Floristic zonation, structure and plant diversity patterns within a Caribbean mangrove forest on the Bay Island of Utila (Honduras)

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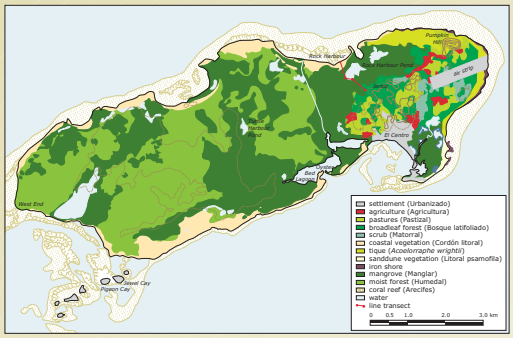

Fig. 1: Major vegetation types and coral reefs on Utila (source: www.islasdelabahia.org).

Study area

Utila is the smallest of the three major Bay Islands situated in the Gulf of Honduras. While the highest point of the island is reached on the northeastern end at Pumpkin Hill (74 m a.s.l.), large parts consist of coralline platforms little elevated above sea level, favouring vegetation tolerant to the influence of brackish and/or salt water (Fig. 1 & Fig. 2). Covering more than 1/3 of the total island surface (42 km²), Utila hosts one of the largest, contiguous and most unique mangroves in the Caribbean (Lemay et al. 2003). Despite occasional Iguana-hunting (the endemic *Ctenosaura bakeri*, see Fig. 2 inset) anthropogenic disturbances are still rather low due to the inland terrain's low land-use potential (Kaiser & Grismer 2001, Currin 2002). While currently still in near-natural condition, Utila's tropical coastal and moist inland forests are at high risk, as tourism on the island rapidly grows and large stretches of the recently undeveloped northern coast will be opened up for tourism infrastructure in the nearest future (Clauss & Wild 2001, Currin 2002).

Fig. 2: Satellite image of Utila (source: www.rainbowbrokerage.com); inset: the endemic *Utila Iguana* Ctenosaura bakeri.

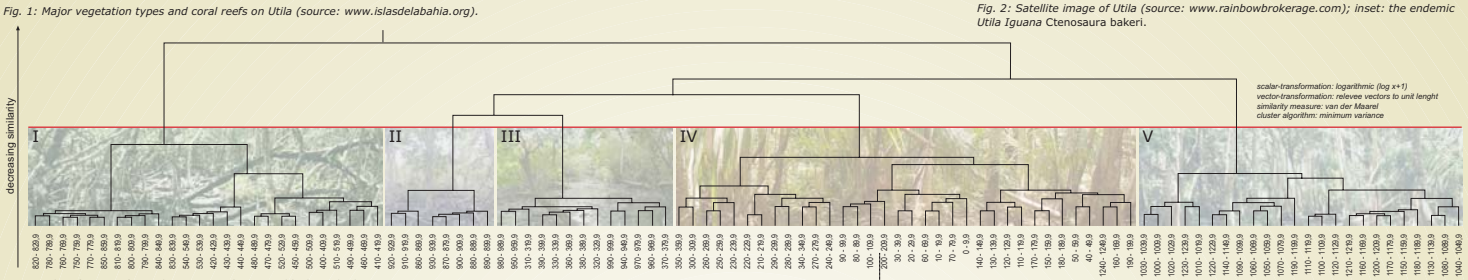

Fig. 3: Classification of sample segments (10 m each) along the line-transect.

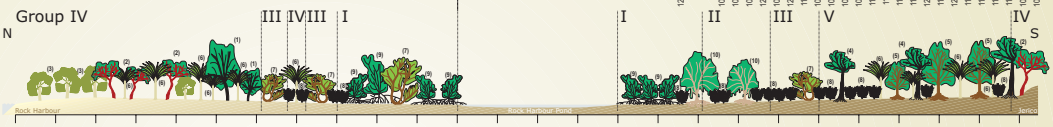

Fig. 4: Generalized vegetation series along the transect from the sea shore (to the left) across Rock Harbour Pond to the swamp forest border at Jerico (to the right), showing the ten most frequent plant species. The numbers above the plant symbols refer to the respective species names listed in Fig. 5.

Aim and methods

Descriptive studies on mangrove zonation exist in immense number. However, quantitative data on within-swamp distribution of plant taxa are relatively rare, leaving important questions concerning ecology and stand dynamics of tropical wet forests unresolved (Ellison 2002, Mendelssohn & McKee 2000). By using quantitative data we try to add some new aspects about the mangrove forests on Utila and Caribbean mangroves in general. Vegetation sampling for this study was conducted along a 1250 m line-transect with a resolution of 10 cm. For statistical analyses concerning floristic zonation, vegetation structure and diversity patterns, the raw data were merged to adjoining 10 m segments.

