

Qualifying Exams Literature Review

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Introduction

This book is a documentation of the key concepts, findings, and figures of the assigned literature for my qualifying exam. In organizing the literature review in a book, the various concepts are able to be synthesized, interlinked, and mapped to my own research ideas and efforts.

1.1 Research interests

My research interests are broadly focused on parsing apart the relative influence of autochthonous (within the system) vs. allochthonous (from outside of the system) inputs to organic carbon in mangrove sediments. I aim to investigate whether remote sensing and ecoinformatics (standardization and aggregation of disperse field data) can be leveraged to better understand heterogeneity both within- and across-sites.

1.2 Fields of examination

Thus, the topics covered in the exam are namely:

1. Mangrove forest ecology, with an emphasis on regeneration dynamics
2. Mangrove soil organic carbon and geomorphology
3. Remote sensing of wetlands, with a particular focus on mangroves
4. Ecoinformatics, tipping points, and decision-making theory

1.3 Book format

The following chapters are organized in this manner, with subsections for each of the assigned chapters that is identified in a “First author, year of publication” format. Each subsection provides a brief review of the key concepts associated with the article of interest, key findings, and a reprint of any key figures.

Chapter 2

Mangrove forest ecology

This is just some intro stuff here.

2.1 Zonation & disturbance

2.1.1 Preface

Establishment of monospecific stands of mangrove trees in zones parallel to shorelines (zonation) has been among the most well-studied phenomenon in mangroves. Physicochemical gradients exist from the shoreward to landward edges of the intertidal zone, with implications for the recruitment, establishment, and dominance of different mangrove tree species. Several hypotheses attempting to explain zonation in mangroves have existed throughout time:

Zonation as mangrove succession - Davis, 1940:

- From his work in Florida, Davis believed that mangroves promoted shoreline progradation, which was followed by establishment of *Avicennia germinans* species in the most seaward portion of the intertidal zone. Eventually *Rhizophora mangle* with a few *Laguncularia racemosa* individuals would outcompete *A. germinans* as the shore (and thus habitat for *A. germinans*) continued to prograde. Davis believed that the zones of species were a successional process, eventually climaxing in a terrestrial forest dominated by non-mangrove species.

Zonation as response to geomorphic condition - Thom, 1967:

- Thom did his field work in a composite lagoon and riverine system in Tabasco, Mexico, and provided one of the first most comprehensive sets of evidence against Davis's hypothesis of zonation as mangrove succession. In looking at the different habitats in which mangrove tree species existed, Thom concluded that zonation of species was in response to the hydrological and substratum conditions of a site, which were ultimately variables controlled by geomorphic processes. As a result, he concluded that spatial patterns of mangrove species were in response to geomorphic changes in the land rather than mangrove species inducing patterns in geomorphology (and thus species zonation was relatively "stable").

Zonation as adaptation to physico-chemical gradients - Macnae, 1968:

Zonation as result of interspecific competition - Clarke and Hannon, 1971:

Zonation due to tidal sorting of propagules - Rabinowitz, 1978:

- Upon investigating no significant difference in survival and growth rates of *Avicennia*, *Rhizophora*, *Laguncularia*, and *Pelliciera* tree individuals planted in monospecific stands in Panama, Rabinowitz concluded that mangrove zonation is not primarily controlled by physiological variables. In response,