# Getting Out of the Risk Assessment Box Workshop

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GETTING BEYOND RISK ASSESSMENT

[Rachel's introduction: Most environment-and-health decisions are now made using numerical risk assessment. But this technique has fatal flaws that cannot easily be overcome. So how can we make good decisions?]

By Peter Montague

As every community activist knows, in the U.S., decisions about the environment and human health are based on numerical risk assessments. In a numerical risk assessment (also known as "quantitative risk assessment") the dangers of a project are translated into numbers and those numbers become the basis for a decision.

For example, in Camden, N.J., government officials have declared that the dangers of living near a garbage incinerator are "acceptable" because their risk assessment concluded that only one in a million people living near the incinerator for a lifetime will get cancer from breathing the fumes and soot.

This particular incinerator spews one ton of toxic lead each year (in the form of a breathable dust) into a residential community of people who are already stressed by low-income and racism. But risk assessors have managed to declare this enormous quantity of a potent neurotoxin "no problem" by considering only its ability to cause cancer. Its ability to cause brain-damage in children has been assigned a value of zero. This is the great appeal of numerical risk assessment -- it allows really serious dangers and injustices to evaporate in a cloud of numbers -- poof!

In recent years, quantitative risk assessment (QRA) has been heavily criticized not only by citizen-activists but also by scientists; see, for example Silbergeld 1993, Karstadt 1988 and Kriebel 2001

Seven scientific criticisms of Quantitative Risk Assessment

QRA is criticized because

(a) We are all exposed to multiple stressors all the time, and the effects of multiple stressors are difficult or impossible to evaluate; in many cases standardized protocols do not even exist for making the needed assessments.

(b) The timing of an exposure can be critical. A fetus exposed to a chemical during the 4th week of pregnancy may develop a birth defect, but exposed to the same chemical in the

12th week may show no effects at all. Chemical toxicity tests are too crude to reveal all such time- dependent effects.

(c) By definition, QRA only takes into consideration things that can be quantified, so QRA omits much that local people might consider important. Historical knowledge, local preferences, spiritual values, ethical perspectives of right, wrong, and justice/injustice -- all are ignored by QRA because they cannot be turned into numbers.

(d) QRA is difficult for most people to understand, and obscure decision-making techniques run counter to the principles of an open society.

(e) Politics can -- and do -- enter into QRA. William Ruckelshaus (first administrator of U.S. Environmental Protection Agency) said in 1984, "We should remember that risk assessment data can be like the captured spy: If you torture it long enough, it will tell you anything you want to know."

(f) The results of a QRA are not reproducible from laboratory to laboratory and so QRA does not meet the basic criterion for being considered "science" or "scientific."

As the National Academy of Sciences said in 1991, "Risk assessment techniques are highly speculative, and almost all rely on multiple assumptions of fact -- some of which are entirely untestable." (Quoted in Anthony B. Miller and others, Environmental Epidemiology, Volume 1: Public Health and Hazardous Wastes (Washington, DC: National Academy of Sciences, 1991), pg. 45.)

(g) By focusing attention on the "most exposed individual," quantitative risk assessments have given a green light to hundreds of thousands or millions of "safe" or "acceptable" or "insignificant" discharges that have had the cumulative effect of contaminating the entire planet with industrial poisons. See Travis and Hester, 1991 and Rachel's News #831.

So quantitative risk assessment stands scientifically discredited. But we still have to make decisions. If risk assessment isn't an adequate basis for decisions, what is?

Guidelines for making decisions under uncertainty

Back in 1993, Donald Ludwig and others offered some awfully good advice about decision-making, in an article in Science magazine:

"Most principles of decision-making under uncertainty are simply common sense," they wrote.

They went on: To make good decisions under uncertainty, we can

** consider a variety of plausible hypotheses about the world (in other words, examine the available alternatives)

** favor actions that are robust to uncertainties (in other words, ask, "What if we're wrong?" and make decisions accordingly.)

