# A SYSTEM FOR ACQUIRING AND ANALYSING SYNECOLOGICAL INFORMATION IN WEED MANAGEMENT

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Prediction of the responses of ecosystems to different forms of manipulation is a basic task in weed management. Long-term responses cannot be predicted on the basis of observed results in treatment trials since the time involved is prohibitive. The information required in prediction can be collected more quickly using synecological studies.

## BASIC CONSIDERATIONS

Prediction is concerned with treatment-response relationships. Treatments can be broken down into component impulses (increased site exposure, soil disturbance, etc.), each producing specific responses in the vegetation community. Synecological studies should examine these relationships and the behavioural properties of the community.

The study techniques used must satisfy not only the requirements of prediction but also the demands of the operational environment in which they are to be applied. Therefore standardized procedures incorporating a level of efficiency and quantification beyond that possible with conventional methods of vegetation study are desirable.

## DATA ACQUISITION

The area being managed is stratified according to variation in both vegetation communities and control treatments. Permanent samples are located within each stratum. They are recorded every 2 or 3 months during the first year to monitor seasonal trends, and less frequently in subsequent years.

Photographs provide a suitably standardized, efficient and quantifiable medium for sample recording. The system which has been developed uses a combination of vertical and oblique photographs taken from the ground.

A remotely controlled camera mounted on a hand-held boom can be raised to any height up to 6 m. A photograph taken vertically downward produces a plain view of the quadrat. Profile views are obtained by rectifying obliques.

A range pole laid on the ground establishes scale control for the photographs, locates the centre of the sampled area and removes the necessity for marking quadrat boundaries in the field.

Trees are recorded using a special technique based on a sighting target and a set of two photographs. No field measurements are required.

## DATA PROCESSING

Manual interpretation and rectification of photographs is not feasible and automated techniques are therefore necessary. Digitizing permits rapid and accurate determination of image lengths and areas and their direct input to rectification formulae.

Three basic parameters are quantified on the photographs. Niche, or crown, volume reflects the plant's share of environmental inputs. Niche dominance, the volume of space described below the crown's extremities, is a measure of competitive influence and site modification. The third parameter, niche condition, evaluates the plant's preference for different levels of exposure.

The photographs also record properties which have behavioural significance but are not readily quantified. Examples are reproductive behaviour, health, grazing by animals and soil disturbance.

## ANALYSIS

The sample is viewed as a group of occupied and vacant spatial niches. Within each a set of definite events such as growth, decline or death (in occupied niches) can occur.

The events observed represent responses to the treatment and the parameters evaluated lead to an explanation of their occurrence. In conjunction with trends in such properties as growth rate and invasion potential for a plant or species they enable the likelihood of subsequent events to be estimated. The relationships observed can also be applied in predicting responses to different treatments before they are actually applied.