. Regulation and control will not wait. All of which points to the urgency of our responsibilities—and opportunities.

Sidney M. Wolfe, M.D.
Director, Public Citizen's Health Research Group

Industry's past negligence in testing chemicals is the main reason for the large number of hazardous substances being discovered in current tests. Since the most highly suspicious chemicals were the first ones cranked into the testing apparatus, it is not surprising that many are turning out to show toxicity. As testing continues, and chemicals with a much lower index of suspicion are tested, fewer will be shown to cause cancer or other types of toxicity. The list will grow, but not at the frightening rate of today.

There are at least two major reasons why the dangers of these chemicals may, if anything, be underestimated rather than exaggerated.

First is the problem of species differences. A chemical which is not very potent in one kind of animal may be very toxic to humans. Thalidomide is one such unfortunate example where animal tests greatly underestimated the danger of this drug which caused hundreds of deformed babies.

Another reason for perhaps thinking chemicals are less dangerous than they are is because positive animal tests usually involve only one chemical. Humans breathe, smoke, eat, or absorb through the skin many chemicals whose combined effects are considerably greater than that of just one component.

When the age-adjusted rate of cancer deaths in this country starts declining instead of increasing, it will be because the public has taken individual and collective action to reduce exposure to the hazards we are learning about.

Ronald A. Lang
Executive Director American Industrial Health Council

There is no question but that the scientific community today is much more sophisticated than heretofore in its ability to test for and to detect physiological changes in test animals or cell cultures which might indicate a potential hazard to man. Thousands of substances, both natural and synthetic, have been shown to cause such effects in selectively designed experiments and with highly imaginative routes of dosing.

The real problem starts once the tests have been completed in that it takes experienced scientific judgment in all but the most clear-cut cases to accurately extrapolate from such tests to a potential human hazard. At least two Federal agencies have proposed doing away with this careful scientific judgment by adopting simplistic rules for "identifying" potential human carcinogens—with the result that hundreds, if not thousands, of substances could be mislabeled. There is too much at stake for this to be allowed to happen for the sake of expediency.

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Recreation, however, is not the outdoors, but our reaction to it. Daniel Boone's reaction depended not only on the quality of what he saw, but on the quality of the mental eye with which he saw it. Ecological science has wrought a change in the mental eye. It has disclosed origins and functions for what to Boone were only facts. It has disclosed mechanisms for what to Boone were only attributes. We have no yardstick to measure this change, but we may safely say that, as compared with the competent ecologist of the present day, Boone saw only the surface of things. The incredible intricacies of the plant and animal community—the intrinsic beauty of the organism called America, then in the full bloom of her maidenhood—were as invisible and incomprehensible to Daniel Boone as they are today to Mr. Babbitt. The only true development in American recreational resources is the development of the perceptive faculty in Americans. All of the other acts we grace by that name are, at best, attempts to retard or mask the process of dilution . . . Like all real treasures of the mind, perception can be split into infinitely small fractions without losing its quality. The weeds in a city lot convey the same lesson as the redwoods; the farmer may see in his cow-pasture what may not be vouchsafed to the scientist adventuring in the South Seas. Perception, in short, cannot be purchased with either learned degrees or dollars; it grows at home as well as abroad, and he who has a little may use it to as good advantage as he who has much. As a search for perception, the recreational stampede is footless and unnecessary . . . Recreational development is a job not of building roads into lovely country, but of building receptivity into the still unlovely human mind.

"Conservation Esthetic"
A Sand County Almanac
Aldo Leopold

The EPA: A Look Inside

Clean Water Act violator John Pozsgai, convicted on 40 counts in December 1988, was sentenced recently to a jail term of a minimum of 27 months, and is required to pay a $202,000 fine and completely restore the wetlands he filled illegally. Between July 1987 and September 1988, Pozsgai filled parts of a federally protected wetlands in Falls Township, Pennsylvania with demolition rubble trucked in from New Jersey and Pennsylvania, despite warnings from the U. S. Army Corps of Engineers that he needed a Clean Water Act permit. Pozsgai also ignored a Corps cease-and-desist order and a temporary restraining order issued in August 1988. "This sentence should serve as a clear signal that the U. S. EPA will do everything in its power to protect a valuable and endangered natural resource such as wetlands," said EPA Region 3 Administrator Edwin Erickson.

