

The Comparative Risk Project

Ohio State of the Environment Report 1995

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Ohio Environmental Statistics and Indicators

The analysis of the environmental problems in the Ohio Comparative Risk Project involves both quantitative and qualitative components. This chapter focuses on available quantitative information that are indicators of the existing state of Ohio's environment.

The following tables consist of statistics that were gathered to enhance the evaluation of environmental problems in Ohio. The statistics are are grouped by general categories of population; land/habitat/natural resources; water; environmental management; public opinion; and economics.

When information about trends was readily available, it is used to depict conditions, however, the tables offer a mix of trend information and existing conditions. In most cases, the source of the information is clearly identified. There are some instances, however, in which the source was a personal interview or unpublished information.

How Ohio ranks among the fifty states for:

NATIONAL RANK

Total population, 1990*	7
Number of fish kills in 1992***	10
Number of hazardous waste sites, 1990*	11
Amount of coal produced**	12
Resident population in metro areas*	18
Number of physicians per 100,000 people*	21
Persons below poverty*	23
Violent crimes per 100,000 people*	24
State-held recreation lands**	26
Median household income for African Americans*	37
Per capita spending on environmental regulation****	39
Federal-held recreation lands**	41
Percent of housing units built between 1980 and 1990*	47
Public recreation land per 1000 people**	47

* Selected State Rankings, Statistical Abstract of U.S., U.S. Dept. of Commerce, Bureau of Census, 1993.

**Statewide Comprehensive Outdoor Recreation Plan, Ohio Dept. of Natural Resources, 1993.

***1992 Ohio Water Resources Inventory, Ohio Environmental Protection Agency.

****Burke et al. 1994. The Environmental Web (see paper on Environmental Management for Complete citation).

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OVERVIEW OF COMPARATIVE RISK

This summary also is the first chapter of Ohio's State of the Environment Report . It provides an overview of comparative risk, discusses the genesis of the Ohio Comparative Risk Project, and explains the methodology used in ranking environmental risks in Ohio. Although this summary offers brief descriptions of some of the environmental conditions evaluated in the Ohio Comparative Risk Project, the State of the Environment Report offers a more complete picture of environmental conditions in the state.

What is Comparative Risk?

Comparative risk is a planning process that endeavors to analyze and assess the risks from environmental issues and ultimately rank the issues on the basis of the risks they pose. Comparative risk is based on the premise that there are limited resources to deal with all of the environmental problems we face; therefore, we need to focus those resources in a manner that will result in the greatest overall reduction of risk. The risks must be identified using science and public values, not one or the other, and the process of comparative risk is set up to do this. Without comparative risk or some similar tool to bring available information into the environmental management arena, we may continue to respond to the environmental crisis of the day--syringes washed up on the shore, newly discovered hazardous waste sites, or the reporting of a new toxic hazard.

The United States Environmental Protection Agency (U.S. EPA) conducted the first comparative risk project in 1987 in the study known as ***Unfinished Business***. ***Unfinished Business*** was a scientific study of environmental issues that have national importance. A subsequent comparison of public perception to U.S. EPA's scientific assessment confirmed that there is a gap between the two. For instance, in a national survey, the public perceived chemical waste disposal as the number one issue of concern, whereas the U.S. EPA team ranked it sixteenth (out of 31 issues). Radon was considered to be one of the top issues by U.S. EPA, but the public did not identify this as important. Comparative risk seeks to bridge the gap between the public and scientific community by providing an avenue of convergence.

Since the ***Unfinished Business*** study was completed, U.S. EPA regional offices have conducted their own studies and seven states have also recently completed studies. What is becoming increasingly clear is that there are not only regional differences in environmental priorities, but these differences extend to states as well. As local entities across the country begin projects of their own, the differences at the local level also will become evident.

Because comparative risk uses values which are important to the public and understandable to a wide range of decisionmakers, it is a planning technique that has the potential to address many environmental issues simultaneously.

DO CHOICES NEED TO BE MADE?

As part of its public outreach, the Public Advisory Group asked the public whether they agreed with the premise of limited environmental resources. In a random telephone survey of 900 Ohioans in June 1995, one of the initial questions asked respondents to identify which of the following statements came closest to his or her view:

A. We do not have enough money to deal with all of the environmental problems Ohio faces, so we must decide which environmental problems we should focus on; OR

B. If we spend our money wisely and enforce environmental standards, Ohio can meet nearly all of the environmental risks we face; OR

C. We are already spending more money and enforcing more standards than we need to in order to deal with environmental problems Ohio faces; OR

D. I'm not sure about this.

Statement B was selected by 58 percent of the respondents, more than double the number (24%) who chose statement A, suggesting that the premise of limited resources is not self-evident.

However, later in the survey, after being asked for their views on the range of environmental problems being considered by the Ohio Comparative Risk Project, respondents were again asked whether it was necessary to prioritize resources. The adjacent figure compares the responses.

Ohio's Project

In April 1993, Ohio EPA submitted a proposal to U.S. EPA to fund a comparative risk project in the state. The proposal was developed by a group of Ohio EPA staff during a series of planning meetings beginning in November 1992. Subsequently U.S. EPA offered Ohio EPA a \$100,000 grant, which was matched by the Ohio General Assembly, to coordinate the project; groundwork for the project began in November 1993.

On March 30, 1994, Governor George V. Voinovich signed Executive Order 94-48V establishing the Ohio Comparative Risk Project; the text of the Executive Order is found in Box 1. On this same day, a Kickoff Event was held in Columbus with approximately 200 participants. The purpose of the kickoff event was to orient interested individuals and potential volunteers to the concepts of comparative risk and to begin generating ideas about important environmental issues in Ohio. Part of the day was spent brainstorming environmental issues that should possibly be evaluated in the course of the project. The participants at the event generated a list of more than 700 potential issues.

Ohio's project was designed with two general components: a technical assessment of risks and a public outreach element.

EXECUTIVE ORDER 94-48V ESTABLISHING THE OHIO COMPARATIVE RISK PROJECT

WHEREAS, Ohio 2000/Ohio First recognizes the importance of the State's environment and natural resources in determining the quality of life for Ohioans; and

WHEREAS, initiatives to enhance, improve, and protect the environment and natural resources must be based upon sound science and comprehensive data; and

WHEREAS, a strategic agenda for the environment is the most cost-effective way to achieve direct benefits with regard to public health and the environment; and

WHEREAS, the diverse groups involved and interested in environmental protection, natural resources conservation, public health, and risk assessment must be given a role in establishing a strategic agenda for the environment;

NOW, THEREFORE, I George V. Voinovich, Governor of the State of Ohio, do hereby Order the creation of the Ohio Comparative Risk Project ("OCRCP"). The OCRCP shall have the following structure, duties, and responsibilities:

1. The Project shall be chaired by the Director of the Environmental Protection Agency, and shall include the departments of Agriculture, Commerce, Development, Health, Natural Resources, and Transportation on an Oversight Group* charged with advising and assisting the Project.
2. The Project shall actively solicit the participation of affected constituencies throughout Ohio, including but not limited to, individuals representing: local governments, public health organizations, agriculture, business and industry; small businesses; fisheries, environmental advocacy; conservation organizations; colleges and universities; petroleum industries; public utilities; recreation; and others.
3. The Project shall include a Public Advisory Group through which the above constituencies shall play an

- active role. In addition, the Project shall conduct public meetings to solicit input from the general public.
4. Data, technical support, and additional expertise shall be provided by a Technical Workgroup, which will involve experts from state agencies, academia, the business community, and others, and will estimate human health, ecological, and quality of life risks.
 5. The Project shall share information with similar projects underway at the local level and shall provide technical assistance to these projects.
 6. The Project shall employ the principles of Quality Service Through Partnership to create an atmosphere of mutual cooperation and consensus-seeking in the pursuit of its objectives.
 7. The Project shall produce a State of the Environment Report, which identifies major issues in environmental protection and natural resource management in Ohio. The State of the Environment Report shall include a priority list of issues based on scientific risk assessment and public values criteria.
 8. The Project shall produce two strategies documents: one with risk-reduction recommendations for policy makers and one with risk-reduction recommendations for individuals.
 9. The State of the Environment Report and two strategies documents shall be submitted to the Office of the Governor no later than December 31, 1996.

(*The name was eventually changed to the "State Agency Advisory Group" to better reflect its responsibilities.)

Individuals who were interested in volunteering for technical workgroups or the Public Advisory Group submitted applications to Ohio EPA. The applications were more for organization than selection, since no one was excluded from participating. The result was three technical groups responsible for assessing human health, ecological, and quality-of-life risks and one Public Advisory Group (PAG), responsible for coordinating public outreach and ultimately ranking the risks. Throughout the period before and after formation of the PAG and the technical workgroups, representatives of Ohio's environmental community and others were kept advised of the status of the project. Project staff used several mailings as well as public meetings and forums to encourage participation.

The list of environmental threats compiled at the Kickoff Event was the starting point for developing the project's working list of issues. All three technical groups worked with the 700+ issue list to reduce redundancies and to identify a manageable group of key issues that could be adequately addressed by the project's volunteers within the available time. On August 18, 1994, the chairs of the three technical groups and the PAG met to negotiate a working list of environmental issues that would serve as a basis for the technical workgroups' research efforts and, ultimately, for the PAG's risk ranking efforts. In order to organize the research for the project, the negotiating team developed the following 11 general problem categories:

1. Indoor air quality
2. Outdoor air quality
3. Land use and development
4. Habitat loss and degradation
5. Surface and ground water quality
6. Drinking water at the tap
7. Food safety
8. Waste management
9. Natural resource use
10. Environmental awareness and access to information
11. Environmental management

Each of the 11 problem categories contains several potential threats. For example, mobile source emissions are a potential threat categorized in the outdoor air quality problem category. Abandoned industrial sites are a

potential threat in the land use and development problem category, and tire management is a potential threat in the waste management category.

