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Natural Disturbance Program Quicknote #26

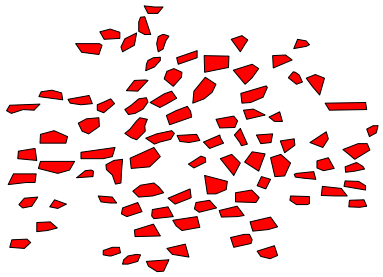
May 2004 *By: David W. Andison*

Paying Attention to "Negative Space"

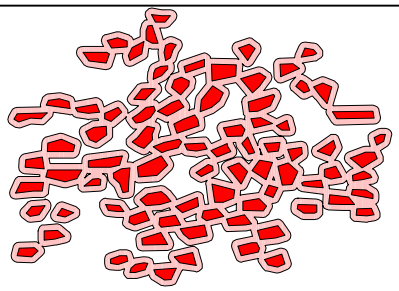
Considerable effort has gone into descriptions of the sizes, shapes, and configurations of natural disturbances, and the ecological consequences of those events. However, it is important to differentiate between the ecological relevance of disturbance patterns in and of themselves, and the critical role they play in modifying the landscape mosaic. For example, in the two disturbance scenarios illustrated below, the size and spatial distribution of the disturbance patches are very different, although the total area disturbed is identical. The pattern on the left (scenario A) depicts a dispersed (or "fragmented") pattern of regularly sized patches, while the one on the right (Scenario B) represents a ("natural") cluster of variously sized disturbance patches.

Disturbance Scenario A

2,400 ha disturbed (11% by area)

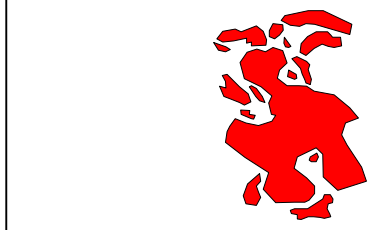


8,000 ha buffer (36% by area)

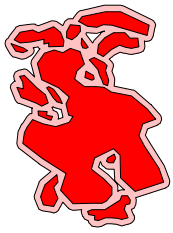


Disturbance Scenario B

2,400 ha disturbed (11% by area)



3,900 ha buffer (18% by area)



The direct, local influence of the disturbance pattern on key ecological attributes such as habitat, refugia, and seed dispersal for each scenario will be quite different. These relate to the "positive space" of the disturbance pattern – where and how large the disturbed areas and residuals are (see Quicknotes 7, 10, 18, and 22). These are also the disturbance attributes most often studied and described.

However, disturbance pattern also influences the landscape pattern – or the "negative space". For instance, a 250m buffer imposed on scenario A covers about 36% of the landscape, compared to only 18% for the same buffer on scenario B. Assuming that the distance to a disturbed edge is an ecologically relevant attribute, clearly a dispersed disturbance pattern impacts far more area of a given landscape than a clustered pattern. If we had measured the total size of the undisturbed patches of the landscape in the two scenarios, the differences would be even more pronounced. Thus, one of the primary functions of disturbance patterns is also to maintain overall landscape integrity – specifically, in this case, by minimizing impacts on the rest of the landscape.

Appreciating the duel role of disturbance patterns is critical if we hope to take full advantage of natural patterns in forest management. The danger of focusing on only the *positive space* aspects of disturbance is evident in the areas of the landscape that are fragmented (see Quicknote 14). It is also yet another example of the cross-scalar, complex nature of dealing with patterns. The good news is that patterns can be easily quantified, meaning that it is entirely possible to capture this complexity with the appropriate combination of indicators.

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