ENVIRONMENT WEEK, July 27, 1989

Cedar Lakes Event

The environmental coalition weekend combined ideas and feelings to produce several goals for the next legislative meeting. Ray George, Liaison Officer, EPA Region III, opened Sunday's concluding session with an introduction to EPA activities in West Virginia.

EPA committment to a better West Virginia cannot be doubted as Mr. George's presence proved. Questions from the audience were not too specific—even on funding—or too general. The one gracious lament from the speaker was the observation that no single phone connection could ensure answers to each and and every environmental concern. This recognition of the acutely fragmented nature of administrative responsibilities for the environment underscores the desirability of environmental forums.

It is never too late to express your concerns. Contact the Environmental Hotline—346-5891, or write Norm Steenstra, Environmental Coordinator, WV-CAG, 1324 Virginia Street, East, Charleston, West Virginia 25301.

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make it an ideal location for tourism, education, and research along the Ohio River." Fletcher added that the C.O.E. and WV-DNR plan for Greenbottom was developed without public input, despite the fact that this is public land.

The Greenbottom Society recommends the following actions:

1. The wetlands should be maintained in its current natural sites without artificial manipulation.
2. The area should be enhanced for public education in regards to the environment and the historic Ohio Valley.
3. Sportsmen should be alerted to the presence of humans and Federally-protected birds such as the bald eagle by the erection of signs.
4. General Jenkins house, which is currently closed to the public, should be opened for visitors at least one afternoon per week.
5. Buffer zone around the house should be increased to accommodate proper restoration and high volume use by visitors.
6. Jenkins house and related sites must be protected from water damage.
7. All archaeological materials excavated at the site should be returned for public display at the site.
8. All agencies and the Society should agree to cooperate in an independent third party evaluation of the area as to its future management potential.

Further recommendations include opportunity for the Society to review and comment on agency plans, creation of a citizens advisory committee to review management plans, and a one-year moratorium on hunting to provide adequate opportunity for all current studies to be completed.

Fletcher added, "The proposal was developed by an ad hoc committee of Marshall University representatives, historians, environmentalists, and archaeologists. The proposal was submitted to the appropriate agencies through the good offices of the Honorable Robert C. Chambers, D-Cabell, Speaker of the House of Delegates." For more information, contact Janet Fletcher (522-7557).

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5. Revision of state laws pertaining to local land use, planning and zoning.
6. Moratorium on Class A landfills.
7. Increased appropriations for DOE, DNR, and APCC for additional enforcement and inspection; funding by higher permit fees and penalties.
8. Adoption of emergency solid waste regulations as proposed by DNR in their original form.

Agency Actions and Federal Legislation

1. Support of federal Bottle Bill.
2. Support for federal bill S269 (to ammend Interstate Commerce Act exempting solid waste)
3. Encourage DNR to create an effective citizens Water Quality Monitoring Program.
4. Require DNR to provide adequate training and assistance to County Solid Waste Authorities.
5. Develop and conduct magistrate education on environmental law and problems.
6. Outright mining moritorium on at least one sensitive Acid Mine Drainage Area.

Long Range Goals

1. Creation of a comprehensive West Virginia Environmental Protection Agency resulting in a state environmental policy and "one-step enforcement."
2. Legislative action requiring environmental education components in the public school systems.
3. Passage of a state packaging law to restrict or eliminate certain materials.
4. Passage of a WV Natural Heritage Act to safeguard endangered species, wetlands and unique land areas.
5. Commission of State Waste Stream Analysis and development of effective methods of implementing waste reduction.
6. Passage of Comprehensive Recycling Programs (SB 301) in as many counties as possible.

Speaker of the House Chuck Chambers was in attendance throughout the entire convention—providing both his unique political perspectives and knowledge of the state's environmental needs. Speaker Chambers also participated in a panel discussion entitled "Politics, The Environment and the 90's."

Other presentations and seminars included "Acid Rain" by both Don Gaspar, WV DNR and Virginia Rouslin of the Canadian Consulate; "Groundwater" by Frank Pelurie, WV DNR; "The West Virginia Recycling Act" by David Grubb; "Public Relations and the Media" by Greg Leaming and "US EPA Resources Available to the Environmental Community" by Ray George.