While the issues list was extensive, it was impossible for this volunteer effort to include every issue of environmental concern to Ohioans. Moreover, project participants recognized that the list represented, at best, a "snapshot" of concerns that were constantly shifting and changing due to developments in Ohio. For instance, in the months after the working list of issues was established, radioactive waste handling--an issue identified as a component of waste management but not included as one of the specific threats on the ranking list--became an issue of much greater public interest. During this time, the Ohio General Assembly considered legislation on the siting of a low-level radioactive waste storage facility in Ohio. Just as the mere inclusion of an issue on the working list should not be interpreted as an indication that the issue presents a significant risk to Ohioans, the absence of an issue from the list should not be interpreted as an indication that the issue is of no concern.

In assessing ecosystem risks and human health risks, the technical workgroups characterized the risks associated with the potential threats rather than the broader problem categories. The quality-of-life group, for reasons which will be explained later, characterized risks associated with each general problem category. The PAG ultimately ranked 45 potential threats in nine problem categories. Two problem categories--environmental management, and environmental awareness and access to information--were addressed as overarching issues that affect the severity of various threats, but were not included as independent threats in the risk ranking.

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Ohio Environmental Statistics and Indicators - Population

As the indicators suggest, Ohio's population grew quite rapidly between 1900 and the mid-1960s, but has leveled off in recent years. The negative migration rates indicate that any change in population is primarily due to natural growth--i.e. and increase in birth rates coupled with a decrease in death rates in the state.

POPULATION		
INDICATOR	VALUE	DATA SOURCE
	1900: 4,157,545 1910: 4,767,121 1920: 5,759,394 1930: 6,646,697 1940: 6,907,612 1950: 7,946,627 1960: 9,706,396 1970: 10,657,423 1980: 10,797,622 1990: 10,847,115	U.S. Bureau of Census (1900-1990), census reports and statistics.
Ohio population density (persons/square mile)	264.9	U.S. Bureau of Census, 1990 census
1990 urban population in Ohio	74.1%	U.S. Bureau of Census, 1990 census
1990 rural population in Ohio	25.9%	U.S. Bureau of Census, 1990 census
1990 minorities in Ohio	12.9%	Ohio Data Users Center, Ohio Dept. of Development, 1990 census information
African Americans living/working in and around Cleveland, Columbus, Cincinnati, and Dayton	65%	U.S. Bureau of Census, 1990 census
Migration rates	1950-60: 4.4% 1960-70: -1.2% 1970-80: -6.0% 1980-90: -5.5%	Ohio Data Users Center, Ohio Dept. of Development, 1970-80, 1992 census information
Number of housing units in Ohio	4,371,945	U.S. Bureau of Census, 1990 census
Ohio's housing units located in urban areas	76.1%	U.S. Bureau of Census, 1990 census

1970-1990 population change	189,692	U.S. Bureau of Census, 1990 census
Projected population growth 1980-2000	4.8%	1985 Statewide Comprehensive Outdoor Recreation Plan, ODNR
1989 median household income	\$28,706	U.S. Bureau of Census, 1990 census
	Heart disease: 34.5% Malignant neoplasms (cancer): 24.8% Cerebrovascular disease: 6.6% Chronic pulmonary disease: 4.5% Accidents: 3.3% Pneumonia and Influenza: 3.2% Diabetes: 3.1%	Ohio Dept. of Health
Ohioans who receive drinking water from ground water	40%	Ohio Environmental Council, 1992, Safe Drinking Water: A Guide to Wellhead Protection for Ohio Citizens and Communities. Ohio EPA, 1986, Ohio Ground Water Protection and Management Strategy; ODNR, 1992, Ohio's Water Withdrawal Facility Registration Program.
Number of permanent homes with private drinking water wells that also have on-site wastewater treatment	1,000,000	Ohio Environmental Council, 1992, Safe Drinking Water: A Guide to Wellhead Protection for Ohio Citizens and Communities. Ohio EPA, 1986, Ohio Ground Water Protection and Management Strategy; ODNR, 1992, Ohio's Water Withdrawal Facility Registration Program.
Number of well logs on file at Ohio Department of Natural Resources (including private, municipal, industrial, agricultural, irrigation, geothermal, cooling, power supply, fire protection, dewatering, monitoring, and test boring)	800,000	ODNR, 1995, Division of Water
Approximate number of homes in Ohio not served by public sewers	1,000,000	Mancl, Karen. 1990. A survey of small sewage treatment facilities in Ohio. Ohio Journal of Science 90, 4: 112-117.
Ohioans who use public transportation to get to work	2%	Ohio Department of Transportation, 1993, Access Ohio

Average length of the trip to work in Ohio	1977: 9.3 miles 1983: 8.8 1990: 10.9	Ohio Department of Transportation, 1993, Access Ohio
Vehicle miles travelled in Ohio	1980: 71.7 billion miles/year 1990: 93 billion miles/year	Ohio Department of Transportation, 1993, Access Ohio
Number of registered voters in Ohio as of May 1, 1995	6,172,298	Ohio Secretary of State
Percent of registered voters in Ohio who voted in gubernatorial elections	1990: 61.23% 1994: 56.6%	Ohio Secretary of State
Number of new cancer cases reported to the Ohio Department of Health in 1992	48,735	Cancer Incidence Among Ohio Residents, 1992: Preliminary Data from the Ohio Cancer Incidence Surveillance System and a Progress Update, 1995, Robert Indian et al., Ohio Dept. of Health
Direct age-adjusted cancer rates per 100,00 people in 1992	Ohio-- 376.0 U.S. --404.9	Cancer Incidence Among Ohio Residents, 1992: Preliminary Data from the Ohio Cancer Incidence Surveillance System and a Progress Update, 1995, Robert Indian et al., Ohio Dept. of Health
Number of cancer cases among Ohio children ages 0-14, 1992	346	Cancer Incidence Among Ohio Residents, 1992: Preliminary Data from the Ohio Cancer Incidence Surveillance System and a Progress Update, 1995, Robert Indian et al., Ohio Dept. of Health
Direct age-adjusted incidence rates per 100,00 children age 0-14, 1992	Ohio--14.4 U.S. --14.1	Cancer Incidence Among Ohio Residents, 1992: Preliminary Data from the Ohio Cancer Incidence Surveillance System and a Progress Update, 1995, Robert Indian et al., Ohio Dept. of Health

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TECHNICAL ASSESSMENT OF RISKS

Three technical workgroups were primarily responsible for evaluating the potential threats and assessing their risks to human health, ecosystems, and quality-of-life. Each of the three groups developed specific frameworks to use in gathering information about the potential threats.

HUMAN HEALTH ASSESSMENT

The National Research Council has taken the lead in developing the human health risk assessment methodology currently accepted as the model. This methodology includes four steps: 1) gathering data; 2) assessing exposure potential; 3) identifying how people may respond to a specified dose of the chemical of interest; and 4) characterizing the risk based on the information gathered in steps 1-3. This risk assessment model is mainly for assessing the probability of harm from specific chemicals. As such, it has limited application for comparing risks from general environmental threats, although the human health group did use it as a basis for developing their outline, which follows.

In evaluating the hazards or severity of human health effects from exposure to environmental threats in Ohio, the Human Health Workgroup identified the types of health effects potentially associated with the threat. These effects can include cancer or non-cancer effects and can be acute or chronic. When there is evidence of chemicals being associated with a potential threat, this was noted by the workgroup. For example, studies have shown that benzene is a carcinogen and mobile sources emit benzene into the atmosphere. People can inhale benzene, so the most common human health pathway is inhalation, rather than ingestion or absorption through the skin.

The Human Health Workgroup focused on identifying the potential for Ohioans to be exposed to the threats. In doing so, they made estimates of the size of Ohio's population that may be at risk to exposure. Where possible, special populations, such as children or the elderly, were identified if the threat poses a greater risk to them. Some of the threats are localized and distinctions among both geography and urban/rural differences were noted.

In an effort to identify further research needs, the members of the Human Health Workgroup identified specific sources of Ohio data. In an effort to make the limitations of the assessment clear, the workgroup noted the assumptions made in the existing research on which their evaluations were based.

Volunteers in the Human Health Workgroup focused on finding Ohio data regarding the potential threats using the outline below as guidance for writing reports. The availability of Ohio data constrained the research efforts, however the group did develop reports that ultimately serve as the foundation for most of the human health-oriented information in this report. The group also rated the human health risks using the reports and their professional judgment and presented their evaluations to the PAG as advice on the human health risks.

Human Health Outline

- I. Introduction
- II. Hazards/Severity
 - A. Types of Health Effects (cancer, non-cancer; chronic, acute)
 - B. Hazards (indicator chemicals, physical hazards such as fires)
 - C. Human health pathway (ingestion, inhalation, absorption)
- III. Population
 - A. Overall estimate (size of Ohio's population exposed to hazards in II)
 - B. Special populations at risk from the hazards in II (children, the elderly, asthmatics)
 - C. Special geographic concerns (regions or communities in the state at special risk from the hazards in II) (e.g. Southeastern Ohio, urban areas)
- IV. Information/Discussion of Data Sources
 - A. Information on human exposure to health stressors (current state of the research identifying how humans are exposed)
 - B. Dose-response (research identifying a link between dose of a chemical and human health response)

- C. Presence or absence of actual state data on incidence of illness or death (current data linking exposure to health risk in Ohio)
- D. Level of conservatism in assumptions
- E. Information based mainly or only on animal model (presence of longitudinal human health studies or mainly laboratory studies)

V. Other Considerations

- A. Time imminence of threat (current, future or ongoing threat)
- B. Interconnectedness with other problems
- C. Reversibility of health threat
- D. Evidence of trend

ECOSYSTEM ASSESSMENT

Ecological risk assessment methods generally are not as well-developed as human health risk assessment methods, so the Ecosystem Workgroup faced a challenge in developing a framework for their research. As the Human Health Workgroup did, the Ecosystem Workgroup agreed to attempt to gather Ohio data relative to how Ohio's ecosystems have been affected by the potential environmental threats. Once again, as with the human health assessment, the availability of Ohio data was a limiting factor. The ecosystem framework is depicted below.

