

EFFECTS OF LAND USE ACTIVITIES ON THE NORTH FORK
OF THE FLATHEAD RIVER BASIN WITHIN GLACIER NATIONAL PARK

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Introduction

At least 56 external threats which endanger the ecology of Glacier National Park (GNP) have been identified (National Park Service 1980). And while this is a park wide situation, Park managers have identified the North Fork Basin of the Flathead River as a region that is particularly sensitive to external land use activities, and as a unique unit within the Park. This area possesses substantial wilderness features (solitude, primitiveness), and provides habitat for threatened and endangered species such as the grizzly bear, gray wolf, and bald eagle, as well as other species of special interest like the westslope cutthroat and bull trout.

We proposed a problem solving analysis to develop a cause and effect model for evaluating the impacts of external land use activities on the North Fork system within GNP. The cause and effect model would provide a qualitative assessment of the impacts on the natural resources of the Park, as well as on recreational quality. The specific objectives of this project were:

1. Identify the problem that exists in the North Fork region;
2. Identify the causes and effects of the environmental problem;
3. Identify tasks to help solve the problem; and
4. Provide a methodology which could be used to help organize and solve problems that the involved agencies might encounter.

Methods

The modeling method uses a process called "backstep analysis" (Erickson 1983) commonly used by industry and the military. A cause and effect model is developed through the reduction of complex information into a logical flow of relationships illustrating the causes of a problem and the environmental effects. The model developed by this approach can be used to articulate the logic and importance of dealing with an external threat, and illustrate the need for taking action. The process involves 6 steps:

1. Define a problem statement;

2. Identify the major categories of causes of the problem;
3. Develop a cause model;
4. Identify the major categories of effects;
5. Develop an effects model; and
6. Use the resultant cause and effect model to specify categories of actions to help solve the environmental problem.

The modeling exercise was conducted during a three day workshop at Glacier National Park. Prior to the workshop background information concerning the current situation in the North Fork Basin was compiled. Biologists and resource managers from Glacier Park, Flathead National Forest, Montana Fish, Wildlife, and Parks, and University of Montana Yellow Bay Biological Station participated in the modeling workshop.

Results

Step 1:

The problem statement was identified as:

The naturally functioning ecosystem of the North Fork drainage within GNP is threatened by internal and external activities.

A naturally functioning ecosystem was defined as a system where the natural processes (interacting parts of the physical and biological environments) are intact, and the integrity of the system has not been altered. Internal indicates activities occurring within GNP, while external refers to activities elsewhere in the North Fork drainage basin.

Step 2

The participants generated a list of activities that currently and/or potentially threaten the North Fork system. The activities were identified as major categories of causes of the overall problem (Table 1). Because of the complex amount of information that was being dealt with, each category was modeled separately. During the workshop the participants modeled the causes and effects of energy exploration and development, and private land uses. For brevity, only energy exploration will be discussed here.

Currently there is some energy exploration in the North Fork. The majority of energy related activities are occurring in British Columbia, while the level of such activities in the U.S. is low. All oil and gas exploration leases on the Glacier View Ranger District of Flathead Forest are presently suspended. But future economics could drastically change this situation. Therefore, the modeling procedure was used to create a documented information base from which to prevent adverse environmental impacts from energy development

Table 1. Categories of causes of the environmental problem in the North Fork of the Flathead River Basin within Glacier National Park (GNP). External refers to activities occurring outside of GNP boundaries, and internal to those within GNP.

| | <u>External to GNP</u> | | <u>Internal to GNP</u> | |
|--|------------------------|-----------|------------------------|-----------|
| | Current | Potential | Current | Potential |
| Forest management | x | x | x | x |
| Energy exploration and development | x | x | | |
| Recreation | x | x | x | x |
| Private land uses | x | x | x | x |
| Water extractions | x | x | x | x |
| Suppression of natural fires | x | x | x | x |
| Human caused fires | x | x | x | x |
| Support facilities on public land | x | x | x | x |
| Livestock management | x | x | | x |
| Illegal activities (i.e. poaching) | x | x | x | x |
| Exotic species | x | x | x | x |
| Research | x | x | x | x |
| Fish and wildlife population manipulations | x | x | x | x |
| Air traffic | x | x | x | x |
| Other major influences outside of the river basin (i.e. industry and energy development affecting air quality) | x | x | x | x |

activities.

Step 3

The causes were modeled by asking the question "What causes energy exploration and development to be a problem in the North Fork?". Several responses were generated including road construction and seismic activity. For each response the same question was asked again until the degree of specificity required was reached.

The cause model is useful in several ways. First, a cause model documents why a particular activity threatens the North Fork ecosystem. Energy exploration and development is a broad category and there are many associated activities which have various impacts on the environment.

Two factors that repeatedly appeared in the cause model were location and size of facilities being constructed, or similarly location and frequency of a disturbance. This illustrates the importance of regional spatial and temporal development patterns. For instance, one development site may not necessarily disrupt migrating ungulates, but several in a particular region could effectively block a critical migration corridor.

A second benefit of the cause model is that it identifies where mitigation would be most effective. Regulating the timing and location of disturbances is a fairly common mitigation recommendation. But the model documents the logic for such a recommendation, as well as the logic for considering other factors that would help to mitigate impacts (i.e. regional development patterns).

