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Alan Hastings talks with *ScienceWatch.com* and answers a few questions about this month's Emerging Research Front Paper in the field of Plant & Animal Science.

Article: The spatial spread of invasions: new developments in theory and evidence
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SW: Why do you think your paper is highly cited?

The issue of spatial spread is central to many areas of ecology, and the number of invaders spreading spatially throughout the world is increasing. This is an issue of great applied interest because the cost to control spreading invasive species is extremely high. For example, many insect pests are spreading invasive species.

Conversely, the study of invasive species is providing insights into general issues of ecology. Thus, the paper focuses on a central issue common to both basic and applied ecology. Since any given invasion is replicated essentially only once in nature, a synthetic approach can be very useful in understanding the dynamics of a particular invasion.

Additionally, this is a paper where all 14 authors truly made substantial contributions. Combining the insights of so many individuals with differing perspectives produced a paper that is both broader and deeper than any one individual could create.

SW: Does it describe a new discovery, methodology, or synthesis of knowledge?

The paper focuses on the synthesis of knowledge in the area of the spread of invading species. By bringing together recent theoretical developments and empirical observations, we can understand both when simpler ideas can explain

rates of spread and also when underlying heterogeneities must be included.

"Future work on understanding other aspects of the problem of invasive species, including impacts on other species, will also clearly be important."

SW: Would you summarize the significance of your paper in layman's terms?

The paper begins with a review of classic approaches to understanding spatial spread, which emphasized the simpler aspects of the problem that would produce a constant rate of spread. More recent work has focused on the complexities of the problem, such as the role played by long-range dispersal and underlying heterogeneities. These change the dynamics of spread in important ways.

SW: How did you become involved in this research and were any particular problems encountered along the way?

My colleagues and I have been looking at spread both from a general point of view and also in the context of specific examples, such as the spread of the cordgrass *Spatina alterniflora*, crabs, and various insects. The paper grew out of a desire to combine the knowledge and insights that came from many of us studying many different invasions from both an empirical and theoretical viewpoint.

Trying to distill the most important insights, to integrate a vast body of empirical studies, and to explain the theoretical work in a straightforward fashion that elucidated how different conclusions depended on different assumptions were the biggest challenges.

SW: Where do you see your research leading in the future?

We are conducting research on both general and specific instances of spread. Additionally, we are carefully working on adding economic considerations, in order to understand how to design cost-effective methods of control.

Understanding how to make management decisions in the face of limited knowledge is a critical aspect of future work on invasions, as is extending insights to include interactions among different species.

SW: Do you foresee any social or political implications for your research?

The spread of invasive species has very large economic consequences. Understanding the dynamics of spread is a first step to understanding potential impacts, and also for planning appropriate management. Future work on understanding other aspects of the problem of invasive species, including impacts on other species, will also clearly be important.

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