The Ecosystem Workgroup took a different approach than the Human Health Workgroup in attempting to specifically quantify the ecosystem risks on numerical scales. The scales resulted in scores for each of the potential threats and these scores were used in the group's rating of the ecosystem risks.

Ecosystem Outline

I. General Overview

- A. Background/Introduction of Activity
- B. Definitions of Technical Terms

II. Stressor Discussion

- A. Intensity. A measure of the severity or magnitude on the health of the ecosystem: 1 = non-lethal effects on individual organisms only; 2 = loss of individual organisms; 3 = non-lethal effects on whole populations; 4 = loss or exclusion of populations; and 5 = complete destruction of ecosystem.
- B. Extent. The percentage of the ecosystem that is affected by the activity: 1 = less than 1% of ecosystem affected; 2 = 1-5% of ecosystem affected; 3 = 5-10% of ecosystem affected; 4 = 10-50% of ecosystem affected; and 5 = 50- 100% of ecosystem affected
- C. Reversibility. A measure of how long it will take the ecosystem to recover from the effect of the stressor: 1=less than one year; 2=1-5 years; 3=5-20 years; 4=20-70 years; and 5 = unrecoverable (greater than 70 years)
- D. Uncertainty. A measure of the evidence that the effect will occur: 1= no direct evidence that effect will be produced; 2 = effect is possible based on understood biological principals; 3 = effect is probably based on experience with similar situations; 4 = some effects have been measured; 5 = effect documented to occur.

III. Level of Confidence

The level of confidence scale is the opposite of the other scales (the higher the level of confidence, the more confident the researcher is about the information). The scale runs from 5 = no confidence to 1 = high confidence.

QUALITY-OF-LIFE ASSESSMENT

Even more than the ecological assessment, assessing quality-of-life risks is not based on an accepted model. The Quality-of-Life Workgroup faced a challenge not only in developing a framework to organize their research, but a real challenge in finding data to support their assessment of quality-of-life risks. The group focused on the six general criteria described below.

CRITERIA CATAGORY IMPACTS

Peace of Mind	Safety,happiness,and health
Sense of Community	Neighborhoods, personal growth and responsibility
Economic Impact	Meeting one's needs, personal goal achievement, actual/projected costs, external costs, achievability
Aesthetics	Visibility, noise, odors, and visual impacts
Fairness	Sense of equity, environmental justice, number of affected persons, severity of effects on subpopulations, property owners rights
Future Generations	Availability of substitutes, reversibility of effects, sustainability
Recreation	Access to recreational lands, passive and active opportunities, quality of recreational environment, opportunities for solitude

In reviewing the criteria, it is clear that finding Ohio data that quantifies the impacts of potential threats on such factors as peace of mind or future generations is not easy. For this reason, the quality-of-life assessment was the most subjective and qualitative component of the technical analysis, although professional judgment did influence the other analysis as well. The Quality-of-Life Workgroup was instrumental in developing and compiling the environmental statistics and indicators found in Chapter 14 of the State of the Environment Report. As the other workgroups did, the Quality-of-life Workgroup ranked risks to quality-of-life in Ohio.

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Ohio Environmental Statistics and Indicators - Land/Habitat/Natural Resources

Ohio is a state with some distinct regional land use patterns. Agricultural land use is centered in the northwest; rolling hills and woodlands are in the southeast; and the major metropolitan areas are in the northeast, central and southwestern parts of the state.

Indicators about land use are not the only information presented in the table below. Also included are indicators for activities that are land-based, such as recreation and agriculture. In addition, some statistics relevant to wildlife habitat are presented below because habitat is a type of land use.

LAND/HABITAT/NATURAL RESOURCES		
INDICATOR	VALUE	DATA SOURCE
Ohio land area (square miles)	40,952.6	U.S. Bureau of Census, 1990 census
Number of designated state or federal "wilderness areas" in Ohio	2	ODNR, Division of Forestry (Shawnee Wilderness Area within Shawnee State Forest and West Sister Island)
	1989: 183 1990: 187 1991: 196 1992: 197 1993: 200	Ohio Dept. of Agriculture, 1991 Annual Report
Urban land use in Ohio	1900: 1.5% 1985: 8.5%	Ohio State University Extension Service, 1989. Information Package Bulletin 698.
Cropland in Ohio	1900: 46.2% 1985: 48.1%	Ohio State University Extension Service, 1989. Information Package Bulletin 698.
Pasture in Ohio	1900: 47.8% 1985: 10.5%	Ohio State University Extension Service, 1989. Information Package Bulletin 698.
Acreage of wetlands in Ohio (percent of total land area) in 1993	701,000 (2.6%)	ODNR, 1993. Ohio Wetlands Inventory.

Number of properties in Ohio in identified flood prone areas	278,000	ODNR, 1994. Division of Water
Number of townships with rural zoning	619	Ohio State University Extension Service, 1989. Information Package Bulletin 698.
	1940: 244,000 1950: 208,000 1960: 149,000 1970: 118,000 1980: 95,000 1990: 84,000 1991: 80,000 1992: 78,000 1993: 76,000	Ohio Dept. of Agriculture, 1991 Annual Report.
Number of federally-listed endangered and threatened species in Ohio	20	ODNR, Division of Wildlife
Number of state and federal endangered plant and animal species in Ohio	337	ODNR, Division of Wildlife
Change in wetlands since 1700	-90%	Ohio EPA, 1992 Ohio Water Resources Inventory
Change in woodlands since 1750	-60%	ODNR, 1994. Forests of Ohio (Note: the percentage of forestland in Ohio reached a low about 1940 but has increased steadily since then)
Change in forest since 1979	+3%	ODNR, 1994. Forests of Ohio
Amount of forest land in Ohio	1940: 3.2 million acres 1991: 7.86 million acres	ODNR, 1994. Forests of Ohio (Note: the percentage of forestland in Ohio reached a low point about 1940, but has increased steadily since then)
Percent of forested land in Ohio, 1991	30%	ODNR, 1994. Forests of Ohio
Change in total woodland in Ohio farms from 1978 to 1987	-15%	ODNR, 1994 . Ohio Wildlife Population Status and Hunting Forecast

Total outdoor recreation acreage (percent of total acreage)	1,417,557 (5.4%)	ODNR, 1993 Statewide Comprehensive Outdoor Recreation Plan
State-held lands for recreation	490,151 acres	ODNR, 1993 Statewide Comprehensive Outdoor Recreation Plan
Federal-held lands for recreation	316,852 acres	ODNR, 1993 Statewide Comprehensive Outdoor Recreation Plan
State and federal outdoor recreation acres per 1,000 people	74.87	ODNR, Division of Real Estate and Land Management (estimated)
	PA : 823 MI: 809 WV: 779 KY: 269 IN: 154 OH: 131	ODNR, 1993 Statewide Comprehensive Outdoor Recreation Plan
Change in state park usage from 1984-1994	+43%	ODNR, Division of Parks and Recreation
Number of state nature preserves open to the public	36	ODNR, Division of Natural Areas and Preserves
Miles of bike and hiking trails in Ohio	3,736	ODOT, Ohio Statewide Bicycle Plan, 1995
Number of bald eagles located in mid-winter 1993 survey	76	ODNR, 1994 . Ohio Wildlife Population Status and Hunting Forecast (a record number)
Number of breeding sites for bald eagles	1979: 4 1994: 26	ODNR, 1994 . Ohio Wildlife Population Status and Hunting Forecast

	<p>Five year averages:</p> <p>1952-56: 85798.6 1957-61: 100906.8 1962-66: 93208.6 1967-71: 104393.4 1972-76: 93472 1977-81: 61422.4 1982-86: 95618.2 1987-91: 138719.4 1992-94: 229758</p>	ODNR, 1994 . Ohio Wildlife Population Status and Hunting Forecast (Note: waterfowl includes ducks, geese, coot, and swans)
Ohio species of fish that are endangered, threatened, extirpated, extinct, or declining	40%	Ohio EPA, 1992 Ohio Water Resources Inventory
Ohio species of fish that were endangered, threatened, extirpated, extinct or declining prior to 1980	30%	Ohio EPA, 1992 Ohio Water Resources Inventory
Number of residential, retail, and other building permits granted in Ohio, 1994	39,596	U.S. Bureau of Census, 1990 census
Number of new housing rental unit developments built in Ohio, 1994	38,394	U.S. Bureau of Census, 1990 census
Number of new oil and gas wells drilled in 1993 (percent change from 1992)	882 (-6.7%)	ODNR, 1994, Division of Oil and Gas
Number of active oil and gas wells	64,622	ODNR, 1994, Division of Oil and Gas

<p>State average soil erosion for agricultural land types in tons/acre/year</p>	<p>cultivated cropland 1982: 3.9 1987: 3.7 1992: 3.3</p> <p>uncultivated cropland 1982: 1.6 1987: 1.9 1992: 1.9</p> <p>pasture 1982: 2.2 1987: 1.7 1992: 1.7</p>	<p>Natural Resources Conservation Service (formerly Soil Conservation Service), Natural Resource Inventory (1982, 1987, 1992)</p>
<p>Natural Resource Extraction</p>	<p>coal (million tons/year) 1960: 34 1970: 55 1992: 29</p> <p>limestone (million tons/year) 1960: 35 1970: 46 1992: 53</p> <p>sand & gravel (million tons/year) 1960: 33 1970: 41 1992:45</p> <p>oil (million bbls/year) 1960: 5.4 1970: 9.9 1985: 15 1993:8.0</p> <p>gas (bcf/year) 1960: 39 1970: 74 1985: 182 1993: 136</p>	<p>Statistical Abstract of Ohio 1969; Ohio Almanac 1970; 1992 Statistical Abstract of U.S.; 1993, 1994, 1995 Ohio Geology</p>

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PUBLIC ADVISORY GROUP

The Public Advisory Group was the central group in the risk ranking phase of Ohio's Comparative Risk Project for two reasons: they were responsible 1) for coordinating public outreach activities and 2) for ultimately analyzing and synthesizing both technical and public information into the risk ranking. The group developed the following mission statement:

The mission of the Public Advisory Group of the Ohio Comparative Risk Project is to facilitate and ensure the use of teamwork and consensus among the people of Ohio in creating a plan of action that merges science and public values as the foundation for ongoing environmental policy and decision making to address environmental risk in Ohio.

