Title: Growth and survival during 12 year in a peat swamp forest at Sebangau, Central Kalimantan

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Introduction

- Peat swamp forest is a unique and fragile ecosystem (Mirmanto 2009; Simbolon & Mirmanto 2000).
- Disturbance may change process of forest-ecosystem dynamics.

**Objective:** To record forest dynamics over 12 year

Study site

Fig. 1. Location of research plots

Method

We examined growth and survival of trunk diameter (dbh ≥ 5 cm) at ex-logged concession area in peat swamp forest after 12 years measurement in five plots (50 m x 50 m each).

Table 1. Tree number, basal area and number of species of five plots. Parenthetic value show data 1999. Plot code, distance from the river and peat depth obtained from Mirmanto et al. (2003)

<table>
<thead>
<tr>
<th>Plot code</th>
<th>Tree number (1/0.25ha)</th>
<th>Number of recruitment in 2011 (1/0.25ha)</th>
<th>Basal area (m²/0.25ha)</th>
<th>Number of species</th>
<th>Distance from river (km)</th>
<th>Peat depth (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>414 (497)</td>
<td>153</td>
<td>5.11 (6.65)</td>
<td>75 (68)</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>S2</td>
<td>483 (693)</td>
<td>21</td>
<td>7.43 (6.90)</td>
<td>66 (69)</td>
<td>3.3</td>
<td>3.0</td>
</tr>
<tr>
<td>S3</td>
<td>560 (752)</td>
<td>25</td>
<td>8.59 (7.63)</td>
<td>71 (75)</td>
<td>3.8</td>
<td>3.0</td>
</tr>
<tr>
<td>S4</td>
<td>558 (902)</td>
<td>4</td>
<td>8.52 (8.70)</td>
<td>65 (72)</td>
<td>4.4</td>
<td>3.5</td>
</tr>
<tr>
<td>S6</td>
<td>546 (748)</td>
<td>23</td>
<td>8.77 (8.70)</td>
<td>62 (64)</td>
<td>5.7</td>
<td>4.0</td>
</tr>
</tbody>
</table>

Results

Over 12 years of dynamic process, most of trees were distributed at small size classes. It can be suggested that recovery at Sebangau catchment is still on going after selective logging in 1996.

Analysis

We estimated relative growth rate per year (RGR) and survival over 12 years by hierarchical Bayesian models.

Survival model

Survival (Si = 0 or 1) follows a Bernoulli distribution with the predicted probability of survival \( p_i \). The logarithm of mortality rate of ith tree (\( M_i \)) is assumed to be the sum of three parameters (\( M_o, M_p, M_s \)) at community-, species- and plot-levels, respectively.

\[
p_i = \exp(-M_i) \\
\log(M_i) = m_o + m_s + m_p
\]

RGR model

RGR of the i-th individual tree, \( R_i \), is assumed to be the sum of three parameters (\( r_c, r_s, r_p \)) at community-, species- and plot-levels.

\[
R_i = r_c + r_s + r_p
\]

The logarithm of the final stem diameter \( D_{i,t} \) is assumed to be the sum of the logarithm of initial stem diameter \( D_{i,0} \) and, the product of \( R_i \) and the census interval, \( t = 12. 
\]

\[
\ln(D_{i,t}) = \ln(D_{i,0}) + R_i t
\]

Reference:


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