There were inherent risks in gathering such an eclectic and large group of environmentalists together. The possiblity of discord, personality clashes and opposing methodology were among those risks. The unity displayed and the degree of commitment to environmental concerns by each attendee dispelled these risks. One other consensus item that was achieved was to hold a Second Annual Statewide Environmental Convention in 1990.

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It is clear that both industry and government are concerned that there still exist some chemicals whose chronic hazards have not yet been identified. The American Industrial Health Council was organized specifically to work with government and other interested parties in attempting to develop a sound scientific method of identifying any such substances and finding methods of minimizing their hazards. But, another concern is that unsound regulations will result in those few real hazards being mixed in with hundreds of mislabled ones to where the public attitude becomes 'Since everything causes cancer, why be concerned about anything?' Such public cynicism would be a national calamity—and yet we are edging ever closer to it.

Paul G. Rogers
Former Congressman and former Chairman, House Subcommittee on Health and the Environment

The question is deceptively straightforward. The problem is that we don't really have a simple answer. Our experience with some very specific chemical substances—for example, PCB's, vinyl chloride, and DDT—has awakened our concern about the whole spectrum of chemicals. This concern is heightened when we realize the breadth of possible human exposure—that there are close to four million chemical substances known to man and that some 70,000 of these are now in commercial use. With as many as 400 new substances entering the market each year our past experience means that we do know that what we don't know is legitimate cause for concern.

We do know that we need a system capable of examining the safety of these substances. We do know that we need to expand upon our present knowledge and attempt to answer some of the very difficult scientific questions concerning the possible hazards of long-term, low-level exposures, of latency periods and the complex issue of synergistic effects.

We also know that there are indications that a substantial number of cancers, as well as birth defects and other serious health problems, are related to occupational and environmental exposures to chemical substances. In terms of possible threats to human health and well-being the unanswered questions are not academic ones, but quite personal in their impact on our daily lives.

I believe that with the passage of legislation such as the Toxic Substances Control Act, with new efforts in basic research, and with improved systems of data and information gathering we will be able to strike a balanced, reasoned approach to the problem. Although we do not intend to ignore the possibility of harmful effects from some chemical substances, neither do we intend to go too far in the other direction and indiscriminately paint all chemical substances as suspect. It appears that finding answers to the broad questions that face us lies not in a simplistic, generic approach but rather through an approach which recognizes the specific facts surrounding each substance. I believe that this is precisely the approach which we have chosen.

Dr. Barry Commoner
Director, Center for the Biology of Natural Systems, and University Professor of Environmental Science, Washington University

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SNOW

If your answer to the question "What is the most unstable mass on earth?" is the WV legislature, you would be wrong. If your answer is WV environmentalists talking about the WV legislature you would still be wrong. The correct answer is newly fallen snow.

Snow in the WV mountains may be more stable or less stable depending upon which side of the mountain you are describing. The idiosyncratic climates on either side of your favorite mountain and the mini-pressure systems they create make mountain weather conditions unique.

Mountains don't receive more snowfall just because they are THERE! A physical principle is involved. Orographic lifting, air forced up and over barriers, can be greatest when wind direction is perpendicular to the mountain (like Hugo hitting the Carolina coast). When the angle of the striking wind decreases the force is less.

Air mass movement flows from high pressure regions to low pressure regions. Terrain effects this flow in unpredictable ways. Mountain slope accumulation of snow is predicated on terrain and air movement.

If one could follow the wind up the mountain, the warm, dry winds of the base (lee side) would become moist as the higher pressures and the elevation rises. Combining the moisture of higher elevations with strong vertical wind force is one accurate explanation of why mountains have more snow.

Once deposited, snow crystals constantly change. Temperature and pressure, the factors delimiting formation of each flake, continue to determine the conditions effecting changes in shape and size.

The life history of a snow crystal is very complex. Initial condensation from changing vapor pressure occurs on microscopic dust, salt, soil particles, or; unfortunately, pollution particles, that are lifted from earth by the wind. These initial nuclei have tiny, tiny dimensions. Each cubic centimeter of air contains 10 to 10000 such nuclei. Once a condensation fix has occured a freezing nuclei is required for creation of a snow flake. The colder the air, the greater number of freezing nuclei.

