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

Tika D. Atikah[1,2], Yoshiko Iida[1], Edi Mirmanto[2], Takashi S. Kohyama[1], and Joeni S. Rahajoe[2]

[1] Hokkaido University, Sapporo Japan, [2] Research Center for Biology-LIPI, Indonesia

E-mail: tikadewi_atikah@yahoo.com

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

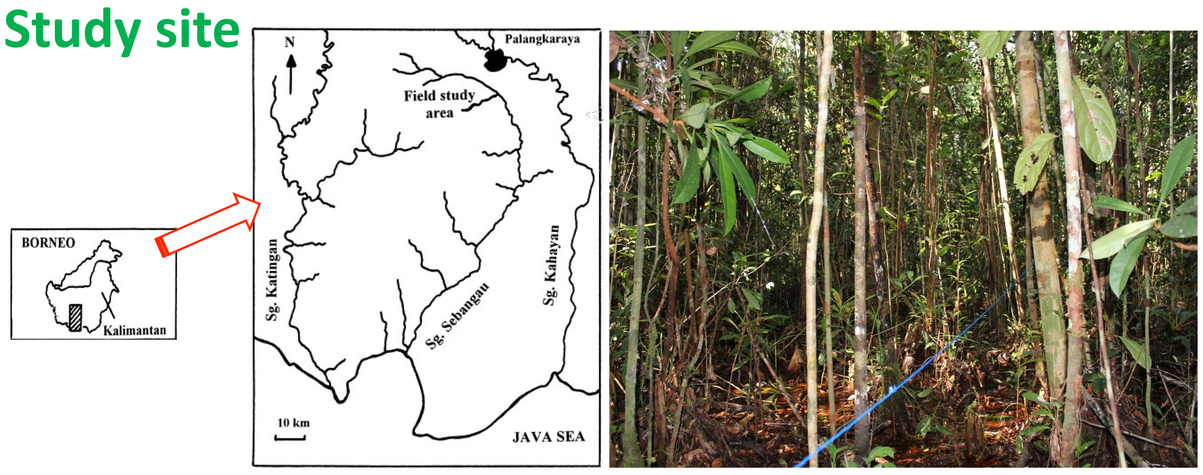

Fig. 1. Location of research plots

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 spesies of five plots. Parenthetic value show data 1999. Plot code, distance from the river and peat depth obtained from Mirmanto *et al.*(2003)

Plot code	Tree number (1/0.25ha)	Number of recruitement in 2011 (1/0.25ha)	Basal area (m^2/0.25ha)	Number of species	Distance from river (km)	Peat depth (m)
S1	414 (497)	153	5.11 (6.65)	75 (68)	2.5	2.5
S2	483 (693)	21	7.43 (6.90)	66 (69)	3.3	3.0
S3	560 (752)	25	8.59 (7.63)	71 (75)	3.8	3.0
S4	558 (902)	4	8.52 (8.70)	65 (72)	4.4	3.5
S6	546 (748)	23	8.77 (8.70)	62 (64)	5.7	4.0

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_c, M_s, M_p) at community-, species- and plot-levels, respectively .

$$p_i = \exp(-M_i)$$

$$\log(M_i) = m_c + m_s + m_p$$

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_{2i} is assumed to be the sum of the logarithm of initial stem diameter D_{1i} and, the product of R_i and the census interval, t = 12.

$$\ln(D_{2i}) = \ln(D_{1i}) + R_i t$$

Conclusion

Plots showed similar pattern of recoverty in terms of growth rate, whereas plot-specific mortality suggests the infulcence of inter-plot difference in peat depth (Mirmanto, 2009). Recorded demographic rates were quite high, which suggests the potential of revoery of peat swamp forest, as far as forest fire is not associated with selective logging.