Steps 4 and 5

The environmental impacts of energy exploration and development were organized into physical, chemical, and biological effects. An example of a portion of the effects model is presented in Figure 1. The models are self explanatory in that a simple logical stepwise format was used to describe the effects. This is one of the primary advantages of this approach.

Step 6

Once the causes and effects were modeled a resource management objective concerning energy development was identified.

Prevent energy exploration and development from altering the naturally functioning ecosystem of the North Fork within GNP.

The participants modeled tasks that were necessary to achieve the above objective. Two categories of tasks were identified. One category was to increase the effective link between research and management divisions within GNP. This would facilitate implementing Park management from research findings.

The second category of tasks involved understanding the problem better. This

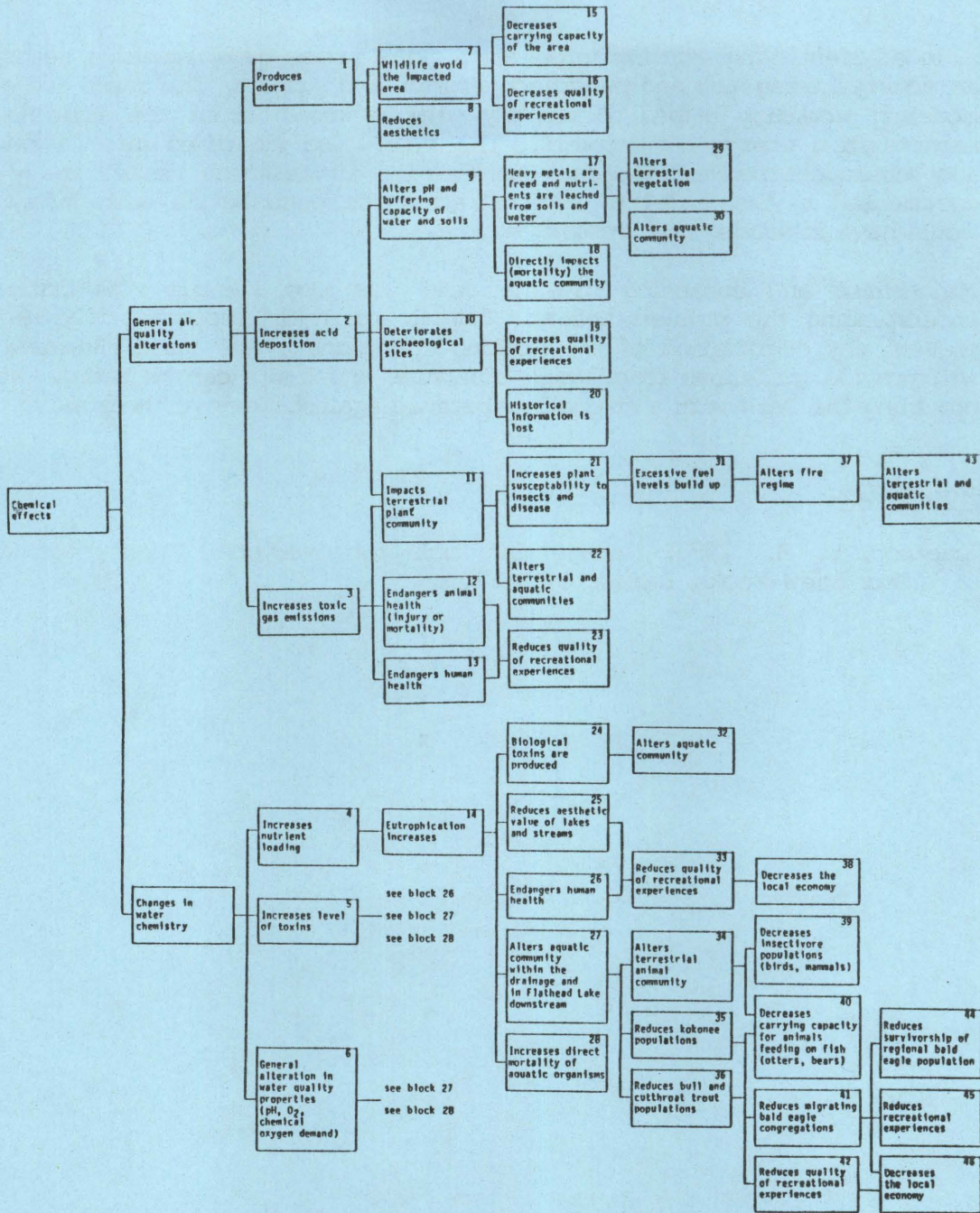


Figure 1. Model of the chemical effects from energy exploration and development activities.

included identifying existing information, information gaps, research needs, and promoting interagency and public cooperation and support. The cause and effect modeling workshop helped to identify what is known about the environmental impacts from energy development. The model also identified information gaps and subsequent research needs. Justification for research has all ready been documented in the model by demonstrating the contribution such information would have in solving the problem.

Maintaining and enhancing baseline data was also identified as critical to understanding the problem better. This is extremely important if GNP is to prevent any degradation of the existing conditions in the Park. Baseline data will provide guidelines from which standards and limits can be set, as well as providing the Park with a strong legal stance against external threats.

References

- Erickson, S. M. 1983. Management tools for everyone: Twenty techniques. Soundview Books, Darien, CN. 170 pp.