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Disturbance, seeds, restoration, and the importance of experiments and long-term observations: the Editors' Award for 2005

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Editors' Award for 2005

Disturbance ecology has become an integral part of vegetation science over the past 25 years. Understanding human disturbances and human effects on natural disturbance regimes is a key to establishing restoration goals and initiating restoration projects. However, as this literature has developed, the picture has become both more interesting and more complex: Disturbances interact; each disturbance leaves behind a patch work of effects; and particular disturbances have different effects in different seasons and from one year to another. In addition, different species respond differently to the same disturbance. We are left with questions such as: Can we predict vegetation response to fire in restoration projects? Clearly, we must understand the mechanisms of species response to disturbance in order to answer these questions and achieve a predictive science.

The Editor's Award for 2005 goes to a paper that treats interactions of fire and mowing in a long-term experiment: "Long-term composition responses of a South African mesic grassland to burning and mowing" by Fynn, Morris & Edwards (2005). The authors report on the 50+ year Ukulinga burning and mowing experiment at the research farm of the University of KwaZulu-Natal in South Africa. This experiment, initiated in 1950, is remarkable: three replicates in a randomized split-plot, full-factorial design with four whole-plot and 11 subplot treatments. Mowing treatments included none to early season, late season, and early-plus-late season. Fire treatments were none, annual, biennial, and triannual in winter, spring or autumn. In sum, plot disturbance ranged from protection over 50 years to twice summer mowing plus mowing or fire in the dormant season each year. The authors found that grasses responded to type of disturbance and fire frequency, but forbs were less sensitive to disturbance type. The disturbance combinations controlled vegetation structure and composition, with some combinations producing a short-grass community and others a tall-grass community. Tillering strategy (below or above ground) for grasses and habit (erect or creeping) for forbs explained many responses and are a means to predict differing responses of grasses and herbs and different responses of species within each group to disturbance combinations. The conclusion of the study suggests that the highest diversity and greatest number of species (as well as benefits for wildlife species) can be achieved by applying results at the landscape scale to create patches of diverse structures from simple combinations of disturbance type and season. The authors also found transient responses and compensatory changes among species, thus demonstrating the importance of long-term and experimental research.

Other papers receiving the Editors' commendation

Four other papers were also nominated. Two of these examine seed ecology and its influence on restoration, one describes interesting interactions between canopy and understory through tree effects on soils, and one reports on long-term vegetation change in Japan.

Research on seed ecology is critical to understanding vegetation and to restoration. Seed banks accumulate from many years of reproduction and thus represent one way that ecosystems can exhibit resilience. Bakker, de Graaf, Ernst &van Bodegom (2005) have made an important contribution in their paper, "Does the seed bank contribute to restoration of species-rich vegetation in dune slacks?" In their case, 60 species were found in the seed bank, suggesting a great potential contribution. Yet, establishment of plants was dominated by seed dispersal, with a chance of only 11% that a species in the seed bank would become established in the vegetation in the following year. These results suggested that the distance to the nearest source of seeds was critically important to restoration. Dependence on the seed crop of the year and dispersal also indicates that restorationists must augment natural seed rain in some cases.

A second paper of note also examined seed ecology: "Seedling recruitment in flood-meadow species: the effects of gaps, litter, and vegetation matrix" by Hölzel (2005). There are two general limits to seedling establishment of particular species: no seeds arrive at the site (dispersal limitation) and absence of appropriate germination conditions (microsite limitation). Hölzel added the seeds of six species in experimental combinations of gap creation and litter addition and then followed the fate of the seeds and seedlings for three years. He concluded that five species were seed limited, while one species was microsite limited. The latter was a small-seeded gap-dependent species. This paper impressed us also because of the author's discussion of seed size as a potential predictor of response and its relation to theory (small-seeded species are gap dependent; large-seeded species show neutral or positive to litter thickness).

We note several other excellent papers from the 2005 issues of *Applied Vegetation Science*: van Oijen, Feijen, Hommel, den Ouden & de Waal (2005) examined the distribution of understory herbs in ancient woodland in The Netherlands and Denmark to overstory tree species and the leaf litter they produced. Although the study was carried out on intermediate to base-rich soils, the trees affected the soil pH and soil conditions (specifically, the fermentation layer) below them. Thus, the trees secondarily controlled the distribution of understorey herbs, with herbs characteristic of the ancient forest more important on higher pH, base-rich soils. This research supports the idea that some trees are calcium-pumps (taking up soil calcium from deeper in the soil and depositing it in leaf litter on the surface) and some are sources of acidity and thick organic mats. These kinds of effects mean that trees with different susceptibilities to such human influences as acidification, nitrogen deposition, and the occurrence of new diseases and pest organisms can, as they decline, cause secondary changes to soil chemistry and forest herb layers.

Another excellent paper, Ohtani & Koike (2005), takes advantage of an 1898 survey map to report on long-term changes in *Fagus crenata* (montane beech) forest in Japan. Understanding forest change often requires that we draw inferences from contemporary vegetation and often have to guess about conditions in the past. Ohtani & Koike showed that beech has been unable to colonize the centers of grasslands over 100 years and that full recovery to late-successional forest is limited by dispersal in this slow-growing species. They also found that beech grows faster under early successional species than under beech in the forest refuges (places dominated by *Fagus* in 1898).

Excellent papers and the Impact Factor

The papers cited above are a clear demonstration of the high level reached by the research published in *Applied Vegetation Science* and the growth of the journal is also demonstrated by its impact on the scientific community. The Impact Factor of the journal was given for the second year by ISI®, and its value, calculated for 2004, increased to 1.571, meaning an almost doubling with respect to the 2003 value (which was 0.877).

The increase in the Impact Factor is already producing an increase in the number of submitted manuscripts and this will result in the selection of high-quality papers producing thereby positive feedback for *Applied Vegetation Science*, the authors publishing their work in this journal and for the scientific community involved in the applied study of vegetation also including vegetation management, restoration and conservation.

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