INTRODUCTION

- Tropical peatlands store soil carbon up to 15-19% of global carbon peat and presently being disturbed by land development and management (Page et al., 2011).
- Peat degradation occurs most rapidly and massively in Indonesia’s peatlands because of
OBJECTIVES OF STUDY

1. Assessing carbon loss from soil ecosystems in tropical peatlands of Central Kalimantan for one year.
2. Comparing the contribution of soil respiration (RS) and dissolved organic carbon (DOC) flux to the carbon loss.

Carbon balance in tropical peatlands

STUDY SITES

Palangkaraya, the capital city of Central Kalimantan province (2°20′S, 114°20′E)

- UF is undrained forest
- DF is drained forest in Ex-Mega Rice Project (MRP) area (Block C)

UF and DF had been logged until the late 1990’s.
METHODS FOR SOIL RESPIRATION (RS)

Calculation of RS in 2011 using an empirical model, which was made using field data in 2004 and 2005 (Sundari et al., 2012)

**UF:**
when GWL > -0.1 m: \( y = 3.53 - 9.83x; r^2 = 0.89 \)
when GWL < -0.1 m: \( y = 4.66 + 0.58x + 2.11x^2; \)
\( r^2 = 0.54 \)

**DF:**
\( y = 4.03 + 2.41x + 1.69x^2; \)
\( r^2 = 0.82 \)

METHODS TO OBTAIN DOC FLUX AND CARBON LOSS

Groundwater level (GWL) measurement  Evapotranspiration measurement

Groundwater flux estimation  DOC concentration

DOC flux calculation

**CARBON LOSS = SOIL RESPIRATION + DOC FLUX**
RESULTS

Annual soil respiration (RS), annual DOC flux, and annual carbon loss in 2011

<table>
<thead>
<tr>
<th>Site</th>
<th>RS in 2011 (gC m$^{-2}$ y$^{-1}$)</th>
<th>DOC flux in 2011 (gC m$^{-2}$ y$^{-1}$)</th>
<th>Carbon loss in 2011 (gC m$^{-2}$ y$^{-1}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UF</td>
<td>1427</td>
<td>48</td>
<td>1475</td>
</tr>
<tr>
<td>DF</td>
<td>1256</td>
<td>94</td>
<td>1350</td>
</tr>
</tbody>
</table>

The contribution of RS was higher than that of DOC flux what both sites to the carbon loss.

Carbon loss in 2011: UF > DF was due to RS at the UF > DF.

DISCUSSIONS

- The difference in annual RS in 2011 was probably attributable to higher forest productivity at the UF site, although peat decomposition is expected to be greater at the DF site.
- RS in the initial year is higher than in the subsequent year after canal excavation in 1997 at the drained forest (Hooijer et al., 2012).
- Lowering GWL by drainage enhanced peat decomposition which resulted in high production of DOC at the drained forest.
CONCLUSIONS

- Carbon loss from soil ecosystems at the undrained forest was assessed larger than that at the drained forest because of greater soil respiration at the undrained forest, although DOC flux was higher at the drained forest.

- These results suggest that carbon loss from soil ecosystems in tropical peatlands was mainly contributed by soil respiration.

ACKNOWLEDGMENT

- Professor Takashi Hirano and Assistant Professor Hiroyuki Yamada (Research Faculty of Agriculture, Hokkaido University, Japan)

- Kitso Kusin and Dr. Suwido H. Limin (CIMTROP-University of Palangkaraya, Central Kalimantan, Indonesia)

- JST-JICA Project (Wild Fire and Carbon Management in Peat-Forest in Indonesia).

THANK YOU VERY MUCH