MANAGEMENT OF WATERSHED REHABILITATION--

REFLECTIONS FROM MT. ST. HELENS AND REDWOOD CREEK

F. J. Swanson[1]
S. D. Veirs, Jr.[2]

Abstract

A critical examination of recent major watershed rehabilitation programs in the western United States reveals five basic guidelines for conducting such programs: 1) state long- and short-term objectives, 2) use an interdisciplinary approach at all stages, 3) consider erosion processes and fate of sediment in planning erosion control measures, 4) define costs of full, partial, and no treatment, and 5) provide independent evaluation of programs.

Many major watershed rehabilitation projects begin in an uneasy, high profile, get-something-on-the-ground-in-a-hurry, politically-charged environment. Despite differences in physical setting, ultimate objectives, and other considerations, these political factors result in a set of problems common to many watershed rehabilitation projects.

Watershed rehabilitation projects at Redwood Creek, California, and Mt. St. Helens, Washington, present some instructive contrasts and similarities. Legislation expanding Redwood National Park provided for rehabilitation of lands affected by road construction and timber harvest. This project is funded for an anticipated program of 10- to 15-year period, planned and conducted in part by scientists, and managed by a single Federal agency. The 1980 eruption of Mt. St. Helens, on the other hand, triggered a mix of responses by many agencies and organizations working with overlapping responsibilities in a crisis environment. Planning horizons for treating watershed problems at Mt. St. Helens have generally spanned only a matter of months to a few years, in part, because funding for rehabilitation and hazard control has come in short-term allocations for specific projects.

Examination of the successes and problems of these two quite different projects reveals five criteria for successful, efficient design and execution of a large watershed rehabilitation program:

[1]USDA Forest Service, Forestry Sciences Laboratory, 3200 Jefferson Way, Corvallis, Oregon 97331.

[2]USDI, Park Service, Redwood National Park, Arcata, California 95521

1. STATEMENT OF OBJECTIVES

Planning of any watershed treatment should begin with a statement of objectives. The range of alternatives is described schematically in Figure 1 modified after Magnuson et al (1980). The reference point or initial condition may be more elusive than generally accepted even in the Pacific Northwest where European man is a relatively recent arrival. In the Northwest poorly documented land use practices in the 1850-1900 period predate the memory of the oldest old-timers. Watershed treatment of the present degraded condition (Figure 1) can have the objective of restoration to the initial condition with tacit acceptance of both good and bad attributes of the more natural initial state. Enhancement, on the other hand, is designed to make improvements that make the system less natural, less like the initial condition. Rehabilitation could be viewed as a mix of enhancement and restoration objectives.

In transferring rehabilitation measures from one area to another it is important to confirm that the measures will meet project objectives at the second site. Rehabilitation work in Redwood Creek basin, for example, is becoming a benchmark for work elsewhere, but we must be alert to the special restoration-oriented objectives of the Park Service as practices demonstrated on Park lands are carried to sites where enhancement is a primary concern.

Short- and long-term aspects of objectives must also be reconciled. A well recognized example of this problem is the use of grasses, particularly exotics, for short-term erosion control purposes where native shrubs and trees are desired in the long run. Problems of advancing beyond the grass stage can arise from simple competition for resources or allelopathic interactions.

2. INTERDISCIPLINARY APPROACH

It is essential that an interdisciplinary approach be used at all stages of a project--planning, execution, and evaluation. If an interdisciplinary team is not embodied within project administration, an outside team should be established for periodic review.

This interdisciplinary approach will reduce the incidence of different groups working at cross purposes in an area and the inadvertent aggravation of one problem by another activity that may at first appear unrelated.

An interesting, hypothetical link between very different problems arose in rehabilitation efforts at Mt. St. Helens. Grass seed and fertilizer was applied in September 1980 to a few thousand hectares of the blast zone for purposes of erosion control. Additional seeding and fertilizer application was proposed for Spring 1980. At the same time a number of pneumonia-causing microorganisms, including species of Legionella, one species of which causes Legionnaires disease, were found in high abundance in several water bodies. These pathogens were part of rich, microbe-dominated, nitrogen-limited ecosystems. If nitrogen fertilizer applied to upland areas for