The PAG volunteers recognized early in the process that they were not demographically-representative of Ohio's citizens. With this understanding, they agreed to actively solicit information from as many groups and individuals as possible and to rely on public outreach data and technical information as much as possible in their ranking.

RISK RANKING ISSUES

The PAG faced a major challenge in combining public and technical information to rank risks in an understandable and defensible manner. In developing their risk ranking methodology, the group agreed to several threshold concepts regarding residual risk, the role of non-risk factors, and the role of public outreach.

Residual risk. The PAG asked themselves if they were ranking "residual" risks, assuming the existence of present regulations or risk management mechanisms, or if they were ranking absolute risks, assuming the non-existence of any risk management. The group agreed to focus on residual risk or the risks that actually exist today. They felt residual risks were a better basis for risk ranking, because (i) such risks would be more easily understood by the public and legislators, and (ii) it would be easier to compile reliable technical data describing existing conditions than it will be to compile data describing hypothetical conditions. The group agreed to use residual risk in the ranking with the caveat that if existing regulations should change, then the ranking could change.

Non-risk factors. The PAG discussed the extent of non-risk factors (such as the technical feasibility of reducing the risk, the economics of reducing the risk and public willingness to accept available options for reducing the risk) in the ranking phase of the project. They determined that the risk ranking process should provide a "baseline" assessment of the risks presented and should not be skewed by factors which relate to the feasibility of reducing those risks, because (i) feasibility issues will be addressed in the second phase of the project when risk management recommendations are developed, and (ii) the more criteria incorporated into the risk ranking phase, the more complicated the analysis becomes and the more difficult it will be to keep the process manageable.

Public outreach information. With the large amount of public outreach information gathered, the PAG needed a focused manner to factor the results of public outreach into the risk ranking process. They agreed that independent of the risk ranking process, the results of the public outreach effort are an important part of describing the "state of the environment" in Ohio. Accordingly, all available data should be presented and explained as part of the Report.

For the risk ranking portion of this report, the PAG sought a sense of the public's risk "values" to assist them in comparing the various types of risks identified in the technical workgroup reports. Even with extensive technical information, subjective policy judgments are an inescapable element of any comparison. For example, what is the relative emphasis placed on human health, ecosystem and quality-of-life risks? Further, within a category of risks (for example, human health), what is the relative emphasis placed on different criteria (for example, protection of future generation vs. lethal effects) within that category.

To produce a risk ranking, these sorts of tradeoffs--which are matters of policy rather than science--must be addressed. The PAG used its public outreach data, particularly the statewide telephone poll, to determine how Ohio's citizens wished to make such choices.

In addition to the public "values," the PAG's outreach efforts generated extensive data on public "perceptions" of the risks presented by various threats. The comparative risk process seeks to rank risks based on actual rather than perceived risk, so such data do not affect the human health or ecosystem rankings. However, when the public believes a condition presents a significant risk, the condition negatively impacts peace of mind, even if the actual risk is much lower than believed. Accordingly, the PAG incorporated public perception data into the quality-of-life ranking, via the peace of mind criterion.

The concepts regarding residual risk, non-risk factors, and the role of public outreach were taken into account as the PAG ranked the risks.

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Ohio Environmental Statistics and Indicators - Water

Among the most comprehensive indicators in Ohio are those that deal with water resources. The Ohio Environmental Protection Agency (Ohio EPA) is a national leader in water quality monitoring and assessment. Ohio EPA has extensively sampled and documented surface water quality in the state since the early 1970s. Ground water quality is as important as surface water quality in Ohio, and several of the indicators below are relative to ground water in the state.

WATER		
INDICATOR	VALUE	DATA SOURCE
Sampled streams in Ohio with impaired uses	1979-88: 44.0% 1989-92: 29.1%	Ohio EPA, 1992 Ohio Water Resources Inventory
Total number of fish kills caused by pollutants in 1992 in Ohio	54	Ohio EPA, 1992 Ohio Water Resources Inventory; U.S. EPA National Water Quality Inventory, March 1994
Total number of fish killed by pollution, 1992	41,318	Ohio EPA, 1992 Ohio Water Resources Inventory; U.S. EPA, March 1994
1992 Ohio fish kills as a percent of the nation	6	Ohio EPA, 1992 Ohio Water Resources Inventory; U.S. EPA National Water Quality Inventory, March 1994
Number of public water bodies cited for having contaminated fish since 1983	18	Ohio Department of Health, 1994
Number of stream miles in Ohio (named and designated streams and rivers)	29,000	Ohio EPA, 1992 Ohio Water Resources Inventory
Number of stream miles impaired in 1992	1,704	Ohio EPA, 1992 Ohio Water Resources Inventory
Number of fish tissue advisories in 1992	20	Ohio EPA, 1992 Ohio Water Resources Inventory
Number of stream miles affected by nonpoint pollution sources in 1992	12,463	Ohio EPA, 1992 Ohio Water Resources Inventory

Streams and rivers in Ohio fully supporting aquatic life uses	33.1%	Ohio EPA, 1992 Ohio Water Resources Inventory
Approximate number of point discharges to Ohio streams	3,800	Ohio EPA Division of Surface Water, 1995
Approximate number of combined sewer overflows in Ohio	2,000	Ohio EPA, 1992 Ohio Water Resources Inventory
Percent of stream miles monitored that were impaired by sedimentation	17.87%	Ohio EPA, 1992 Ohio Water Resources Inventory
Percent change in point sources as a major source of impairment in reassessed streams	-56%	Ohio EPA, 1994 Ohio Water Resources Inventory; Ohio EPA
Major water uses in Ohio	Power: 73% Manufacturing: 14% Public supplies: 10% Other: 2% Rural: 1%	ODNR, Division of Water, Water: Ohio's Remarkable Resource
Number of water supplies in 1992 with detected levels of VOCs	97	Ohio Environmental Council, 1992. Safe Drinking Water: A Guide to Wellhead Protection for Ohio Citizens and Communities.
Approximate percent of private water wells containing high levels of bacteria	23-40%	Ohio Department of Health (personal communication); Ohio Environmental Council, 1992. Safe Drinking Water: A Guide to Wellhead Protection for Ohio Citizens and Communities.
Number of scenic rivers (percent total Ohio river miles)	10 (8.9%)	ODNR, 1993. Division of Natural Areas and Preserves
Number of state park beaches closed or posted by local health departments due to elevated coliform counts in 1993 & 1994	17	ODNR, Division of Parks and Recreation
Estimated percentage of on-site residential wastewater systems that are failing to adequately treat wastewater	27%	Mancl, Karen. 1990. A survey of small sewage treatment facilities in Ohio. Ohio Journal of Science 90, 4: 112-117.
Approximate number of idle/orphan water wells in Ohio	200,000	ODNR, Division of Water

Number of sole source aquifers in Ohio	5	ODNR, Division of Water
Approximate number of people with public water systems exposed to trihalomethanes above the maximum contaminant level	1993: 34,960 1994: 20,690	Ohio EPA, Division of Drinking and Ground Water (NOTE: 9,690 people in 1994 were the same people also exposed in 1993)

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RISK RANKING

There were several steps to producing the overall list of issues ranked by risks including: 1) developing categorical rankings of human health, ecosystem, and quality-of-life risks; 2) drafting an overall ranking based on specific criteria; 3) seeking public comment on the draft list; and 4) revising the list as necessary based on public comment.

CATEGORICAL RANKING

Prior to establishing the overall ranking of risks, the PAG considered the potential threats in terms of their risks to human health, ecosystems, and quality-of-life. The PAG developed three separate rankings using information provided by three technical workgroups (one for each category of risk), telephone interviews with Ohio environmental professionals, results from numerous public outreach activities, and their own judgment and experience.

To guide their development of three categorical rankings, the PAG developed a set of criteria applicable to the types of risk presented by each category. These criteria, some of which were given greater weight than others, were used to compare and evaluate potential threats to establish a relative A, B, C ranking. The weight attached to each criteria was derived from responses of Ohioans obtained through the public outreach process, from the recommendations of the professional workgroups, and from the judgment and experience of PAG members. The criteria for each category are outlined below.

Human Health

Greater weight	Are there lethal effects when Ohioans are exposed to the potential threat? Does the potential threat affect future generations? Are there non-lethal effects that may be irreversible?
Middle weight	Are the effects from exposure to the potential threat non-lethal? Are some segments of the population, such as low-income or minorities, at greater risk from exposure than others? What is the trend; is the situation improving or getting worse?
Lesser weight	How toxic are the components of the potential threat?

Ecosystems

Greater weight	Are there lethal effects on ecosystem components? Are future generations affected? Are sensitive, rare, threatened, or endangered species affected? Are there non-lethal effects that may be irreversible?
Middle weight	What is the impact on the diversity of species? Are there reversible non-lethal effects? What is the impact on ecosystem function?
Lesser weight effects?	Are there disproportionate impacts? Is there evidence of cumulative, antagonistic, or synergistic effects?