Now a frozen droplet, ice crystals collide with other droplets. A snowflake, a coagulation of several snow crystals, is formed. The forces effecting latter changes will be determined by the temperature and surrounding conditions at the place of deposition. Light, newly fallen snow will not share many characteristics of snow that has lain under compressed layers. Along with changes in density come changes in form. The International Classification of Solid Precipitation lists ten basic snow crystal forms with four modifications.

Groundwater Resources

A Vital National Resource

Almost anywhere in the United States that you live, chances are that you depend on groundwater to a greater extent than you may realize. Consider these statistics. Setting aside the 94% of the earth's water that rests in oceans and seas at high levels of salinity, groundwater accounts for about two-thirds of the freshwater resources of the world. If we only consider the portion that can be used (minus icecaps and glaciers), then groundwater accounts for almost the total volume. Even if we only consider the most "active" groundwater regimes, the breakdown comes to: groundwater, 95%; lakes, swamps, reservoirs, and river channels, 3.5%; and soil moisture, 1.5%. This map shows the distribution of major aquifers across the country.

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To answer this question it is useful to start with the facts. The evidence in support of claims of health hazards from synthetic chemicals is clear-cut. In recent years research has considerably improved the testing of chemicals for toxicity, and the resulting data have been carefully collected and reviewed. For example, the International Agency for Research on Cancer in Lyon, France, publishes carefully analyzed summaries of the data about the carcinogenicity of chemicals. These data show that the number of synthetic organic chemicals that have been identified as carcinogens is rising rapidly; between 1950 and 1960, 17 new such carcinogens were identified. These and similar data establish quite clearly that the widely-held impression that we are learning about increasing numbers of hazardous chemicals is based on solid fact.

Is there any factual evidence to support the idea that claims about such hazards are being exaggerated? Such evidence would be, for example, scientific data which show that substances previously identified as hazardous, on being studied further, have been shown to be not hazardous. To my knowledge a list of such substances which have been downgraded with respect to toxicity has not been compiled, but it must be very small. For example, reexamination of a number of suspected substances which have been the subject of controversy has, in fact, confirmed their carinogenicity: saccharin, TRIS, vinyl chloride and various hair dyes. There is, therefore, no scientific evidence to support the notion that such claims have been "exaggerated."

In the face of this evidence it is important to ask why the question of exaggeration should arise at all. What has happened to encourage such an unsubstantiated response to the solid evidence of increasing numbers of toxic chemicals? My own answer is that in the last few years the public knowledge about toxic chemicals has begun to affect certain groups where they really hurt—in their pocketbooks.

For example, in the last few years, as a result of evidence regarding environmental or health hazards, several major chemical products have been forced off the market: fluorocarbons, propellants extensively used in a wide range of products, have been replaced by finger-pumps; PCB's, once produced at the rate of 40,000 tonsper year, have been withdrawn, following evidence that they ahve become very widespread in all living things. It is therefore not surprising that chemical companies have recently begun a massive public relations campaign against what they call "chemophobia"—irrational fear of chemicals.