** hedge (which I take to mean, "Don't put all your eggs in one basket.")

The next 4 suggestions from Ludwig are similar to "Adaptive Management." (See Holing, 1978; Walters, 1986; and Lee, 1993.)

** favor actions that are informative;

** probe and experiment;

** monitor results;

** update assessments and modify policy accordingly.

And finally:

** favor actions that are reversible.

As you might imagine, if these criteria were applied to the municipal discards (aka "garbage") of Camden, New Jersey, it is unlikely that an incinerator in a residential neighborhood would be the answer.

Other ways of gathering information

In addition to using common sense in making decisions, decision makers can use modern techniques for gathering information, to prepare themselves for making good decisions. Quantitative risk assessment is one way of gaining information, but there are others. I will briefly describe three.

1) Identify hazard, not risk

Risk assessment requires scientific knowledge of (1) the hazard posed by a chemical (or combination of chemicals), plus (2) knowledge of how people may become exposed, plus (3) knowledge of how the human body will react to the exposure. In reality this information is exceedingly expensive to collect, and therefore exceedingly rare. Missing knowledge is assigned a numerical value and the risk assessment proceeds.

A simpler approach is to stop at the stage of "hazard assessment" and then require chemical users every few years to search for less- hazardous alternatives. However, even this approach is not as simple as it sounds because microbiologists are constantly learning many new ways in which chemicals can influence living things.

Under this simplified approach, chemical manufacturers (or users) would be given several years in which to make a reasonable demonstration of hazard for each of their chemicals (including its associated byproducts and breakdown products), to show that each is neither persistent nor bio accumulative, nor carcinogenic, nor multiage, nor disruptive of intracellular signaling (by hormones, neurotransmitters, growth factors, cytokines, and so on), nor toxic at low doses to growth, development, reproduction, immunity, or neurological function. Testing would occur on multiple generations of sensitive species of animals, unless testing on less than whole animals can give equivalently useful and reliable results.

As you can see, even "hazard assessment" is contentious and difficult. (Adapted from Thornton, 2000.)

2) Delphi technique.

The Delphi technique (or simply, "Delphi") has been widely used in the medical field to try to reach consensus among experts on important questions that entail considerable

uncertainty. Delphi consists of a series of questionnaires sent to a group of experts, who usually remain anonymous and never meet face-to-face (thus keeping costs low).

Initially, the experts are asked an open-ended question, such as "What are the 50 most important problems facing nurses who specialize in cancer?" After the initial results are tabulated, a second and third round (or more) of questionnaires are sent to the experts asking them to rank the results of the first round. In between rounds, the experts are given feedback on the results of the process so far. The goal is to reach consensus, though consensus is sometimes not carefully defined, and may never be achieved. In any case the technique improves communication, reveals areas of agreement and disagreement, and uncovers gaps in knowledge.

In Delphi, the selection of the "expert" panel is crucial and can skew the results. The technique avoids the problems sometimes encountered with dominant personalities in face-to-face discussions. To have a chance of succeeding in reaching consensus on public policy issues, Delphi would need to include experts that citizens trust.

To learn more, see Tickner 2001, Powell 2002, and Beech 1999.

3) Citizens Juries

Juries composed of citizens are a form of participation based on the legal jury system and promoted by the Jefferson Center in Minneapolis, Minnesota. The Center randomly selects a panel of 12 jurors who are expected to represent the community. The jury is asked to study a particular public issue (for example, solid waste, traffic congestion, or physician assisted suicide); the jury meets for four or five days to hear expert witnesses with a range of views on the issue, deliberates, and then presents its recommendations to the public. The Jefferson Center has trademarked the term Citizen Jury so if someone wants to use this exact phrase they must go through the Jefferson Center). On the other hand, anyone could create a similar process in their own community and call it something like a "civic jury" without violating copyright laws. This process may be limited because some minority views may not be adequately represented, and there is no guarantee that the results of the jury will become part of a decision. Whoever sets up the jury process needs to make sure that these problems are addressed. This description taken from Pellerano 2002. See also Anonymous 2004 and Veasey 2004.