Quality-of-life

Greater weight	Does the issue affect peace of mind, future generations or some
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segments of the weight population disproportionately?

Middle threat? weight Are there economic, aesthetic or recreational impacts from the

Lesser property weight Is exposure to the potential threat voluntary in nature or are there impacts that are non-monetary? Does the potential threat impact sense of community or mobility?

To the extent that the PAG felt there was adequate information to support a ranking, each potential threat was ranked either A, B, or C. These labels are designed to convey relative rather than absolute levels of importance. For instance, the issues in Group A are considered greater risks than those in Group B and Group C, and issues in Group C are considered lesser risks than those in Group A or Group B. However, placement in Group A does not mean the threat presents an urgent risk and placement in Group C does not mean the threat presents an insignificant risk.

DRAFT OVERALL RANKING

Once potential threats were ranked on the basis of human health, ecosystem, or quality-of-life risks, the PAG developed an integrated ranking using the framework discussed below. Since some potential threats ranked higher in one category than in others, the PAG had to make choices about the relative weight of human health, ecosystems, and quality-of-life impacts. The group turned to its public outreach information for guidance in how to make such "tradeoffs." In a geographically-balanced, statewide random telephone poll, 900 Ohioans said that they are most concerned about how environmental threats impact their health. Survey respondents gave the second greater weight to quality-of-life impacts and the third greatest weight to impacts to Ohio's ecosystems. The survey also demonstrated great concern for protection of future generations. The PAG's preliminary overall ranking was weighted based on the criteria outlined below.

Greater weight:	High human health risk
high	High ecosystem risk and either medium human health risk or quality-of-life risk
	High quality-of-life risk and medium human health risk
Medium weight:	Medium human health risk
	High ecosystem risk
	High or medium quality-of-life risk
Lesser weight:	Low human health risk
	Medium or low ecosystem risk
	Low quality-of-life risk

As with the separate rankings for human health, ecosystems, and quality-of-life, the overall criteria were used to place potential threats in Group A, Group B, or Group C. It is important to note that the PAG chose to use A, B, and C in the ranking process rather than high, medium, and low because the ranking process is intended to provide insight into relative degrees of risk, not absolute degrees of risk. Those issues in Group A represent greater risk than those in Group B and Group C, but not necessarily the greatest risks in Ohio.

PUBLIC COMMENT ON THE DRAFT RANKING

On September 25, 1995, the PAG issued a draft ranking for public review and comment using the criteria outlined above. Approximately 50 comments were received and the PAG reconsidered the overall ranking criteria and the ranking of some specific issues on November 8, 1995. The group made two major changes prior to finalizing the ranking: 1) they re-evaluated the quality-of-life ranking and 2) they re-evaluated the weight of ecosystem effects in the overall ranking.

Quality-of-life Ranking. For the purpose of the draft list, the PAG separately ranked individual threats within the problem categories, but ranked the quality-of-life risks by problem category only. This provisional ranking was consistent with the Quality-of-life Technical Workgroup's ranking approach and there was insufficient time to rank each potential threat for quality-of-life risk and complete the draft overall ranking. The result of this decision was that all threats in a specific problem category were given the same quality-of-life rankings (in the draft ranking, yard waste received the same quality-of-life ranking as unregulated hazardous waste facilities).

OHIO RISK RANKING

However, the PAG recognized that these rankings would probably require some adjustment before the rankings were finalized. PAG members reviewed and reranked the quality-of-life categorical rankings and the list below reflects the re-ranking.

The PAG's human health, ecosystem, and quality-of-life rankings are below:
(NR=not ranked at this time; NA=not applicable to this category).

	Human Health	Ecosystem	Quality-of-Life
	Rank	Rank	Rank
Abandoned industrial sites	A	B	A
Abandoned water wells	B	C	B
Channelization of streams and rivers	C	A	B
Combustion by-products	B	C	A
Construction of dams	C	B	B
Construction and demolition debris	NR	C	B
Disposal capacity	C	C	A
Drinking water at the tap	A	NA	A
Exposure from consumer unawareness	A	A	A
Filling/diking/draining of wetlands	C	A	A
Floods	C	C	A
Fugitive dust	C	C	B
Harvesting natural resources	C	B	B
Illegal dumping	NR	C	A
Inadequate infrastructure	A	B	B
Indoor air quality	A	NA	B
Industrial/commercial wastewater discharges	A	A	B
Litter	NR	NR	A
Loss of wildlife habitat	B	A	A
Loss of species diversity	B	A	A
Mining activities	B	A	B
Mobile source emissions	A	B	A
Municipal waste disposal facilities	A	B	A
Municipal wastewater discharges	C	B	A
Natural food toxins	B	NA	C
Nonpoint source/agricultural runoff	B	A	B
Oil and gas exploration	B	B	B
Other natural hazards	C	C	C
Overconsumption of natural resources	NR	NR	B
Ozone-depleting substances	A	A	A
Pesticide spraying	B	B	A
Pesticide residues on foods	B	NA	C
Population change	B	A	A
Recreation	C	C	B
Regulated hazardous waste facilities	B	B	A
Sludge disposal	C	C	B
Spills and accidental releases	C	B	B
Stationary air emissions (utilities, industrial & commercial)	B	C	A
Storm water runoff from non-agricultural areas	NR	A	B
Tire management	B	C	B
Transportation of waste	C	C	B

OHIO RISK RANKING

Uncontrolled development	C	A	A
Underground storage tanks	B	C	B
Unregulated/abandoned hazardous waste facilities	A	A	A
Yard waste	C	C	C

Overall ranking. Many of the comments received on the draft list indicated a serious concern with the relative weight given to ecosystem issues. The PAG discussed the available public outreach data upon which the relative weighting of human health, ecosystems and quality-of-life was based. The group agreed that human health risk should remain the most important criterion. However, given the public's significant concern with threats to future generations and long term impacts of ecosystem degradation, the PAG revised the overall criteria to give ecosystem effects equal weight with quality-of-life effects. The group also revised the ranking group breakdowns from three major groups to seven smaller groups. The final ranking follows and the seven groupings are identified below. THE ISSUES IN EACH GROUP ARE ALPHABETIZED--NOT RANKED.

RELATIVE RISK	GROUPING
HIGHER	ISSUES PLACED IN HUMAN HEALTH GROUP A
	ISSUES PLACED IN BOTH ECOSYSTEM GROUP A AND QUALITY-OF-LIFE GROUP A
	ISSUES PLACED IN BOTH HUMAN HEALTH GROUP B AND EITHER ECOSYSTEM GROUP A OR QUALITY-OF-LIFE GROUP A
	ISSUES PLACED IN HUMAN HEALTH GROUP B
	ISSUES PLACED IN EITHER ECOSYSTEM GROUP A OR QUALITY-OF-LIFE GROUP A
	ISSUES PLACED IN EITHER ECOSYSTEM GROUP B OR QUALITY-OF-LIFE GROUP B
LOWER	ISSUES PLACED IN HUMAN HEALTH GROUP C

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Ohio Environmental Statistics and Indicators - Environmental Management

Indicators pertaining to environmental management include indicators about solid and hazardous waste management, as well as the use of pesticides in the environment. Outdoor air quality indicators are also located in this section.

ENVIRONMENTAL MANAGEMENT		
INDICATOR	VALUE	DATA SOURCE
Change in quantity of pesticides used on Ohio's farms from 1982 to 1986	-19.5%	Waldron et al., 1986. Pesticide Use on Major Crops in the Ohio River basin in Ohio and Summary of State Usage--1986. The Ohio Cooperative Extension Service and Ohio Agricultural Research and Development Center.
Number of unregulated hazardous waste sites in Ohio	1,180	Ohio EPA ,1995. Master Sites List.
Approximate number of people with private wells with contaminants above the secondary maximum contaminant level	566,306	ODNR well log data, ODNR geologic map, 1990 county population--Ohio Data Users Center
Approximate number of people with public water systems exposed to trihalomethanes above the maximum contaminant level	1,072,123	Ohio EPA--Division of Drinking and Ground Water, trihalomethane data
Number of publicly available landfills	69	Ohio EPA, 1993. Ohio Solid Waste Facility Report
Percentage of Ohio's solid waste that was incinerated in 1992	8%	Ohio EPA, 1993. Ohio Solid Waste Facility Report

	(million tons) Landfilled: 16,522,000 Incinerated: 1,349,000 Transferred: 2,309,000 Recycled: 84,000 Resource recovery: 869,000	Ohio EPA, 1993. Ohio Solid Waste Facility Report.
Number of licensed solid waste disposal facilities	1971: 361 1992: 104	Ohio EPA, 1993. Ohio Solid Waste Facility Report
Number of Ohio counties that are marginal or moderate ozone nonattainment areas	24	Ohio EPA, Division of Air Pollution Control
Number of Ohio counties that are marginal or moderate PM10 nonattainment areas	1	Ohio EPA, Division of Air Pollution Control
Number of blood lead level assessments conducted by Ohio Dept. of Health	FY92: 223 FY91: 128	Ohio Dept. of Health, 1992 Annual Report
Number of reported incidents in 1993 that resulted in the disposal of flammable or explosive substances	72	Ohio Dept. of Commerce, 1993 Annual Report
	UST Inspections Upgrades: 3,818 Installations/replacements: 3,125 Repairs: 510 Temporary Closures: 64 Removals & replacements: 8,318	Ohio Dept. of Commerce, 1993 Annual Report
	in pounds/year 1987: 482,768,794 1988: 498,960,958 1989: 341,378,117 1990: 287,360,468 1991: 257,770,716 1992: 231,021,887 1993: 225,262,526	Ohio EPA, Division of Air Pollution Control, 1995
	Transfers off-site: 29.88% Public sewer systems: 7.74% Deepwell injection: 11.48% Land: 10.35% Water: 2.13% Air: 38.44%	Ohio EPA, Division of Air Pollution Control, 1995

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Ohio Environmental Statistics and Indicators - Final Overall Ranked List of Environmental Issues

(Issues within each of the following seven groups are alphabetized and of equal rank)

Relative risk is listed from higher to lower.

