

ANALYSIS OF THE RELATIONSHIP BETWEEN
NATURAL DISTURBANCE AND VEGETATION PATTERNS
IN CASCADE CANYON, GRAND TETON NATIONAL PARK

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Objectives

The steep-walled valleys of the Tetons are subject to frequent natural disturbances, including avalanches, rockfall, and debris flow. The vegetation patterns of these valleys are a function of these disturbance events, with the distribution of the community types being controlled by both environmental factors and the disturbance regime. This project will analyze the relationship between disturbances and vegetation patterns in order to determine how the type, frequency, and magnitude of disturbance affects vegetation. This information should lead to an understanding of how vegetation patterns are created and how they change through time.

The research is designed to create a dynamic computer model of vegetation patterns in the Teton valleys, predicting changes in the vegetation pattern through time. This should determine whether the landscape is stable, constantly changing, or if it exists in a shifting equilibrium which maintains a certain amount of coverage by each vegetation type.

The summer of 1985 was used to gather enough information to create a rough model, to be refined in later stages. Three goals were set: (1) to map and classify vegetation, (2) to describe and locate disturbances, and (3) to determine what environmental factors need to be considered in the model. In general, the summer work succeeded in meeting these goals.

Methods

After general reconnaissance of the major Teton valleys, it was decided to limit detailed research to Cascade Canyon, an area representative of the vegetation patterns found in other valleys. Vegetation data were initially collected through detailed mapping of small areas and subsequent sampling using a line intercept technique to find species coverage. This method proved to be too slow and site specific and failed to provide the broad analysis needed to model a large area.

The same ideas were then applied on a broader scale. A less detailed map was sketched for the four mile east-west portion of Cascade Canyon running from the mouth to the main fork. This map located major vegetation types and areas of disturbance in the valley. The apparent vegetation communities were then sampled using a Braun-Blanquet (1932) cover-abundance scale to record the

species coverage. Environmental factors including topography, available moisture, and substrate quality were recorded at each site. A total of one-hundred and twelve sites were sampled.

These data are now being analyzed in order to produce the desired model. The first step will be to classify the vegetation into community types, a process done with the aid of computer packages such as BMDP and SYSTAT. Secondly, environmental factors will be used to cluster sites into environmental types. The vegetation communities, environmental site types, and disturbances will be correlated and mapped. This should determine the relationship between the disturbance regime and the existing vegetation pattern, leading to a static model which will represent the existing vegetation in a highly disturbed area.

Results and Conclusions

Preliminary results indicate a direct relationship between the disturbance regime and the present vegetation pattern. In order to create a dynamic model showing how this pattern changes through time, more research needs to be done. The summer of 1986 will be used to determine the frequency of occurrence for different disturbance types and to obtain information on the rate of vegetation succession following disturbance. These data will be built into the dynamic model that shows changes in vegetation through time.

Literature Cited

Braun-Blanquet, J. 1932. *Plant Sociology: the Study of Plant Communities*. Hafner, London. 439 pp.