4) Consensus Conferences

Originally developed by the U.S. National Institutes of Health to produce consensus statements on controversial medical topics, consensus conferences are now being used by European governments to reach consensus on controversial social issues (for example, genetically altering livestock, telecommunications policy, or the use of transplants in medicine). The conference is managed by a steering committee that chooses a lay panel of 15 volunteer participants who lack significant prior knowledge about the issue. Working with a skilled facilitator, the lay panel discusses a government-provided background paper on the subject and formulates questions for a public forum. The government agency sponsoring the conference assembles an expert panel including scientific, technical, social, and ethics experts and stakeholders from unions, industry, and environmental organizations. The lay panel then reviews more agency-provided background papers, asks more questions, and suggests additions and deletions to the expert panel. During the concluding four-day public forum, the experts make presentations and answer questions from the lay panel and sometimes from the audience. The lay panel deliberates and then cross-examines the expert panel to fill in information gaps and to clarify areas of disagreement. The lay panel

then writes a report, summarizing the issues on which it has achieved consensus and identifying points of disagreement. Results of the panel are widely distributed to the media and local hearings are held to stimulate informed public debate, help citizens understand the issues, and influence decision-makers. As with all these processes, serious effort is needed to insure a diverse panel. This description was taken from Pellerano 2002. See also work by Sklove here and here.

A Precautionary Approach

Given that numerical risk assessments have allowed the entire planet, and all of its inhabitants, to become contaminated with toxic chemicals, another approach seems in order. The precautionary principle describes such an approach -- a constant search for the least-harmful alternative, involving affected people in decisions, a commitment to consider the consequences for the seventh generation, an explicit, acknowledged duty to monitor outcomes and to take action to prevent harm, with nature and human health being given the benefit of the doubt. Risk assessment asks the question, "How much toxic exposure can we get away with?" The precautionary approach asks, "How much toxic exposure can we avoid?"

The precautionary approach suggests some large goals for us all to consider:

** To make it repugnant and unthinkable to harm public health or nature any more than is minimally necessary to achieve our human purposes;

** To make it repugnant and unthinkable to deprive anyone of liberty, equality, or democracy any more than is minimally necessary to achieve our human purposes. Achieving these goals will require deep cultural shifts toward acknowledgment of limits and of the value of sharing.

My hypothesis about achieving such a deep cultural shift is that adopting the precautionary principle at the local level will help people adopt transformation goals.

Consider the San Francisco precautionary principle ordinance, which begins:

"Every San Franciscan has an equal right to a healthy and safe environment. This requires that our air, water, earth, and food be of a sufficiently high standard that individuals and communities can live healthy, fulfilling, and dignified lives.

"The duty to enhance, protect and preserve San Francisco's environment rests on the shoulders of government, residents, citizen groups and businesses alike." (The full text of the San Francisco ordinance is available here.)

Notice that it starts with an assertion of rights and ends with an assertion of responsibilities. And it suggests some worthy goals that most of us can probably agree upon: everyone has a right to an environment of sufficiently high quality to allow everyone to enjoy healthy, fulfilling, and dignified lives.

Zero waste and the precautionary principle

Zero waste and the precautionary principle are two key ideas driving a worldwide movement to reorder priorities, built on the bedrock of the U.N. Universal Declaration of Human Rights of 1948. (Be sure to see Paul Palmer's zero waste piece in this issue of Rachel's News.)

Some other parts of the same international movement can be described by phrases such as clean production, extended producer responsibility, the public trust doctrine, protecting the commons and our common wealth, green chemistry, green engineering, green building, biomimicry, cradle-to-cradle design, the soft energy path, sustainable agriculture, global justice, and environmental justice.

Together, they aim to create the world anew with liberty, justice and a peaceable, decent life for all. Another world really is possible.