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**Spatial Analysis in R**

*An introduction to data manipulation, spatial data analysis and statistical modeling*

**Background**: we received many requests from TNC scientists and researchers for a statistics course and, Global Science's professional development program is pleased to offer its first "*Spatial Analysis in R: An introduction to data manipulation, spatial data analysis and statistical modeling*" training. This is an experiential-learning training where participants will develop skills focused on implementing complex analytical tasks and spatial modeling in the R Statistical Environment. The five-day on-line training that allows participants to work through a well-defined learning objective in small group settings. Participants will also be expected to work through problems and write code implementing their unique solution. All data and examples will be ecological in nature and strive to provide a relevant context to conservation decision making.

**What to Expect:** starting with a basic review of R object types and programming basics, the training will cover managing spatial objects and implementing complex data manipulation, query and analytical tasks using raster, vector and multi-temporal arrays. It will also focus on extending some common GIS overlay and proximity functionality. Building on this foundation, participants will learn about distance and neighbor contingency analysis contributing to a foundational understating of autocorrelation and the evaluation of linear model assumptions. It further expands the knowledge in understanding some fundamentals of spatial statistics including point process, attraction and diffusion, first and second order spatial process, nonstationarity, anisotropy, semivariance, interpolation and spatial regression. Through building these skills, participants will become well versed in manipulating spatial objects, integrating different data types and leverage existing R package functionality in expanding their analysis. The training will apply these skills by reviewing the conceptual theoretical foundations, and then implementing, three modeling approaches: 1) a graph theoretical gravity model for quantifying characteristics of landscape level geneflow; 2) a Random Forests model for estimating probability of species distribution and; 3) a spatial-temporal model for quantifying trend in above ground biomass.

**Trainer’s Biography**: Jeffrey S. Evans, Ph.D., is a Senior Landscape Ecologist and Biometrician with The Nature Conservancy and a Visiting Professor at University of Wyoming, where he attempts to bring vigor from diverse fields such as landscape ecology, spatial statistics, remote sensing, population genetics and applied mathematics to answer practical conservation questions. His focus is on the development and implementation of novel statistical methods for the assessment of cumulative impacts to ecological systems, understanding species limits, quantifying habitat use through patterns of genetic structure and monitoring biodiversity. With over 20 years of experience, he also has formal training in quantitative ecology and spatial statistics from UC San Diego and UC Berkeley with a tenure at the Berkeley-Stanford Joint Statistics Colloquium. Prior to TNC, he worked as a Research Ecologist for the USDA-USFS Research Station with a joint appointment as an Assistant Professor at University of Idaho after being a research fellow at the California Academy of Sciences. He currently has 110 publications in peer-reviewed journals and several published R packages.

**Tentative Agenda**

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| **Day (international participants)** | **Agenda** |
| **Pre-webinar required video** | Please watch video reviewing R object types and structures before the start of the workshop |
| **Monday, January 18**  *Session 1: 9:00pm-12:00am (EST)* | Spatial query, manipulation, overlay (replicating GIS like operations in R) |
| **Tuesday, January 19**  *Session :2 9:00pm-12:00am (EST)* | Distance/neighbor analysis, k nearest neighbors, imputation, spatial autocorrelation |
| **Wednesday, January 20**  *Session 3: 9:00pm-12:00am (EST)* | Raster analysis, quantifying landscape structure, timeseries analysis |
| **Thursday, January 21**  *Session 4: 9:00pm-12:00am (EST)* | Spatial regressions, mixed effects models implementing graph theoretic models |
| **Friday, January 22**  *Session 5: 9:00pm-12:00pm (EST)* | Predictive models with nonparametric methods. |

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| **Day (US participants)** | **Agenda** |
| **Pre-webinar required video** | Please watch video reviewing R object types and structures before the start of the workshop |
| **Monday, January 25**  *Session 1: 9:00am-12:00pm (EST)* | Spatial query, manipulation, overlay (replicating GIS like operations in R) |
| **Tuesday, January 26**  *Session 2: 9:00am-12:00pm (EST)* | Distance/neighbor analysis, k nearest neighbors, imputation, spatial autocorrelation |
| **Wednesday, January 27**  *Session 3: 9:00am-12:00pm (EST)* | Raster analysis, quantifying landscape structure, timeseries analysis |
| **Thursday, January 28**  *Session 4: 9:00am-12:00pm (EST)* | Spatial regressions, mixed effects models implementing graph theoretic models |
| **Friday, January 29**  *Session 5: 9:00am-12:00pm (EST)* | Predictive models with nonparametric methods. |

**Timeline:**

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| **Item** | **Deadline** |
| Announcement | September |
| Application deadline | November |
| Application review | November |
| Announcement and selection | November |
| Webinar dates | January 18 – January 22 & January 25 – January 29 |

**Selection Criteria:**

**How to apply:**

If interested, kindly submit your application online:

<https://forms.office.com/Pages/ResponsePage.aspx?id=wW2-eY7Xu0uyK9mUwKQXp1-4OmZ7mCBIkC0Y9RAq_plUOEowOEtQRUIzRjFQMENHN0tWMUMwSURCNy4u>

**Program Contact**

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