ENVIRONMENTAL DEGRADATION AND THE TYRANNY OF SMALL DECISIONS

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Economist Alfred E Kahn's premise of "the tyranny of small decisions" is applicable to environmental issues. Examples of so-called "small decision effects" range from loss of prime farmland and acid precipitation to mismanagement of the Florida Everglades. A holistic rather than reductionist perspective is needed to avoid the undesirable, cumulative effects of small decisions (Accepted for publication 2 March 1982).

Ideally, society's problems are resolved through a system of nested levels of public decision are made by the individual or by small groups of individuals. Higher decision-making levels range from local and state governments to the higher decision-making levels range from local and state governments to the highest levels of the federal government. Theoretically, the highest levels are composed of experts whose joint decisions provide constraints in the form of "rules" for decisions made at the lower levels.

Unfortunately, important decisions are often reached in an entirely different manner. A series of small, apparently independent decisions are made. Often by individuals or small groups of individuals. The end result is that a big decision occurs (post hoc) as an accretion of these small decisions: the central question is never addressed directly at the higher decision-making levels. Usually, this process does not produce an optimal, desired, or preferred solution for society.

This process of post hoc decision making has been termed "the tyranny of small decisions" by the economist Alfred E. Kahn (1966). As Kahn has pointed out, this is a common problem in market economics. He gives as an example the loss of passenger train service to Ithaca, New York. Even though the majority of the inhabitants of Ithaca would have preferred to retain passenger train service, they "decided" to terminate service through the combined effects of a series of small, independent decisions to travel by automobile, airplane, and bus.

SMALL DECISIONS AND THE ENVIRONMENT

Clearly, "the tyranny of small decisions," or what might be called "small decision effects," applies to much more than market economics. Much of the current confusion and distress surrounding environmental issues can be traces to decisions that were never consciously made, but simply resulted from a series of small decisions. Consider, for example, the loss of coastal wetlands on the east coast of the United States between1950 and 1970. No one purposely planned to destroy almost 50% of the existing marshland along the coasts of Connecticut and Massachusetts. In fact, if the public had been asked whether coastal wetlands should be preserved or converted to some other use, preservation would probably have been supported. However, through hundreds of little decisions and the conversion of hundreds of small tracts of marshland, a major decision in favour of extensive wetlands conversion was made without ever addressing the issue directly.

Regional problems are highly vulnerable to small decision effects. The ecological integrity of the Florida Everglades has suffered, not from a single adverse decision, but from a multitude of

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small pin pricks. These include a series of independent choices to add one more drainage canal, one more roadway, one more retirement village, and one more well to provide Miami with drinking water. No one chose to reduce the annual surface flow of water into the Everglades National Park, to intensify the effects of droughts, or to encourage unnaturally hot, destructive fires. Yet all of these things have happened, and, at this point, it is not clear how the "decision" to degrade the Everglades can be reversed.

Each threatened and endangered species with a few exceptions, owes its special status to series of small decisions, Polar bears, key deer, bald eagles, California condors, Everglades kites, humpback whales, and green turtles have all suffered from the combined effects of single decisions about habitat conversion or over-exploitation. In the case of the green turtle, the removal of nesting beaches one by one through development and human intervention has paralleled the decline of green turtle populations. Furthermore, this decline has been accelerated by a multitude of independent decisions by individual fishermen to harvest one more turtle despite their recognised threatened status.

The insidious quality of small decision effects is probably best exemplified by water and air pollution problems. Few cases of cultural eutrophication of lakes are the result of intentional and rational choice. Instead, lakes gradually become more and more eutrophic through the cumulative effects of small decisions: The addition of increasing numbers of domestic sewage and industrial outfalls along with increasing run-off from more and more housing developments, highways and agricultural fields. Similarly, the gradual decline in air quality of the Los Angelies basin during the 1940s and 1950s was produced by thousands of small decisions to add one more factory or one more family automobile.

Obviously, Alfred Kahn's observation concerning the net effect of small decisions has great applicability to environmental problems. We could add many more examples to our list, including the decline of prime farmland in the United States, desertification, misuses of groundwater resources, the impact of persistent pesticides, the Side-effects of single species management in fisheries and wildlife management, the threat of tropical forest clearing and the increasing severity of acid precipitation.

LOOSING THE CHAINS

While it is easy to recognise the basic problem in the environmental decision-making process, it is not so simple to do anything of a corrective nature. One apparent step would be to strengthen and protect the upper levels of environmental decision-makers (Department of the Interior, NOAA, EPA etc). Unfortunately, these organisations do not always operate with the greatest efficiency, become entangled in their own bureaucratic red tape, and in the end, leave decisions to the lower levels by default.

Moreover, most of the rewards and pressures within both contemporary political and scientific systems force us toward specific problems and specific solutions, in other words, small decisions. In the political realm, the trend is toward decision-making at lower levels of the system (eg the "new federalism" of Ronald Reagan). Although this may be successful for relatively simple problems, such as building schools, this type of approach offers little hope for solving complex problems of environmental management. Unfortunately, it is much easier and politically more feasible for a planner or politician to make a decision on a single tract of land or a single issue rather than attempting policy or land-use plans on a large scale.

This pattern of rewards, pressures and trends is not unique to politics but also permeates academic science. The majority of scientists are most comfortable concentrating upon pieces of problems rather than an entire system. In medicine the trend since the time of Louis Pasteur has been toward single cause and single effect medicine ("germ theory") with modest emphasis

on total body responses ("holistic medicine"). Reinforcing this reductionist tendency in science is the co-ordination of both grant money and academic tenure with the solution of short-term problems (ie small problems).

One key to avoiding the problem of cumulative effects of small environmental decisions lies in a holistic view of the world around us. Scientists, no matter how reductionist their research, should be able to understand and predict how their speciality fits into whole system processes. In addition, we must have at least a few scientists who study whole systems and help us to avoid the consequences of small decisions. Conversely, planners and politicians must have a large-scale perspective encompassing the effects of all their little decisions. Most important of all, environmental science teachers should include in their courses examples of large-scale processes and resulting man-induced problems (eg the Florida Everglades, the Colorado River, the Amazon Basin).

Sadly, prospects are not encouraging. Few politicians, planners, or scientists have been trained with, or have developed a truly holistic perspective. Considering all of the pressures and short-term rewards that guide society toward simple solutions, it seems safe to assume that the "tyranny of small decisions" will be an integral part of environmental policy for a long time to come.

REFERENCE CITED

Kahn, Alfred E. (1966) The tyranny of small decisions: market failures, imperfections, and the limits of economics. *Kylos* 19:23-47.

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