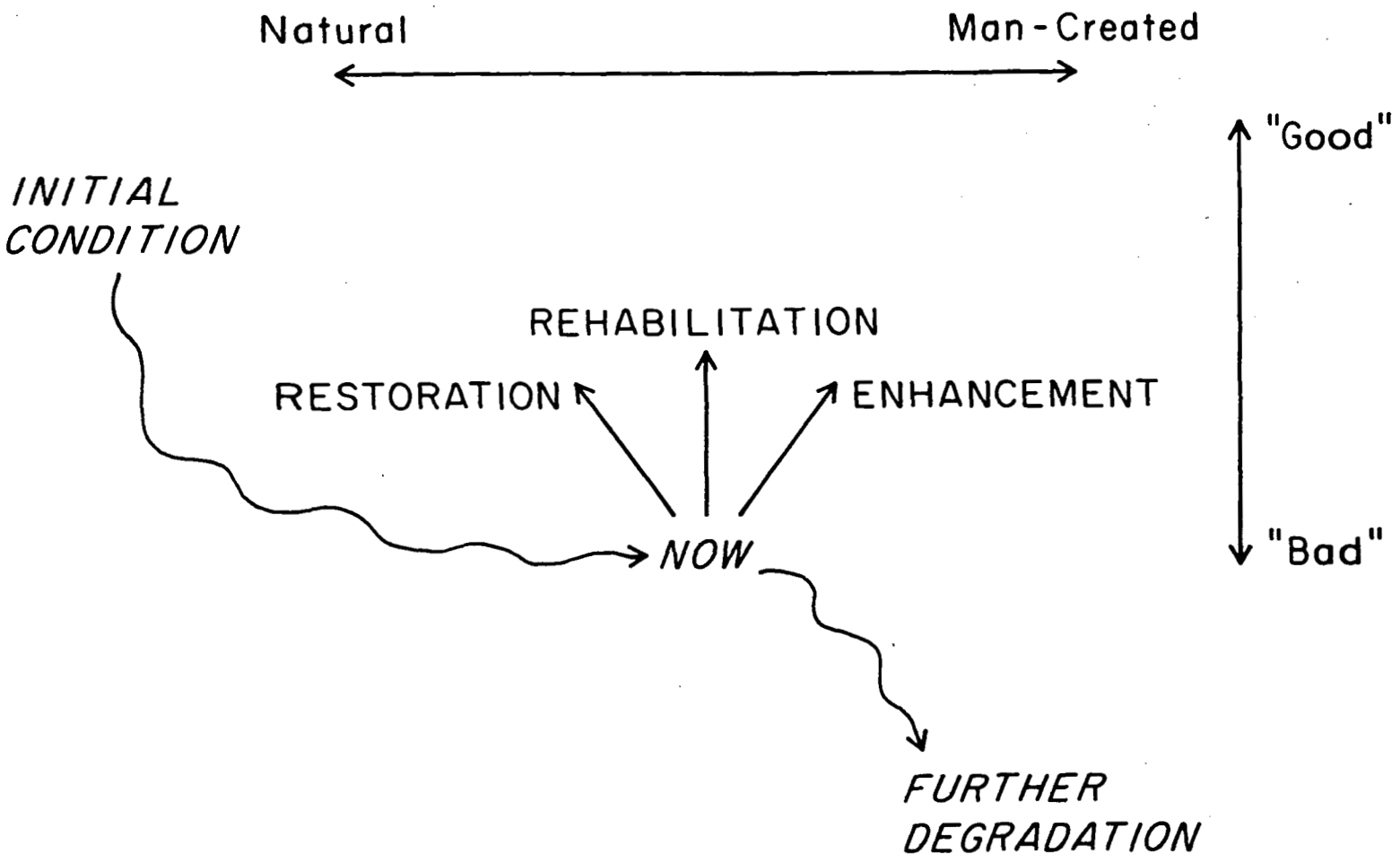

Figure 1. Schematic definition of restoration, rehabilitation, and enhancement (modified after Magnuson et al, 1980). See text for discussion.

erosion control purposes were to enter key waterbodies, overall microbial activity and abundance of pathogenic organisms could increase.

Unexpected linkages occur commonly in complex natural systems, hence the course of watershed rehabilitation should be tracked from an interdisciplinary viewpoint in order to detect undesirable secondary effects.

3. EROSION PROCESSES AND FATE OF SEDIMENT

Planning of erosion control measures should be based on knowledge of overall soil and sediment movement through drainage basins. Key points are identifying dominant processes, applying methods to treat those processes, where treatment is justified, and considering the fate of sediment derived from areas proposed for treatment. The relative importance of erosion processes and the success of control measures can be judged by calculating erosion budgets before and after treatment.

Certain "band-aid" approaches are sometimes applied indiscriminantly. Some grass seeding at Mt. St. Helens, for example, was done in areas where the dominant erosion processes are river channel cutting and mass failure of 30+m high banks, processes that completely disregard even the most vigorous grass cover.

Other seeding proposals at Mt. St. Helens included areas that contribute sediment to natural lakes. These natural sediment traps control sediment delivery to downstream areas. The purpose of protecting of downstream areas, the stated purpose of the program, would not be served by seeding in basins that feed natural, efficient sediment traps with high storage capacity.

4. DEFINE COSTS

Cost - benefit analysis is a part of most justifications for rehabilitation work, but it is open to manipulation to justify objectives decided upon on other grounds. Motivations for carrying out watershed rehabilitations, aside from economic considerations, are strong, running the full range of human emotions from "paying for past wrongs" to "doing all the good you can". We simply encourage more objective evaluation when millions of dollars are at stake and there should be less fear of doing nothing if that is justified on all but political grounds.

A certain "politics of name" may occur in crisis situations. When a "rehabilitation team" is appointed to evaluate alternatives there is a certain implicit charge to come up with rehabilitation programs and doing nothing may not seem like a viable alternative.

5. INDEPENDENT EVALUATION

Periodic, independent, objective evaluation is particularly critical to maximize efficiency of management of a project and to provide the best documentation of effectiveness of rehabilitation activities. This documentation would then be available for planning future projects. These activities

could be funded by a 3 to 5% assessment of the total project budget. Just facing such an analysis would probably lead to sufficient increase in efficiency that the analysis would essentially pay for itself.

CONCLUSIONS

This set of guiding principles of watershed rehabilitation may seem obvious, yet they are commohly ignored for a variety of reasons--human nature, bureaucratic foibles, technical problems. The relatively long-term and well funded watershed rehabilitation programs at Redwood National Park are taking the lead in setting technical and administrative standards for future programs. There is need for better use of this base of experience when programs are needed in the future.

Literature Cited

Magnuson, J. J., H. A. Regier, W. J. Christie, and W. C. Sonzogni. 1980. To rehabilitate and restore Great Lake Ecosystems. Pages 95-113 in J. Cairns, Jr., editor. The recovery process in damaged ecosystems. Ann Arbor Press, Ann Arbor, Mich.