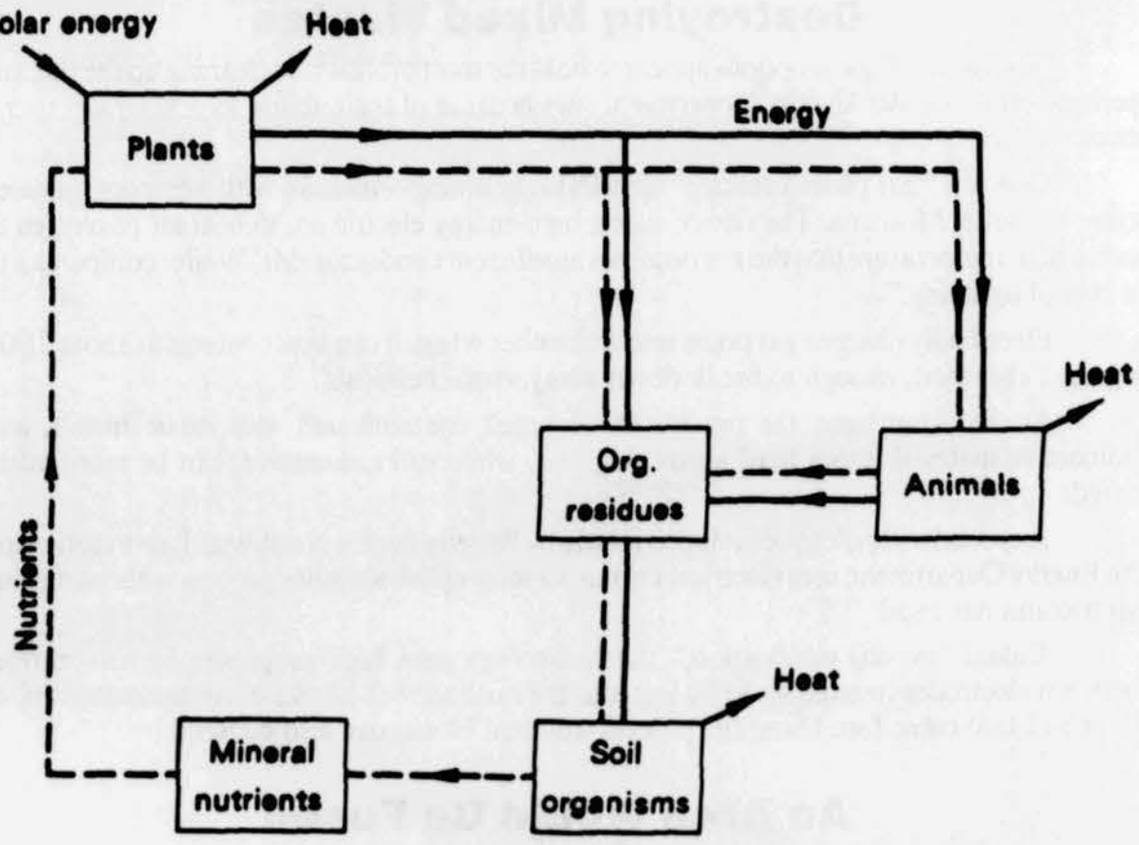
Arthur C. Upton, M.D.
Director, National Cancer Institute

Since the recognition of scrotal cancer as an occupational disease of chimney sweeps over 200 years ago, more than 20 chemicals have since been implicated as causing various forms of cancer in other types of workers. Environmental chemicals have also come to be linked with certain forms of cancer in the population at large. These observations, considered in the light of the growing number of new chmicals being introduced into commercial use each year, make it increasingly important to evaluate suspected substances in order to minimize any potential hazards that they may pose.

Although proof that a chemical can cause cancer in humans rests only on the demonstration of such an effect in human beings themselves, the high correlation between carcinogenicity in humans and carcinogenicity in animals makes it possible to utilize animal tests as a means of identifying presumptive carcinogens and thereby instituting prudent safeguards for the protection of human populations. This method for the evaluation of environmental hazards constitutes an essential approach toward the prevention of cancer, which must be reflected in modern public health policy.

EPA JOURNAL, March, 1979

Ecologically speaking, the life cycle of bacteria is a careful, precise balance between energy output and nutrition intake. The steady state maintained by each soil ecosystem belies the second law of thermodynamics and maintains an efficient equilibrium.



Generalized picture of an ecosystem, showing the major pathways of energy and nutrients.

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Experiments With Microbes

Energy Department researchers are also experimenting with microbes at other sites, including the Savannah River Plant in South Carolina.

In this case, microbes are not being used to deal with radioactive material, but appear to be able to consume toxic metals either in a "bio-reactor" vessel or directly in contaminated soil.

It appears that the D.O.E. may address some contamination problems with the least elaborate of all technologies—waiting them out. Larry Mann, a United States Geological Survey hydrologist assigned to INEL, says the contamination of the Snake River Aquifer with tritium and other radioactive substances can best be addressed by waiting for the radiation to decay or to be diluted as it moves slowly off the site.

A "plume" of tritium centered around two INEL installations is spreading through the aquifer at a rate of just over 1,000 feet per year and can now be detected about eight miles south of two original disposal sites.

