
Foreword

Planners everywhere rely on models; conservation planning is no exception. It is also no easy task—especially when planning for conservation on large landscapes. Just making a list of the ingredients one might want to include in a model can be exhausting.

For a start, one will almost certainly need to model the population dynamics, perhaps even the meta-population dynamics, of one or more species. Their habitat preferences will be important, so they too must be modeled, and this in turn creates a need for vegetation and landscape modeling. Events may play an important role in the landscape dynamics, so the model might need to include flood, drought, wildfire, harvesting, high winds or hurricanes. The model will likely be used by multiple stakeholders with conflicting objectives, so their concerns must be addressed. Finally, spice this thick brew with climate change, annual migrations, political change, economics, epidemics and even conflict or warfare, then add in scientific uncertainty and erase some of the most relevant data. The result is a complex recipe that might delight the witches in Macbeth, but confuses and challenges the modeler and those who attempt to use the model.

It is pertinent to ask how the human brain handles such complexity. Think of the overload of information that the eye or ear sends to the brain every fraction of a second. The brain copes with all this input by being selective; it ruthlessly ignores most of the information. It directs its *attention* only to those sights or sounds it considers to be important at that moment. Modelers, stakeholders and planners have to be similarly selective, but while the brain focuses its attention automatically, modelers have to be deliberate. The success or failure of a modeling and planning exercise depends on how attention is directed.

The first question to ask is “How will we decide whether one plan is better than another?” This immediately focuses attention on the objectives of the planning exercise, and the need to identify clear and measurable goals and to negotiate their relative importance. The next question is “What do alternative plans look like?” In other words, what are the characteristics of the various options? The answers to these two questions provide the structure for the modeling exercise. We now know what kind of outputs the model must provide (the measurable goals) and also what inputs are essential (the characteristics of the options). What remains is the development of a model to link the options to the goals. Designing and defining the *planning process* provides the essential purpose for the *model*.

However, even with a clear purpose, there will still be questions and arguments about what to include in the model, how to cope with uncertainty and missing information, and what level of detail or resolution is required.

Paradoxically, we often need the model to decide what model we need. Modeling therefore has to be a learning process. Evolution taught the brain to give immediate attention to loud or shrill noises and swift movements. We can *evolve* an appropriate model by first building the simplest possible prototype, testing it, checking how sensitive it is to missing data, estimating how added complexity might affect its performance, and then making incremental changes to it. In other words, rapid prototyping combined with sensitivity analysis and an analysis of assumptions allows us to ultimately build as complex a model as we need. The secret of dealing with complexity is to start simple and only add detail as needed.

We started with a reference to Macbeth. Shakespeare comes to mind again: this book reminds one of *The Tempest*. It is rather like an enchanted island stocked with enticing techniques, approaches, paradigms, concepts and examples. Alas, it is all too easy to get bewildered or lost on an enchanted island. Some readers will never escape from it—their intellectual skeletons will lie buried in obscure paragraphs. Others will sail off clutching inappropriate treasures that lose their sparkle in the outside world. However, armed with a determined mind-set, and paying careful attention (again!) to objectives and priorities, readers can venture into this book and emerge with ideas that truly fit their needs.

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