

Presentation Information

Presenter	Robert Pontius Jr
Title	Inclusion of Uncertainty in Landscape Models of Coupled Human Natural Systems
Affiliation	Clark University
Authors	Robert Pontius Jr, Neeti Neeti, Colin Polsky

Abstract:

This paper presents a method to compare the output maps of different scenarios of future land change, in a manner that considers the uncertainty of the projections. It is essential to be able to measure whether maps of various future scenarios are meaningfully different. Previous research shows that projections from models can be highly uncertain as measured by validation using historic data, whereas this new research presents a method to examine the implications of model accuracy on the interpretation of maps of the future. We illustrate the technique by comparing two scenarios of future land change in the Plum Island Ecosystems of northeastern Massachusetts, USA. We use a validation step to measure the model's accuracy over a historic time interval, and then we assume the model will have the same accuracy in the future over the same time duration and that eventually the accuracy will decay to randomness in the very distant future. The first scenario is a business as usual scenario that extrapolates past trends of net forest loss, while the alternative scenario portrays forest gain. The methods show how the duration of the future projection influences the differences between the raw scenario maps that ignore uncertainty versus the adjusted scenario maps that account for uncertainty. Results show that the business as usual and alternative scenario raw maps are 26 percent different after 50 years, while the corresponding maps that are adjusted for uncertainty are only 1 percent different after 50 years. A strategy to increase the level of complexity in models is likely to increase uncertainty, hence to exacerbate the problem. Therefore, we recommend that a priority for future work should be to aim for clarity in presentation of modeling so that it is at least intellectually accessible to a wide audience.