Quality-of-	Categorical Rankings		
	Human health	Ecosystem	life

Issues Placed in Human Health Group A

Abandoned industrial sites	A	B	A
Drinking water at the tap	A	NA	A
Exposure from consumer unawareness	A	A	A
Inadequate infrastructure	A	B	B
Indoor air quality	A	NA	B
Industrial/commercial wastewater discharges	A	A	B
Mobile source emissions	A	B	A
Municipal waste disposal facilities	A	B	A
Ozone-depleting substances	A	A	A
Unregulated/abandoned hazardous waste facilities	A	A	A

Issues Placed in Both Ecosystem Group A and Quality of Life Group A

Filling/diking/draining of wetlands	C	A	A
Loss of species diversity	B	A	A
Loss of wildlife habitat	B	A	A
Population change	B	A	A
Uncontrolled development	C	A	A

Issues Placed in Both Human Health Group B and Either Ecosystem Group A or Quality of Life Group A

Combustion by-products	B	C	A
Mining activities	B	A	B
Nonpoint source/agricultural runoff	B	A	B
Pesticide spraying	B	B	A
Regulated hazardous waste facilities	B	B	A

Stationary air emissions (utilities, industrials
and commercial)

B C A

Issues Placed in Human Health Group B

Abandoned water wells	B	C	B
Natural food toxins	B	NA	C
Oil and gas exploration	B	B	B
Pesticide residues on foods	B	NA	C
Tire management	B	C	B
Underground storage tanks	B	C	B

Issues Placed in Either Ecosystem

Group A or Quality of Life Group A

Channelization of streams and rivers	C	A	B
Disposal capacity	C	C	A
Floods	C	C	A
Litter	NR	NR	A
Stormwater runoff from non-agricultural areas	NR	A	B

Issues Placed in Either Ecosystem Group B

or Quality of Life Group B

Construction and demolition debris	NR	C	B
Consttuction of dams	C	B	B
Fugitive dust	C	C	B
Harvesting natural resources	C	B	B
Illegal dumping	NR	C	A
Municipal wastewater discharges	C	B	A
Overconsumption of natural resources	NR	NR	B
Recreation	C	C	B
Sludge disposal	C	C	B
Spills and accidental releases	C	B	B
Transportation of waste	C	C	B

Issues Placed in Human Health Group C

Other natural hazards	C	C	C
Yard waste	C	C	C

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ISSUES PLACED IN HUMAN HEALTH GROUP A

Abandoned industrial sites

- These sites are idle land that previously housed industrial operations ; also called "brownfields."
- Exposure to chemicals associated with these sites could lead to lethal effects, especially in children, who may come in contact with the sites most often.
- The infeasibility of developing these sites could lead to habitat loss as other areas are developed.
- Many of these sites are located in urban areas and their abandonment has led to disproportionate health and economic impacts on those who live closest.

Drinking water at the tap

- All Ohioans depend upon the availability of a safe drinking water source. Ground water contamination from threats like leaking underground storage tanks and landfill leachate threaten the health of citizens who rely on private water wells. Tap water quality is dependent on the chemical, physical and biological hazards in the water; inadequate supply and distribution, lead, water treatment processes, and biological contaminants are among the potential threats to drinking water.
- Some contaminants in drinking water, such as lead, affect children more than adults.
- Ohioans who live in older homes are more likely exposed to some contaminants than those who do not.
- Ohioans polled at the 1995 state fair consider drinking water to be the most important environmental concern in the state.

Exposure to hazardous substances due to lack of consumer awareness

- Ohioans sometimes expose themselves and ecosystems to hazardous substances due to a lack of understanding about the potential risks. Examples of threats in this category include improperly disposing of used motor oil and unsafe practices with household pesticides.
- Exposure to some household chemicals could lead to lethal or non-lethal irreversible health effects, particularly in children.
- Improperly disposing of substances such as motor oil and household chemicals could lead to irreversible impacts on ecosystems.
- Ohioans who participated in a 1995 public opinion poll believe that people being unaware of safe environmental practices is among the top five most important environmental issues.

Inadequate infrastructure

- Inadequate infrastructure includes impacts from inadequately treated wastewater, combined sewer overflows, and storm water drainage wells.
- There are approximately 2,000 combined sewer overflow locations in Ohio. There are approximately 4,000-5,000 inventoried storm water drainage wells (Class V wells) in Ohio; and there may be as many as 50,000 Class V wells total in the state.
- The presence of improperly treated residential sewage creates the potential for the transmission of disease.
- During periods of heavy rainfall, storm water drainage wells and combined sewers may overflow, resulting in localized impacts on the ecosystem.
- When surface water is contaminated by an overflow, aesthetic and recreational opportunities are affected.

Indoor air quality

- Radon, environmental tobacco smoke, biological organisms, lead, and "off-gases" from chemicals, carpets and furniture are some of the potential threats to indoor air quality.
- This issue affects almost every Ohioan; there are very few controls in place to reduce exposure.
- Scientists generally view indoor air quality as a greater health risk than do citizens.

- In the 1995 state fair poll and the public opinion survey, Ohioans ranked indoor air quality as an area of low concern.

Industrial and commercial wastewater discharges

- Industrial discharges can include heavy metals, volatile organic compounds, oil and petroleum products, among other pollutants.
- The major risk associated with these discharges is contaminated sediment from past discharges, which occurred when this activity was less regulated.
- Ohioans may be exposed to serious pollutants by consuming contaminated fish.
- Contaminants from past industrial and commercial discharges accumulate in the ecosystem, creating the potential for long-term impacts, especially for rare and endangered species.

Mobile source emissions

- Forty-three percent of all air pollution has been linked to mobile source emissions, including carbon monoxide, carbon dioxide, nitrogen oxides, and some known carcinogens such as benzene.
- Only 2 percent of Ohioans use public transportation to get to work.
- Exposure to pollutants from mobile sources is chronic and long-term and can result in lethal and irreversible, non-lethal human health effects.
- Ohioans who live in urban areas are exposed to the greatest risk from mobile source emissions.
- In a public opinion poll and an outreach project focusing on African Americans, outdoor air quality issues were the greatest concern.

Municipal waste disposal facilities

- Most municipal waste in Ohio is disposed of in landfills; those landfills that were sited prior to current regulations pose greater health risks than those sited after landfill regulation in Ohio.
- Ohioans may be exposed to contaminants from landfills when water leaches through the landfill into ground water.
- The threats to ecosystems from landfills are associated with contaminated storm water runoff and generally are localized.
- The locations of landfills suggest that some of Ohio's population is disproportionately exposed to risks.
- Ohioans who participated in facilitated sessions with the Ohio Alliance for the Environment ranked solid waste issues as the most important problem.

Ozone-depleting substances

- Ozone-depleting substances include naturally occurring substances and artificial substances such as chlorofluorocarbons (CFCs).
- Every Ohioan who spends time outdoors is at risk from depletion of the ozone layer; the major health concerns are ultraviolet radiation and increased cases of skin cancer.
- Large ecosystems can be irreversibly destroyed by continual depletion of the ozone layer.
- There is some evidence that this problem may become a greater concern as time goes by; future generations are at-risk to exposure.

Unregulated or abandoned hazardous waste facilities

- Abandoned hazardous waste facilities include those sites that are on the Superfund list for cleanup. Pollutants associated with these sites can include known and suspected carcinogens.
- There are 1,180 abandoned or uncontrolled hazardous waste sites in Ohio.
- Health risk from exposure to these sites occurs mainly as a result of drinking contaminated ground water; some substances associated with these sites are known carcinogens.
- Ecosystem effects are greater at these sites than active sites because of the potential for off-site migration of contaminants.

- There is some evidence that some segments of Ohio's population may be at greater risk to exposure than others.

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ISSUES PLACED IN BOTH ECOSYSTEMS GROUP A AND QUALITY-OF-LIFE GROUP A

Filling, diking and draining of wetlands

- Wetlands often are altered mechanically in order to make way for development or other purposes.
- Ohio has lost 90 percent of its wetland habitat since 1900.
- Altering wetlands results in complete destruction of one the most sensitive ecosystems.
- While this is a serious ecosystem concern, the health impacts are not known.
- Women who participated in a poll at a conference of environmental professionals consider habitat loss the most serious environmental problem in Ohio.

Loss of wildlife habitat and species diversity

- Over the past 200 years, habitat in most of Ohio has been converted from nearly a continuous cover of mature, deciduous forest to a mosaic of agricultural, suburban/urban and fragmented woodlands; original prairie habitat has been lost as a functional ecosystem.
- Humans rely on many natural species for medicines. When species are lost some medicinal cures may be lost as well.
- The loss of habitat is a serious ecosystem risk, resulting in fragmentation and isolation of habitats.
- There are 337 state and federal endangered species in Ohio.
- In a 1990 poll, 84.5 percent of Ohioans surveyed felt it was extremely important to set aside areas for endangered species.

Population change

- Changes in population include both changes in size and distribution.
- Increased population density and crowding can result in the increased incidence of the spread of infectious diseases.
- There are 264.9 persons per square mile in Ohio.
- Population growth and changes in distribution can lead to irreversible land use and, therefore, habitat loss.
- Land use changes resulting from population change can greatly affect peace of mind.

Uncontrolled development

- Uncontrolled development occurs when land use changes without a vision of the future of the area.
- There were 39,596 building permits granted in Ohio during 1994.
- Rapid land development can lead to irreversible loss of ecosystems.
- Loss of forest and agricultural land to development can result in adverse impacts to future generations.
- Ohioans who participated in facilitated sessions with the Ohio Farm Bureau ranked land use issues as their most important concern.