Results

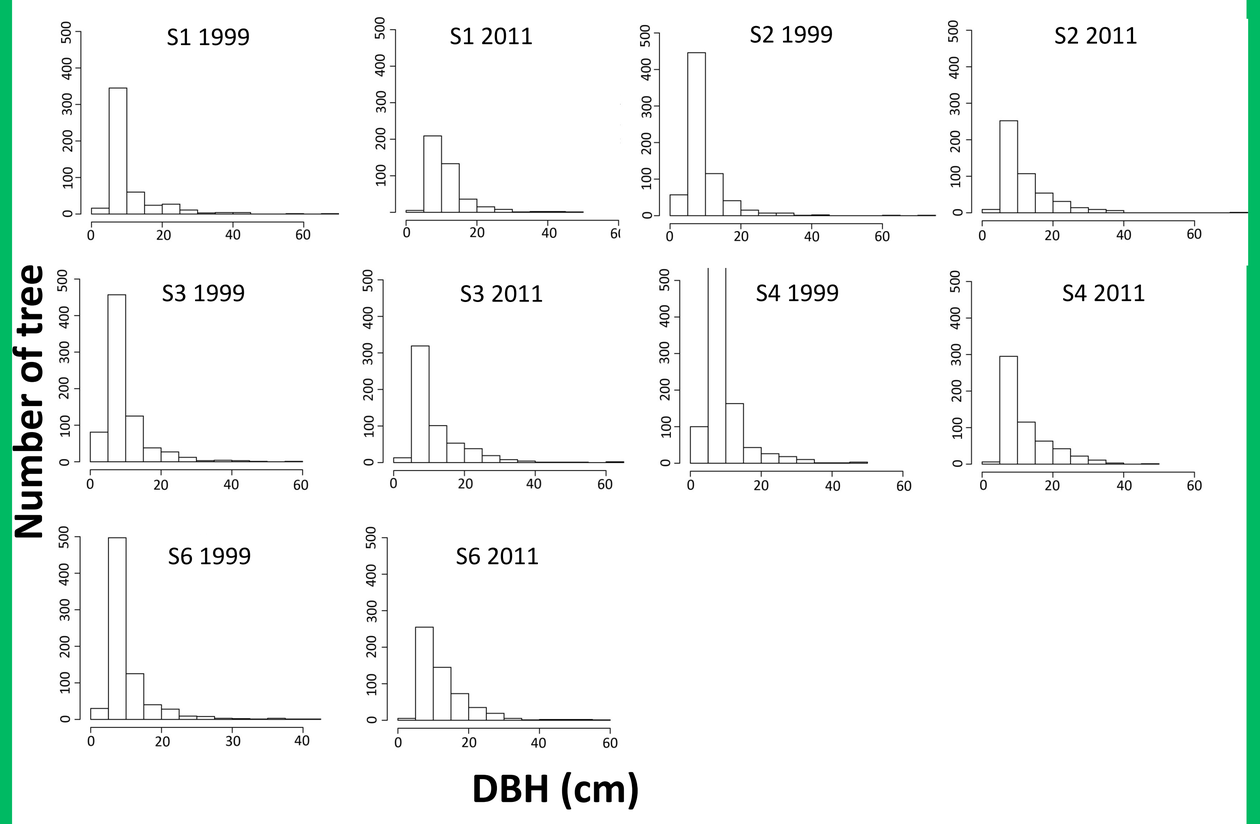

Fig. 2. Frequency distribution of DBH of each plot in 1999 and 2000.

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.

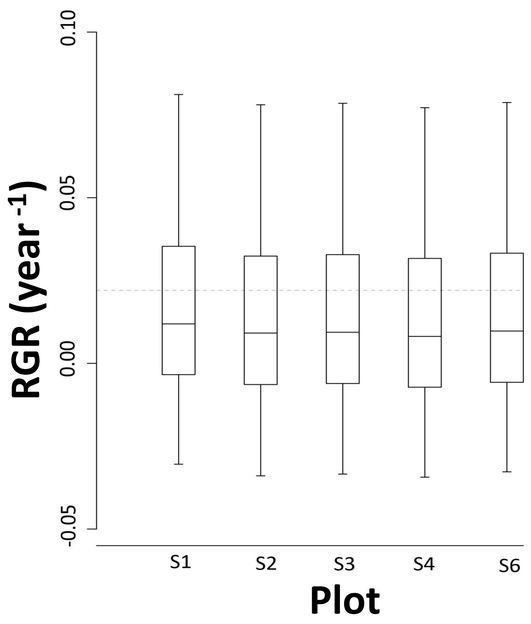

Fig. 3. Differences in relative growth rate among five plots.

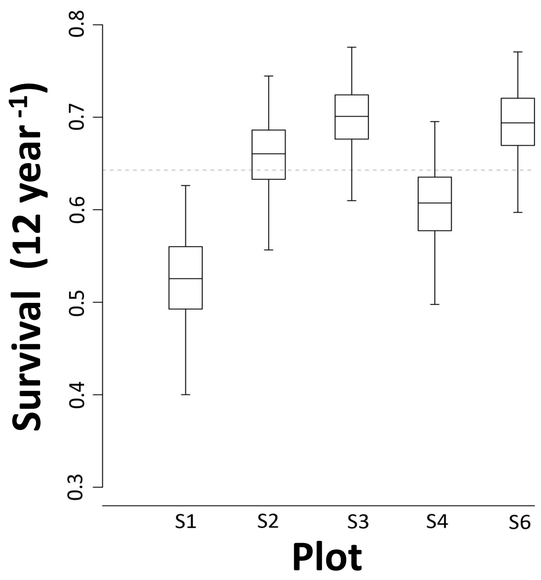

Fig 4. Differences in survival rates over 12 years among five plots.

Average RGR was 0.025 year^{-1} and average probability of survival was 0.64 during 12 years.

RGR were not different across plots whereas survival were different among plots.

Reference :

Mirmanto, E. 2009. Forest dynamics of peat swamp forest in Sebangau, Central Kalimantan. *Biodiversitas.* 10(2): 187-194.

Simbolon, H & Mirmanto, E. 2000. The plants of peat swamp forest in Central Kalimantan Indonesia. *Proceeding of International Symposium on Tropical Peatlands*. Bogor 22-23 November 1999. pp. 165-172.

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