But according to Mr. Mann; the leading edge of the tritium, which has a half-life of about 10 years, has decayed to such a degree that it now meets Environmental Protection Agency drinking water standards. His computer projections show that it will further decay to below detectable levels by the time it reaches the border of the site.

New York Times January 3, 1989

U. S. Turning to New Technologies To Clean Up Arms Plants

Faced with one of the most costly environmental contaimination problems ever, the Department of Energy is searching for new technologies to help it clean up toxic and radioactive wastes at its weapons installations.

The technologies range from high-voltage devices that can melt soil, steel drums and contaminated machinery into a glassy mass to microbes that produce polymers to which toxic metals and radioactive particles adhere.

The extent of the problem is staggering. More than a dozen weapons plants across the nation have generated toxic industrial chemicals and radioactive matter. Early estimates of the total clean-up costs range to more than $100 billion.

Aside from sheer magnitude—millions of cubic feet of poisoned soil and millions of gallons of contaminated ground water—the Energy Department faces the unique problem of industrial hazardous waste mixed with radioactive substances.

An Intractable Problem

That combination defies traditional clean-up methods. In some cases, removal of contaminated soil would need to be accomplished with remote-controlled earth-moving machinery, with operators isolated in shielded towers hundreds of feet away.

One of the most intractable of such problems is at the "buried waste site" near the southern boundary of the 900-square-mile Idaho National Engineering Laboratory near Idaho Falls.

According to Hunter Weiler, manager of environmental restoration programs at the laboratory, the site was used "like a garbage dump" for contaminated wastes from a Colorado weapons manufacturing installation between the early 1950's and 1970.

Some wastes were buried in steel barrels. But others, he says, where dumped in wooden crates and cardboard boxes. The boxes and crates have long since decayed, and many of the steel barrels are now leaking.

The wastes include such items as gloves and aprons classed as "low level" waste as well as lathes and other machinery irradiated by plutonium, considered to be in the middle range of radioactivity.

The contamination has spread from the three million cubic feet of buried waste to another five million cubic feet of soil.

Destroying Mixed Wastes

Two technological options appear to hold the most promise for cleaning up the site, and perhaps other, similar Energy Department sites because of their ability to destroy or control mixed wastes.

One is a "gas plasma reactor" that INEL is testing—initially with non-contaminated soils—in Butte, Montana. The device uses a high-energy electric arc to heat air or oxygen to such a high temperature that the gas becomes an efficient conductor. Mr. Weiler compares it to "a bolt of lightning."

Electrically charged gas pours into a chamber where it can heat contents to about 2,900 degrees Fahrenheit, enough to break down many toxic chemicals.

At the same time, the process should melt contaminated soils, toxic metals, and radioactive material into a hard glassy slag that, while still radioactive, can be more safely stored.

A second technology, developed jointly by Battelle Pacific Northwest Laboratories and the Energy Department, uses electrical current to accomplish a similar process without digging up contaminated soil.

Called "in situ vitrification," the technology uses high amperage current moving between electrodes inserted up to 50 feet into the earth to melt blocks of contaminated soil as large as 1,000 cubic feet. Using the process, adjacent blocks can also be fused.

An Area Would Be Fused

The process would subject a site to such immense amounts of heat that the entire area, including the discarded, radioactive machinery and disposal barrels, would be fused into an obsidian-like substance.

In theory, the process could destroy organic chemicals and bind-up radioactive matter and metals so that they could remain safely buried on site.

The technology has already been proven to work in field trials and is being marketed to industries by a Battelle subsidiary, but it is still not clear how effectively it will work with the irradiated wastes at INEL or, even if it does, if the process will work with the wetter soils at sites in the eastern half of the United States.

Specialists at INEL say that neither process will provide an ideal or easy answer, since the gas plasma process requires risky and difficult digging-up of wastes, and the other makes it difficult to know how effectively deep soils were treated.

Researchers are also studying microbes that may help filter radioactive wastes from water. According to Patrick Dugan, director of bioprocessing technology at INEL, some kinds of bacteria may be able to absorb radioactive particles.

In trials, scientists have been able to show that a nonradioactive form of uranium will adhere to the bacteria and to a polymer that the microbes produce.

The next step, says Dr. Dugan, is to determine whether the process will work with so-called transuranic substances, including plutonium. The process would make it easier to precipitate these radionuclides out of water.