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ISSUES PLACED IN BOTH HUMAN HEALTH GROUP B AND EITHER ECOSYSTEM GROUP A OR QUALITY-OF-LIFE GROUP A

Combustion by-products

- Pollutants associated with combustion, including dioxins and heavy metals.
- Although there are health risks from exposure to combustion by-products, these are still being evaluated.
- In 1992, 8 percent of Ohio's solid waste was incinerated.
- Ecological impacts from dioxins and heavy metals have been noted, however, there is still a high level of uncertainty surrounding long-term effects.
- People who live close to sources and who consume food grown locally may be disproportionately exposed.

Mining activities

- The major concern with this threat is abandoned mines that operated and closed before current regulations were put in place.
- In 1993, Ohio was ranked 12th in the nation for coal production and third for coal consumption.
- Abandoned mines adversely effect ecosystems through erosion, acid mine drainage and habitat isolation.
- The impacts of active, regulated mines are generally short-term and localized.
- Ohio environmental professionals interviewed for technical information in the process ranked natural resource use as the fourth greatest threat to ecosystems.

Nonpoint source/agricultural runoff

- Nonpoint source pollution occurs as water runs off from broad land areas rather than from a distinct point, such as a pipe. Agricultural runoff may contain pesticides and fertilizers.
- Nonpoint runoff during growing season can lead to elevated levels of nitrates in drinking water. Infants are more susceptible to adverse health effects from exposure to nitrates.
- Because nonpoint source pollution is an areawide source, large portions of the ecosystem could suffer effects.
- This threat probably is more of a direct risk to ecosystems than to human health.
- Citizens who participated in the Ohio Alliance for the Environment facilitated sessions placed a high priority on all nonpoint source pollution.

Pesticide spraying

- Pesticides to control plants and insects often are sprayed in Ohio; Malathion is an example of a pesticide that is commonly used to control mosquito populations and is considered relatively safe to humans.
- Most pesticides that are sprayed are considered safe, however, sensitive individuals, such as asthmatics, may suffer health effects.
- Current pesticides are only moderately toxic to ecosystems.
- Pesticide spraying is a highly visible activity and could elevate public concerns.

Regulated hazardous waste facilities

- Regulated hazardous waste facilities are active facilities that treat, store or dispose of hazardous waste. Most of the regulated facilities in Ohio are for treatment and storage; there is only one publicly-available hazardous waste disposal facility in the state.
- Exposure to pollutants from these facilities can occur as the result of a permitted release or from accidental releases.

- Certain hazardous materials are known to adversely affect aquatic organisms.
- In the 1995 public opinion poll, Ohioans indicated that they were very concerned about improper disposal of nuclear waste and improper disposal of toxic waste.

Stationary source air emissions (utilities, industrial and commercial)

- Emissions from large fossil fuel-fired steam generators and other stationary sources include particulates, sulfur dioxide, carbon monoxide, trace metals and hydrocarbons.
- Sensitive populations, such as asthmatics, are more prone to health effects from pollutants emitted from these sources.
- The ecosystem effects from acid deposition currently is being studied. Although Ohio contributes to the problem, Ohio's ecosystems are at less risk than other states.
- Major stationary sources generally are located in urban areas and may increase the risk to Ohioans in these areas.

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ISSUES PLACED IN HUMAN HEALTH GROUP B

Abandoned water wells

- An abandoned water well is a well that is no longer in use or is in such a state of disrepair that continued use for the purpose of accessing ground water is unsafe or impractical.
- There are approximately 200,000 abandoned water wells in Ohio.
- Improperly abandoned water wells provide a pathway for chemicals, bacteria and viruses to get into our ground water supply.
- These wells create a physical hazard to children and wildlife.
- There are economic effects associated with properly capping abandoned wells.

Natural food toxins

- Many foods contain naturally occurring toxins such as those found in broccoli, coffee, and peanut butter.
- There is debate about the magnitude of the health effects from exposure to natural food toxins.
- Many cases of food poisoning are the results of natural toxins not being killed during processing; there were 1,214 documented cases of salmonella poisoning in Ohio in 1993.
- Ohioans polled at the 1995 state fair perceive food safety as a higher risk than any other group that was polled.

Oil and gas exploration

- Drilling for oil and gas in Ohio began in 1850; while the number of wells has declined since 1985, Ohio currently has 64,473 active wells.
- There was a 6.7percent decrease in the number of oil and gas wells drilled between 1992 and 1993. The major risks from this activity come from old wells which pre-date current regulations.
- Improperly abandoned wells provide a pathway for contaminants to enter our ground water. Ohioans who live in the eastern part of the state and in rural areas are more likely to be exposed than others.
- Although oil and gas drilling activities generate products that could adversely affect ecosystems, the impact is generally localized.
- Ohioans polled at the 1995 state fair and the Ohio Alliance for the Environment's facilitated sessions were more concerned with natural resource use than other groups who were polled.

Pesticide residues on foods

- Pesticides used in food production can remain in produce as it is consumed.
- Since organic foods are more expensive than non-organic, lower income individuals may be at greater risk to exposure from pesticide residues.
- There was a 19.5 percent decrease in the use of pesticides on Ohio's farms from 1982 to 1986.
- At a 1994 meeting of Ohio Health Commissioners, participants in a poll ranked food safety seventh out of 11 potential threats to Ohio.

Tire management

- Fire and disease caused by pests are the two major concerns with Ohio's waste tire piles at present.
- The Ohio Department of Health has determined that tire piles are the primary breeding ground for one type of mosquito that carries encephalitis.
- Encephalitis is generally a non-lethal health effect, although some strains do affect children more than adults.
- There is little evidence to suggest lethal ecosystem effects of tire piles.
- There were 51 tire fires reported to Ohio EPA between January 1992 and December 1993. Individuals with respiratory problems are most susceptible to adverse health effects.

Underground storage tanks

- Petroleum products and other chemicals often are stored in underground tanks, such as gas stations and agricultural operations; petroleum products account for 87percent of Ohio's underground storage tanks.
- Since 1990, underground storage tanks have come under increasing regulation; the primary risk is from tanks abandoned before current regulations took effect.
- There may be as many as 80,000 underground storage tanks in Ohio; the effects from these tanks occur if they are leaking. The Department of Commerce, Bureau of Underground Storage Tank Regulations estimates that as many as 8,042 tanks are leaking.
- Some of the constituents stored in underground tanks are known carcinogens and if these leak into drinking water sources, people may suffer serious health effects.
- The greatest threat of contamination to ground water is posed by unregistered and/or abandoned tanks. These tanks are probably not in compliance with current regulations that are intended to protect against environmental releases.

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ISSUES PLACED IN EITHER ECOSYSTEM GROUP A OR QUALITY-OF-LIFE GROUP A

Channelization of streams and rivers

- Channelization is an engineering technique that allows stream water to flow potentially free of obstruction, thus creating changes in flow speed. Sometimes this technique is used to increase the amount of water the stream can handle to reduce flood risks.
- This is mainly an ecosystem issue, although effects from flooding are linked to channelization.
- This practice changes the physical attributes of the ecosystem, eliminates sensitive species and has a cumulative effect in watersheds.
- Habitat alteration leads to aesthetic impacts.
- The public opinion poll indicates that Ohioans are generally more concerned about environmental issues that impact their health and quality-of-life rather than those that affect ecosystems.

Disposal capacity

- Disposal capacity refers to opportunities remaining in Ohio to dispose of solid waste. Ohio's present capacity appears adequate for current needs.
- There are 69 publicly-available landfills in Ohio.
- There is no evidence linking the lack of capacity to health effects.
- Siting new landfills can result in disproportionate impacts to certain ecosystems in the state.
- The areas in Ohio that have greater capacity are concerned with the fairness of accepting wastes from other areas.

Floods and flood damage

- Ohio has a long history of damaging floods and no area of the state is free from the threat of flood-producing storms.
- Flooding presents drowning risks.
- Based on floodplain maps, approximately 5 percent of Ohio's land is at risk from extreme flooding.
- Some ecosystems are adversely affected through sediment and habitat alteration that occurs during flooding while other ecosystems depend on flooding to thrive.
- The threat of flooding affects peace of mind. Ohioans who live in low-lying areas are at greatest risk from health and economic damage due to floods.

Litter

- There is very little evidence of human health risk from exposure to litter.
- There is very little evidence of ecosystem risk from exposure to litter.
- The main concern with this threat is the negative effect on quality-of-life.

Storm water runoff from non-agricultural areas

- Nonpoint source pollution occurs after storm events in urban, residential and other developed areas. A 1995 report sponsored by the National Geographic Society and the Conservation Fund found that over half of our nation's water pollution came from nonpoint sources.
- Storm water from urban areas can carry oil, fertilizers, pesticides, road salt, and sediment among other contaminants.
- Suburban and urban development are emerging as important sources of nonpoint source pollution.
- Aquatic ecosystem can suffer habitat alteration and toxic effects.
- In a 1988 report from U.S. EPA, nonpoint source pollution caused the degradation of up to 76 percent of

the degraded lakes.

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ISSUES PLACED IN EITHER ECOSYSTEM GROUP B OR QUALITY-OF-LIFE GROUP B

Construction and demolition debris

- There has been no research relative to the human health effects from exposure to these sites.
- Ecosystem effects result mainly from leachate; runoff will be localized and reversible.
- There are aesthetic concerns over these facilities because they are often large and visible.
- Current rules for these sites are being developed in Ohio and will add to the knowledge about the risks associated with these sites.

Construction of dams

- Dams are constructed generally to store water and to generate electric power.
- Human health effects occur when dams fail and floods result. The effects are mainly economic in nature and include property loss.
- Construction of dams affect ecosystems in the reservoir area. In some cases, dams are an asset to ecosystems, creating wetlands surrounding streams and rivers.
- There are aesthetic impacts from dam construction and economic impacts from dam failure.