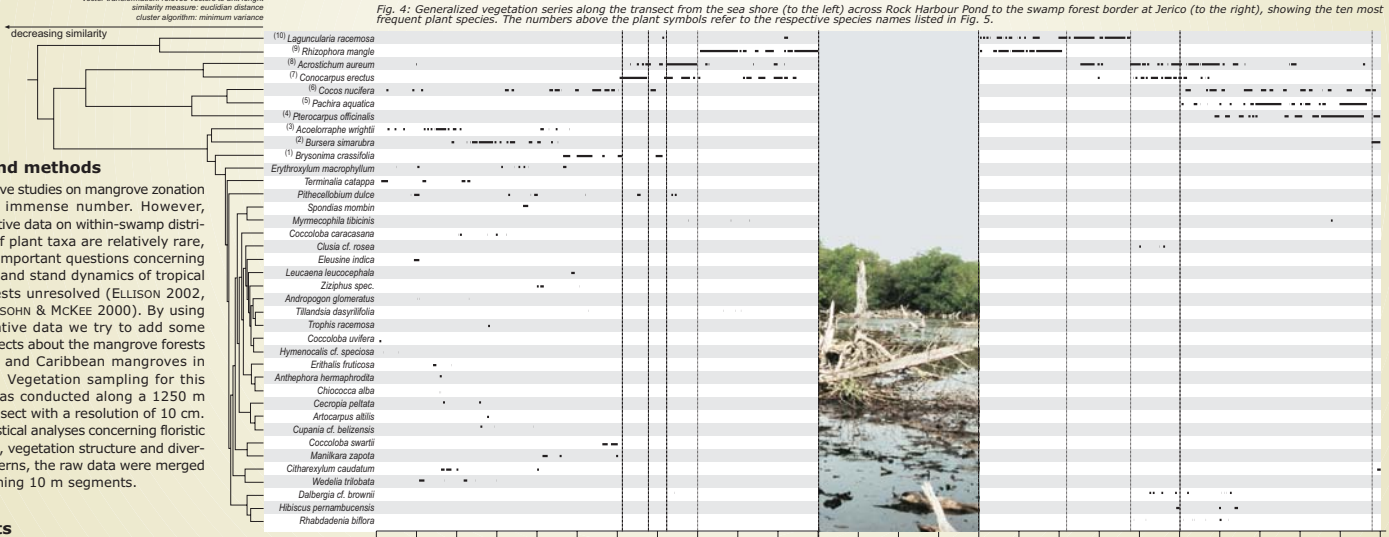

Fig. 5: Classification and distribution of all species (n = 38) encountered along the transect based on 10 meter segments.

Results

Even if a floristic zonation in mangroves is discussed controversial (at least for old world mangroves, see Ellison 2002), the classification of the 10m segments along the transect reveals five discrete groups for the relatively simple structured Caribbean mangroves on Utila (Fig. 3). Due to the bowl shaped topography of the island, the common and much described Caribbean mangrove zonation (i.e. from shore to inland regions as summarized for example by Hartshorn 2000) is modified to a more or less symmetrical arrangement of forest belts to the north and south of the Rock Harbour Pond. To get a better impression, Fig. 4 shows a schematic sequence of dominant plant species along the 1250 m transect. This profile is accompanied by a list of all 38 vascular plant species encountered in combination with distribution bars in Fig. 5. Structural patterns such as stratification in five height classes and lifeform composition including groundcover are shown in Fig. 6 and Fig. 7, respectively. Finally, boxplots for the species numbers within the five distinct groups (Fig. 8) as well as different diversity measures (Fig. 9) illustrate changes in vascular plant diversity along the transect.

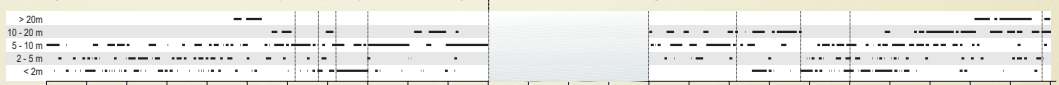

Fig. 6: Stratification patterns along the profile based on five height-classes.

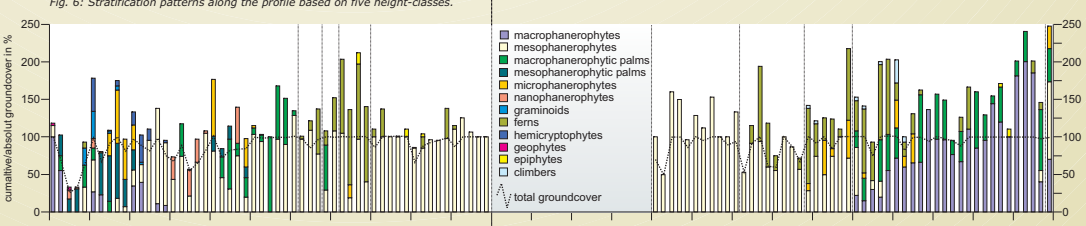

Fig. 7: Life-form composition (cumulative coverage) and total ground cover along the transect based on 10 meter segments.

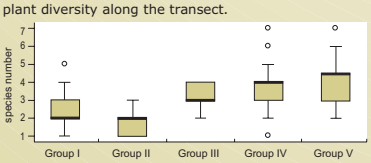

Fig. 8: Boxplots for the five groups of the classification in Fig. 3.

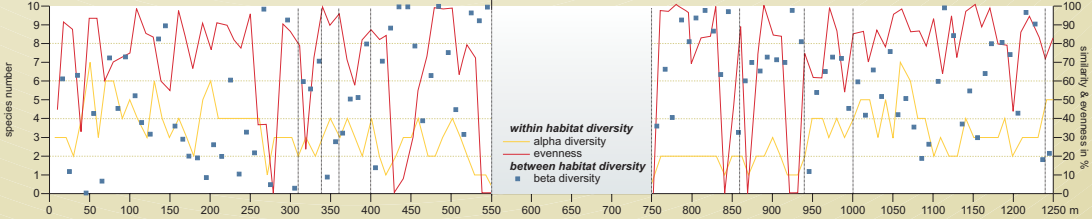

Fig. 9: Diversity measures within and between 10 meter segments along the transect.

Acknowledgement

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