

Guidelines for model adaptation: a study of the transferability of a general seagrass ecosystem DBN model

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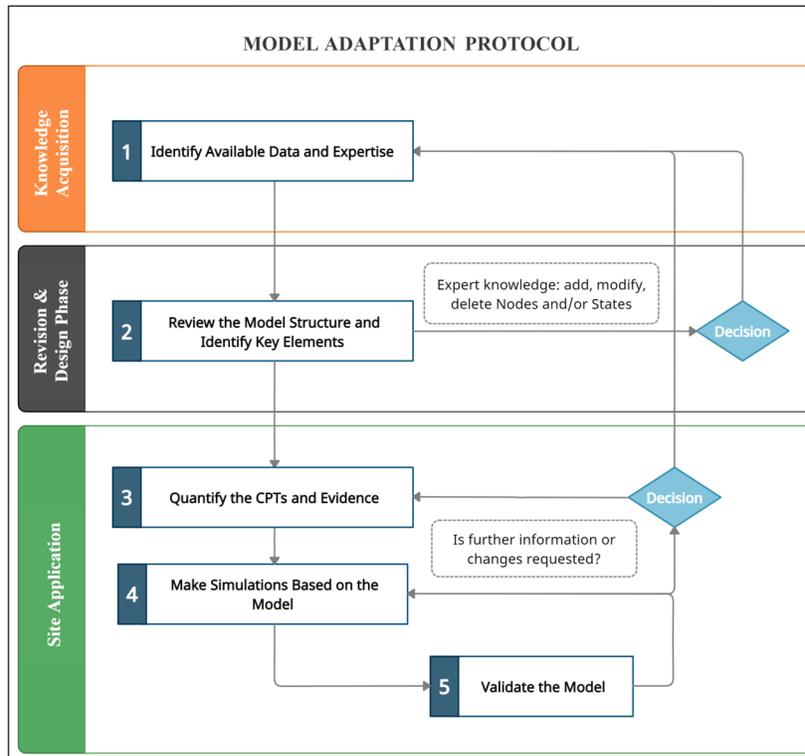
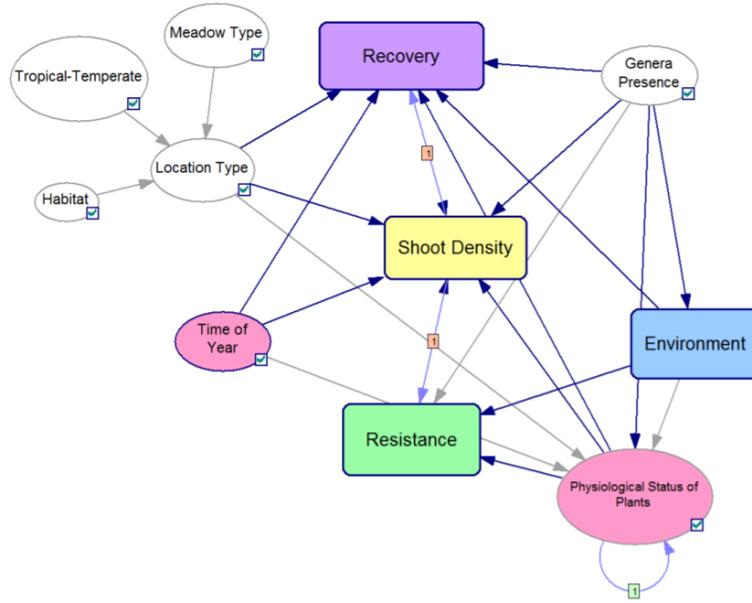
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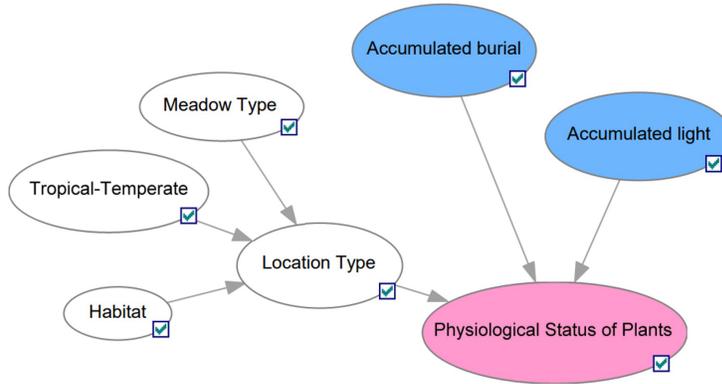
Abstract

