

While assessing human health risks associated with drinking water has typically been the province of science and the government, the perception of that risk lies within the value-laden territory of the public. Certainly, neither risk assessment nor risk perception is exact or objective. Science and the public must find a path of commonality if some of the most pressing environmental concerns are to be addressed.

Assessing Risk

Determining toxicity, risk to human health, and exposure

Risk assessment is an odds game, based on toxicity testing, probability of health risk, and exposure. Toxicity testing is generally performed on animals to establish health risks to humans.

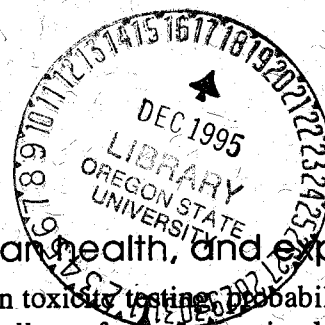
- * Short-term, or acute toxicity testing measures the lethal concentration—the dose at which fifty percent of the test subjects die.

- * Chronic toxicity is harder to detect, since it may not be apparent for several years, or even generations. Studies on the chronic health effects of smoking are probably the best-known example.

Recent toxicity testing has begun to include plants and insects, and is increasingly complicated and uncertain: determining mortality is easier than determining toxic effects on reproduction and growth, and assessing toxicity for a given species is easier than for a population.

Realizing that “zero effect” is not practical, risk assessment generally sets the acceptable probability for cancer at one extra occurrence in one million people. Determining the exposure to carcinogens is based on certain assumptions over space and time. For example, what is the risk faced by a person drinking one liter of water containing a hazardous material over a lifetime? What may initially seem straightforward or well-defined bristles with complexities. How toxic is the hazardous material? How susceptible is the individual to that toxicity? What if the person drinks twice the assumed amount of water every day? Do other environmental factors influence exposure?

Given the myriad of complex issues faced when assessing risk, it is understandable that ambiguity and generalization exist. It is simply not possible to assure a zero effect or make a precise assessment, given the number of variables. Assessment can set standards and manage risk, but the public needs to be involved in these processes. Although seemingly uninformed or capricious, public perceptions of risk must also be addressed.



Establishing priorities

Getting the biggest bang for the buck

Over the past decade, risk assessment—a field derived from a combination of biological, statistical, and physical sciences—has been the basis for federal and state agency decisions about human health and ecosystems. Assessing risk is a way of judging the seriousness of a specific environmental problem and how much regulation is necessary.

That specificity, focusing on a single problem, is giving way to a new perspective on risk assessment: comparing environmental problems and deciding where society's finite resources are best spent. Instead of isolating one problem at a time, the focus is shifting to prioritizing them. Where can society get the most results for the money spent, the "biggest bang for the buck"?

The public's and the agencies' environmental concerns, however, don't necessarily coincide; to prioritize action, some degree of consensus must be reached. In some respects, risk assessment and risk perception have little in common, and this disparity provides a continuing challenge: how to communicate scientific findings to the public and encourage their involvement in deciding which problems need to be dealt with first. Increasingly, the public is unwilling to accept some of the judgments and evaluations handed down by scientists, who are no longer viewed as having all the right answers. In risk assessment especially, the public perceives science as losing its objectivity. Whether or not these perceptions are accurate, they nonetheless remain a consideration agencies and their scientists cannot ignore.

What's a risk? Where the priorities differ

EPA concerns

Global climate change
Stratospheric ozone depletion
Habitat alteration
Species extinction and biodiversity loss
Criteria air pollutants (smog)
Toxic air pollutants (e.g. benzene)
Radon
Indoor air pollution
Drinking water contamination
Occupational exposure to chemicals

Public concerns

Active hazardous waste sites
Abandoned hazardous waste sites
Water pollution from industrial wastes
Occupational exposure to toxic chemicals
Oil spills
Destruction of ozone layer
Nuclear power plant accidents
Industrial accidents
Radiation from radioactive wastes
Air pollution from factories

source: Science (1990) Vol 249, p. 616

Oregon Water Resources Research Institute Guests

In addition to its other activities, OWRRI has sponsored and co-sponsored several international guests over the past year, including:

Ronald King'ang'i—Kenyan water engineer, internship in water management.
July 5 – August 2, 1992.

Jacques Brossier—Directeur de Recherches Institut National de la Recherche Agronomique, Dijon, France. Seminar: "Research of the Vittel Region of France." August 18 – 20, 1992.

Alex Dubgaard—Associate Professor Royal Veterinary and Agricultural University, Department of Economics and Natural Resources, Copenhagen, Denmark. Seminar: "Searching for Nonpoint Water Pollution Control: The Potential of Tradeable Nitrogen Quotas in Denmark." October 16, 1992.

Martin G. Khublarian and Roald G. Dzhamalov—Water Problems Institute and Academy of Sciences, former USSR, Moscow. Seminar: "Environmental Water Problems in Russia." October 25 – 28, 1992.

Publications

Tualatin River Basin Study

Late Winter 1992 Sampling for Water Quality in Three Stream Segments of the Tualatin River Basin, Oregon.

An Analysis of Water Quality Data in Tualatin River Tributaries with Three Different Land Uses.

Other publications

Oregon Water Policy Issues, the publication from the Spring 1992 Seminar Series, is now available for \$2.50 at the Oregon Water Resources Research Institute.

Conferences and Seminars

"Managing Riparian Areas: Common Threads and Shared Interests"

February 4 – 6, 1993, Albuquerque, New Mexico. Speakers will discuss developing an integrated approach to riparian area management. Focus will be on projects that did and didn't work, and successful and unsuccessful techniques for riparian management. Registration: \$100 in advance; \$135 late registration. For more information, call Barbara Tellman or Mary Wallace, (602)792-9591.

"New Directions in Pesticide Research, Development, Management, and Policy." The Fourth National Pesticide Conference, Richmond, VA. November 1 – 3, 1993. Abstracts due February 1, 1993; manuscripts due October 1, 1993.

"Constructed Wetlands Wastewater Treatment Systems: How Do They Work?" Department of Bioresource Engineering, Oregon State University. Presentations will be on Thursdays, January 7 – March 11, 1993, from 3:30 – 5:00p.m. in Weniger Hall, room 153.

Oregon Water Resources Research Institute will sponsor the Spring 1993 Seminar Series **"Watershed Analysis and Management for Nonpoint Source Pollution Control."**

April 1 – June 3, 1993. Topics will appear in the next newsletter.

Water Publications Digest summarizes and abstracts information from approximately 12 leading water periodicals. 11 issues per year, \$59. Sample issue available for \$2. Write: Water Publications Digest, Lakeview Publications, P.O. Box 6866, Charlottesville, VA. 22906. Or call (804) 973-5111.

Drinking Water—One way to tell if it's safe

During his recent presentation at the Water Resources Research Institute's seminar on drinking water, Stephen Hubbs of the Louisville Water Company suggested that if the public trusts the quality of their tap water, sales of

bottled water in a given area will be low. According to Hubbs, few people in Louisville, Kentucky buy bottled water, an indication they perceive the city's water, provided from the Ohio River, to be safe.



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