Water Resources Sustainability

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What is Sustainability?

Because of the many interpretations of sustainability, the following are given as some useful working definitions:

Definition by the Brundtland Commission

"*Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs*." - Brundtland Commission (1983).

The Daly Rules for Sustainability

University of Maryland School of Public Policy professor and former Chief Economist for the World Bank Herman E. Daly suggests the following three operational rules defining the condition of ecological sustainability:

(1) Renewable resources such as fish, soil, and groundwater must be used no faster than the rate at which they regenerate.

(2) Nonrenewable resources such as minerals and fossil fuels must be used no faster than renewable substitutes for them can be put into place.

(3) Pollution and wastes must be emitted no faster than natural systems can absorb them, recycle them, or render them harmless.

One way to implement these rules is to consider how the use of renewable resources can be compared to the rate of renewal, as follows:

Consumption of renewable resources	**State of Environment**	**Sustainability**
More than nature's ability to replenish	Environmental degradation	Not sustainable
Equal to nature's ability to replenish	Environmental equilibrium	Steady-state sustainability
Less than nature's ability to replenish	Environmental renewal	Sustainable development

Apply the Concept: The Systems View

Long Duration

Public policies that are intended to be permanent are aimed at the idea of long duration. Over many years, for example, we have methodically intervened in the natural hydrologic system, especially in Western states, to move water from its origin to where we want it to be. As time has progressed, we have discovered that this policy becomes more difficult; adverse impacts have been discovered, and now we are rethinking the whole policy. But, by now there are major population and economic centers in areas that could never sustain them without engineering intervention.

Reasonable Use Rate

It would seem obvious that a natural resource like water cannot be used indefinitely at a greater rate than it can be renewed, which usually occurs via natural processes. Yet, our history of water use is replete with examples of water use that have regarded the resource as boundless. Ground water depletion has been, and in some cases continues to be, a major problem. The idea of "water mining" regards water as a resource to be used until exhausted, and ignores renewal entirely. In many cases deep water aquifers of various kinds contain water that takes thousands of years to reach the aquifer, so that the renewal rate is less than the pumping rate by many orders of magnitude.

Moderate Solutions

Moderate public policies are those which tend to avoid extreme solutions to problems about water resources. Extreme solutions are those in which inordinate efforts are undertaken, often meaning very large investments in facilities. Liberal application of water, fertilizers, and pesticides to agricultural regions has led to runoff, soil erosion, and nonpoint source contamination. The extreme cases tend to be those of too great a

concentration or density of human activity. In this kind of decision making trap, each step seems to be relatively harmless, yet over time accumulated decisions lead to serious problems.

Flexibility

Because public policy decisions are regarded as the solution or end of a problem, little thought is often given to what might be done to address an action that turns out to be a serious mistake. The problem with such cases is commitment to some course of action without regard for unintended consequences. Because it is not possible to know everything when a decision is made, we should anticipate the need for revisiting the problem, and be careful about making commitments that are difficult to modify. Periodic monitoring and determining how to reverse the policy become important. We should be able to learn lessons from experience but stay on the path of improving sustainability. These notions have seldom been part of public water policy, but would go far to avoid some of the problems we see today.

REFERENCES

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