Fugitive dust

- Fugitive dust results from construction and other operations that disrupt the soil and send it airborne.
- There is limited evidence that exposure to fugitive dust causes significant human health risks.
- The events that create this problem are localized and short-term.

Harvesting natural resources

- Forestry operations are the main concern with harvesting natural resources.
- There is no evidence of human health risks from harvesting operations.
- While there may be ecosystem effects from harvesting some resources, many of these effects are covered in the other categories of oil and gas exploration and mining activities.
- The quality-of-life impacts are mainly aesthetic.

Illegal dumping

- A variety of materials are dumped illegally in Ohio, including hazardous wastes, tires, and solid wastes.
- There is no research explicitly linking the action of illegal dumping to health effects, but some waste products that are dumped could create health hazards.
- Illegal dumping creates localized ecosystem effects; the magnitude of the effects depends on the constituent.
- There is some evidence that this problem affects some areas of the state more than others, specifically the southeastern part of Ohio.

Municipal wastewater discharges

- Municipal discharges are point sources of treated wastewater that are emitted from sewage plants to surface waters.
- Advances have been made in sewage treatment plants in recent years and the residual human health risk from these facilities is decreasing.
- Even with improvements, organic enrichment still has a major impact on surface water ecosystems by removing oxygen from the receiving stream.
- Releases of inadequately treated wastewater cause aesthetic impacts.

Over consumption of natural resources

- Overconsumption differs from harvesting because harvesting involves management techniques for resource use, whereas overconsumption refers to using more resources than necessary, regardless of the harvesting technique.

Recreation

- People impact natural resources from recreation activities such as off-road vehicles and intensive hiking and camping.
- There are 3,736 bike and hiking trails in Ohio.
- The top three recreational activities in Ohio are fishing, fall foliage tours, and hunting.
- In a 1990 poll, 75.6 percent of Ohioans surveyed felt it was important to acquire land for parks, forests and recreational areas.

Sludge disposal

- Sewage sludge from municipal wastewater treatment often is applied to farmland; metals and other chemicals that may be present in the sludge are of concern.
- Agricultural ecosystems may be positively impacted by the organic nutrients contained in the sludge.

Spills and accidental releases

- Spills and accidental releases include accidental chemical releases and above-ground storage tank leaks.
- From 1983 to 1993, 50,759 spills were reported to Ohio EPA's Division of Emergency and Remedial Response.
- Most spills are localized events and generally only Ohioans who come in contact with the spilled material suffer health risks.
- When spills to surface water or ground water occur, the ecosystem could be adversely affected. The effects depend on the type and amount of spill.

Transportation of waste

- Many types of waste are transported through Ohio, mainly by truck, including solid, hazardous, infectious and radioactive.
- From 1990 to 1994, accidents involving hazardous waste accounted for approximately 0.4% of all shipping accidents in Ohio.
- Health effects are dependent on the type of waste and the proximity to the accident.
- Transportation accidents are generally confined and cleaned up rapidly.
- Spills are localized events and generally only Ohioans who come in contact with the spilled material suffer health risks.

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ISSUES PLACED IN HUMAN HEALTH GROUP C

Other natural hazards

- This category includes earthquakes, tornadoes and hurricanes.
- These are uncontrollable events that may result in loss of life.
- Some natural hazards can result in ecosystem fragmentation and habitat isolation.
- Earthquakes and tornadoes can be extremely frightening, affecting peace of mind.

Yard waste

- Grass clippings are the main component of yard waste.
- The greatest ecosystem impact is its impact on disposal capacity.

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Ohio Environmental Statistics and Indicators - Public Opinion

Perhaps the most important indicator of quality of life is how Ohio citizens feel about the environment. The only way to obtain an understanding of these feelings is to survey people. Some survey work has been done in Ohio to gauge citizen opinions and use of the environment. Some of the results of these surveys are presented below.

PUBLIC OPINION		
INDICATOR	VALUE	DATA SOURCE
Percentage of Ohioans who feel it is somewhat to extremely important to acquire land for parks, forests, and recreational areas	75.6%	The Tarrance Group Survey: Ohio Initiative 6394 (7/23/94)
Percentage of Ohioans who feel it is somewhat to extremely important to protect/develop land for hunting and fishing	80%	The Tarrance Group Survey: Ohio Initiative 6394 (7/23/94)
Percentage of Ohioans who feel it is somewhat to extremely important to set aside areas for endangered species	84.5%	The Tarrance Group Survey: Ohio Initiative 6394 (7/23/94)
Percentage of Ohioans who reported that they closely watched or tried to identify types of wildlife living near their homes	65%	1991 ODNR Survey
Percentage of Ohioans who reported that they took one or more trips or outings to observe, photograph, or feed wildlife	43%	1991 ODNR Survey

Percentage of households who participated in wildlife/nature observation as an outdoor recreation activity	48.9%	1990 ODNR Survey (reported in 1993 SCORP)
Top three recreational activities with percentage of participants	Fishing: 28.8% Fall foliage tours: 12.6% Hunting: 8.1%	Ohio Dept. of Transportation, Travelers survey (4/92-5/93)
Number of Ohioans who participated in wildlife recreation in 1991	5.2 million	1991 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation
Percentage of Ohioans who stated that educating and informing the public about wildlife issues was either important or very important	92.9%	ODNR, Division of Wildlife, 1992 Public Attitude Survey
Percent of survey responses to the question: "Over the past few years, do you think the environment in Ohio has gotten better, stayed about the same, or gotten worse?"	gotten better: 30% stayed same: 41% gotten worse: 26% don't know: 3%	Public survey for Ohio Comparative Risk Project, June 1995
Percent of respondents who view dealing with environmental problems that threaten people health to be a higher priority than dealing with problems that harm the environment	82%	Public survey for Ohio Comparative Risk Project, June 1995
Five most important environmental problem facing Ohio, in order with percent respondents	1. outdoor air pollution (20) 2. unsafe drinking water (17) 3. water pollution in lakes and streams (16) 4. toxic and hazardous waste (15) 5. people being unaware of safe environmental practices (8)	Public survey for Ohio Comparative Risk Project, June 1995

ECONOMICS

INDICATOR	VALUE	DATA SOURCE
	Employment (thousands) Manufacturing: 1,068.3 Services/Health: 1,200.7 Retail: 892.5 Government/ public education: 726.9 Wholesale: 262.6 Finance/Insurance: 257.2 Transport/Utilities: 210.7 Construction: 176.3 Agriculture: 117.5 Mining: 16.1	Ohio Dept. of Development ,1991. Annual Report
Amount spent on improvements to roads and bridges (Ohio Public Works Awards)	1989: \$71,914,169 1994: \$51,691,397	Ohio Public Works Commission
Number of companies that either located, expanded or started a business in Ohio since 1991	1,141	Bottom Line, Ohio Dept. of Development
Number of jobs created since 1991	45,000	Bottom Line, Ohio Dept. of Development
	Ohio: 689 Texas: 386 North Carolina: 376 Florida: 286 California: 198 Kentucky: 166 Louisiana: 166 Virginia: 144 South Carolina: 131 Indiana: 122	Site Selection, Ohio Dept. of Development, 1994
% change in statewide public environmental spending from fiscal year 1989 to fiscal year 1995 (in constant dollars)	120.1%	Ohio EPA ,1994. Office of Fiscal Analysis
Dollars spent on outdoor-related recreation per household in Ohio in 1993	\$1,300	ODNR, 1993. Statewide Comprehensive Outdoor Recreation Plan

Total 1992 expenditures by Ohio state parks and natural areas' users	\$6,000,000,000	ODNR. Resource Ohio: Protecting our Natural Resources
Annual public expenditures on governmental park and recreation providers	\$370,000,000	ODNR. Resources to Treasure: A Study of the Condition and Needs of Ohio's Parks and Recreation Resources
Ohio apportionment of Land and Water Conservation Fund monies	1979: \$14,4000,000 1992: \$700,000	ODNR, Division of Real Estate and Land Management
	FY89: \$218,564,340 FY90: 376,939,200 FY91: 340,678,052 FY92: 396,182,385 FY93: 455,892,070 FY94: 537,988,412 FY95: 581,095,575	Ohio EPA, Office of Fiscal Analysis, 1994. Memorandum: Comparison of Environmental Expenditures FY89-FY95.
Amount of grant funds for lead poisoning prevention in Ohio (largest federal grant in the country for this program)	\$1,300,000	Ohio Dept. of Health, 1992 Annual Report
	Statewide Averages: 1989: \$19.51/ton 1990: \$23.91/ton 1991: \$25.68/ton 1992: \$25.73/ton	Ohio EPA, 1993. Ohio Solid Waste Facility Report
Average loss to flood	\$4,000	ODNR, Division of Water, 1994
Monies awarded for projects to control nonpoint source pollution	1993: \$2,603,150 (state contribution: 40%) 1992: \$1,763,557 (state contribution:44%)	Ohio EPA, State of Ohio Section 319 Report
Manufacturing payments to governmental units for public sewage service, 1990	\$107.8 million	National Economic, Social and Environmental Data Bank on CD.ROM, Pollution Abatement Expenditures Survey

Motor vehicle inspection test fees--state share	1994:\$2,753,861	State of Ohio Accounting System Records
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RISK REDUCTION RECOMMENDATIONS

The information in the 1995 *State of the Environment Report* is integral to the second phase of the Ohio Comparative Risk Project. The purpose of the second phase is to develop risk reduction strategies and recommendations. These recommendations will be directed to both policymakers and Ohio citizens. During the second phase, issues of cost and efficiency will be examined in greater detail, especially in relationship to specific strategies. Environmental education and environmental management also will be considered in developing risk reduction strategies.

Two additional reports will be issued as a result of the second phase; one will summarize recommendations for policymakers and the other will summarize recommendations for Ohio citizens.

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