Ecological models are extensively and increasingly used in support of environmental policy and decision making. Dynamic Bayesian Networks (DBN) as a tool for conservation have been demonstrated to be a valuable tool for providing a systematic and intuitive approach to integrating data and other critical information to help guide the decision-making process. However, data for a new ecosystem are often sparse. In this case, a general DBN developed for similar ecosystems could be applicable, but this may require the adaptation of key elements of the network. The research presented in this paper focused on a case study to identify and implement guidelines for model adaptation. We adapted a general DBN of a seagrass ecosystem to a new location where nodes were similar, but the conditional probability tables varied. We focused on two species of seagrass (*Zostera noltei* and *Z. marina*) located in Arcachon Bay, France. Expert knowledge was used to complement peer-reviewed literature to identify which components needed adjustment including parameterisation and quantification of the model and desired outcomes. We adopted both linguistic labels and scenario-based elicitation to elicit from experts the conditional probabilities used to quantify the DBN. Following the proposed guidelines, the model structure of the DBN was retained, but the conditional probability tables were adapted for nodes that characterised the growth dynamics in *Zostera spp.* population located in Arcachon Bay, as well as the seasonal variation on their reproduction. Particular attention was paid to the light variable as it is a crucial driver of growth and physiology for seagrasses. Our guidelines provide a way to adapt a general DBN to specific ecosystems to maximise model reuse and minimise re-development effort. Especially important from a transferability perspective are guidelines for ecosystems with limited data, and how simulation and prior predictive approaches can be used in these contexts.

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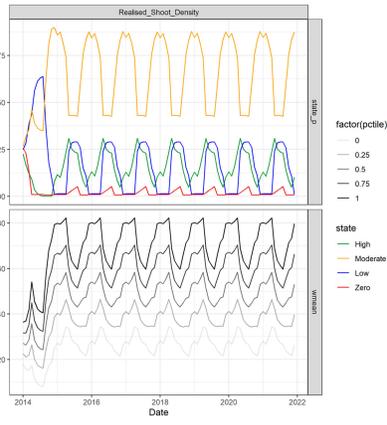
Paper.pdf available at <https://authorea.com/users/455146/articles/552529-guidelines-for-model-adaptation-a-study-of-the-transferability-of-a-general-seagrass-ecosystem-dbn-model>



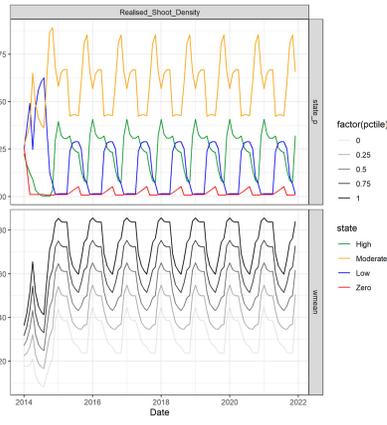


Accumulated Light	Accumulated Burial	Location Type	Physiological Status of Plants		
			Good	Medium	Poor
Above Saturation	No Effect	Persistent Temperate InterTidal	Extremely Likely	Extremely Unlikely	Extremely Unlikely
Below Saturation	No Effect	Persistent Temperate InterTidal	Unlikely	Likely	Extremely Unlikely
NA	Effect	Persistent Temperate InterTidal	Extremely Unlikely	Likely	Unlikely
Above Saturation	No Effect	Persistent Temperate InterTidal	Likely	Unlikely	Extremely Unlikely
Below Saturation	No Effect	Persistent Temperate InterTidal	Extremely Unlikely	Unlikely	Likely
NA	Effect	Persistent Temperate InterTidal	Extremely Unlikely	Very Unlikely	Very Likely
Above Saturation	No Effect	Persistent Temperate InterTidal	Very Unlikely	50/50	Unlikely
Below Saturation	No Effect	Persistent Temperate InterTidal	Extremely Unlikely	Extremely Unlikely	Extremely Likely
NA	Effect	Persistent Temperate InterTidal	Extremely Unlikely	Extremely Unlikely	Extremely Likely

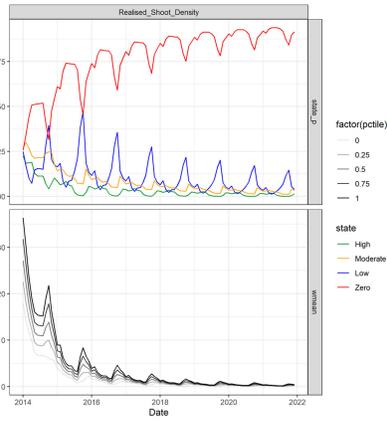
(a)



(b)



(c)



(d)