"Nothing like this can be made to go away," says Dr. Dugan. "The hope is to find ways to move this material around so that it can be handled better."

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Research Sheds Light On The Lightning Bolt

WASHINGTON—Researchers have found lightning to be an even more widespread danger than was believed, with more than five dozen Americans losing their lives and hundreds more injured last year.

A hazard whose scattered victims usually attract only local notice, lightning finally made the national headlines in 1988 by sparking forest fires that ravaged much of Yellowstone National Park.

In the past, weather observers have recorded the presence of lightning through the simple expedient of listening for the thunder that comes after the electrical discharges.

But electromagnetic detection systems have discovered that, because of interference with sound waves, between 22 percent and 40 percent of all lightning occurs without observers hearing the thunder that follows.

That is not good news, researchers note, pointing out that lightning can strike with no warning, sometimes occuring before storms or reaching out ahead of the clouds.

Detailed thunderstorm records go back to the late 1800s, but they have always depended on the reports of trained observers, primarily listening to thunder. This means that the operators of electrical plants and others who use weather records to anticipate the danger of lightning have underestimated the risk.

The toll of 68 lightning deaths in 1988 was the same as in 1986, tying for the lowest this decade. In between, however, 1987 recorded the most in the decade with 86 fatalaties.

The long-term average is 96 lightning deaths annually, an average boosted by several very deadly years back in the 1960s, including 1963, when 210 peple were killed by lightning.

As usual, in 1988 many victims were in the open or under trees, with several on golf courses or in boats. Florida retained its place as leading in lightning deaths with nine, while six died in Colorado.

There were four lightning deaths each in Georgia, Michigan, New York, North Carolina and Wisconsin, the National Weather Service reported. And states with three fatalities were Minnesota, New Mexico, Texas and Virginia.

Pennsylvania had two lightning deaths, and New Jersey had one.

More than half of all electrical storms had only a few cloud-to-ground lightning flashes, while a small number of storms had hundreds of strokes.

One reason lightning doesn't get the respect that meterorologists think it deserves is that it is like automobile accidents, usually claiming victims one or two at a time over a scattered area.

The sudden arrival of thousands of volts of electricity, however, can sometimes involve a lot of people.

For example, on July 17, 1988, lightning struck a utility pole at a speedway in Snyder County, Pa. Twenty-two spectators were injured by the charge, which traveled down the pole and into the bleachers.

Lightning results from a buildup of electrical charges in a storm cloud. The process isn't fully understood, but it appears to involve movement of raindrops up and down in the cloud, propelled by strong winds.

When the electrical charges build up to large levels, an invisible "step leader" moves down from the negatively charged cloud base in segments about 50 yards long, until it reaches the positively charged ground.

When that contact is made, thousands of volts of electricity move in several "bolts," giving lightning its sometimes flickering character.

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Well Seminar

WV League of Women Voters

A seminar on Wellhead Protection will be held this fall, in Jefferson County, at Priestfield, 9:00 am to 4:00 pm, on October 31. The objectives of the seminars are to inform the public about the Wellhead Protection Program (WHP), create a forum for the exchange of information, and assist the state in the development of its WHP program as an integral part of its overall ground water protection strategy.

The Wellhead Protection Program is a section of the Safe Drinking Water Act Amendments of 1986. Its purpose is to protect the area (surface and subsurface) surrounding public water supply wells so that contaminants cannot reach the well. Boundaries are determined based on factors such as pumping rates, travel time for ground water to flow into a well, aquifer boundaries, and degree of confinement. In West Virginia, the Health Department is the lead agency for implementing the Wellhead Protection Program.

Each state will devise its own program which is to meet broad federal guidelines. Because public participation and local government involvement in the planning process was written into the law, EPA asked the League of Women Voters to plan and organize these seminars. Agencies cooperating in the seminars include the USEPA, West Virginia's Division of Water Resources, and West Virginia's Environmental Engineering Division of the Department of Health. Those attending the seminars should come from many constituencies, including those with economic interests, planners, agency personnel, public officials, water providers, environmentalists, and the general public.

If you would like more information, contact Helen Gibbins, 6128 Gideon Rd., Huntington, WV 25705; phone: 736-3287.