

# **Appendicies**

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# 大気環境変動の植物影響に関する講演会

## 記

主 催：国立環境研究所地球環境研究センター

共 催：大気環境学会植物分科会・同関東支部植物部会

日 時：平成10年8月10日 15:00～17:00

場 所：茨城県つくば市小野川16-2  
国立環境研究所中会議室

演 題：Impacts of Rising CO<sub>2</sub> and O<sub>3</sub> on Vegetation

演 者：Dr. Jeremy D. Barnes

Air pollution laboratory

Department of Agricultural and Environmental Science

University of Newcastle Upon Tyne, UK

参加費：無料

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# **Impacts on Plants of Atmospheric Environmental Changes**

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- Organized by** : Center for Global Environmental Research(CGER)／  
National Institute for Environmental Studies (NIES)  
Japan Society for Atmospheric Environment  
Subcommittee meeting of Plant-Environment(JASE)
- Date and Time** : August 10, 1998 15:00～17:00
- Venue** : Middle Size Meeting Room, NIES  
16-2 Onogawa, Tsukuba, Ibaraki 305-0053, Japan
- Title of the Subject** : Impacts of Rising CO<sub>2</sub> and O<sub>3</sub> on Vegetation
- Speaker** : Jeremy D. Barnes, Dr.  
Air Pollution Laboratory  
Department of Agricultural and Environmental Science  
University of Newcastle Upon Tyne, UK
- Participation Fee** : Free
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## **Abstract**

### **Impacts of Rising CO<sub>2</sub> and O<sub>3</sub> on Vegetation**

Jeremy D. Barnes

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Ridley Building, The University, Newcastle Upon Tyne, NE1 7RU, UK*

The mechanisms underlying the differential sensitivity of plants to the ubiquitous air pollutant ozone (O<sub>3</sub>) are far from fully understood. There is, however, a growing realisation that, following the uptake of the pollutant into the leaf interior, the first reactions take place in the aqueous matrix associated with the leaf cell walls (i.e. the leaf apoplast). This compartment forms the primary boundary between atmosphere and biosphere. The leaf apoplast is known to contain several antioxidants that react readily with O<sub>3</sub> (and/or its primary dissolution products) to yield ostensibly harmless compounds. There is therefore the possibility that significant amounts of O<sub>3</sub> are scavenged (i.e. detoxified) prior to reaching the primary target - the plasmalemma. If this is the case, antioxidants situated in the leaf apoplast may afford an important first-line of defence against O<sub>3</sub>. Herein, we focus on the role played by one of these compounds, ascorbate (vitamin C), in screening the plasmalemma from O<sub>3</sub>-induced oxidative insult.

## PROGRAM

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# Workshop : Environmental Changes and Biodiversity

Date: 24 March 1999    Venue: NIES, Japan

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9:30: Opening: **Makoto M. WATANABE** (NIES, Japan)

Session 1 : Biodiversity Information System

Chair: **Junko R. SHIMURA** (JCM/RIKEN, Japan)

9:40: The need for a global, authoritative index of scientific names.

**Rainer FROESE** (ICLARM, Philippines)

10:40    *Coffee break*

Session 2 : Terrestrial Ecosystems/Biodiversity

Chair: **Youbin ZHENG** (CGER/NIES, Japan)

11:00: Trees and upland ecosystems -Their diversity and performance: The role of greenhouse gases.

**Fred T. LAST** (Univ. Edinburgh, UK)

12:00    *Lunch*

Session 3 : Effects of Indonesian forest fire on ecosystem and biodiversity

Chair: **Naozumi SUKIGARA** (JWRC, Japan)

14:00: Forest and land fires in Indonesia: A serious threat to the conservation of biodiversity.

**Herwint SIMBOLON** (RDCB/IIS, Indonesia)

15:00    *Coffee break*

Chair: **Yasuhisa ABE** (FFPRI, Japan)

15:20: Wildfires in East Kalimantan, sources of the fires and effects of fire disturbances on lowland  
dipterocarp forests.

**Dadang Iman GHOZALI** (Mulawarman Univ., Indonesia)

16:20: Synthesis

Chair: **Hideyuki SHIMIZU** (CGER/NIES, Japan)

Commentators: **Junko R. SHIMURA** (JCM/RIKEN, Japan)

**Yoshihumi YASUOKA** (Univ. Tokyo, Japan)

**Eiji SUZUKI** (Kagoshima Univ., Japan)

**Makoto KOMODA** (JWRC, Japan)

16:50: Closing

**Yohichi GOHSHI** (CGER/NIES, Japan)

17:20    *Hotter discussions with added fuels*

19:00    Adjourn


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Secretary: **Hideyuki SHIMIZU** (Tel+81-298-50-2347, Fax+81-298-58-2645, E-mail: cgercomm@nies.go.jp)

## **Abstracts**

### **Workshop: Environmental Changes and Biodiversity**

March 24, 1999  
Ohyama Memorial Hall,  
National Institute for Environmental Studies  
16-2, Onogawa, Tsukuba, Ibaraki 305-0053 Japan

 **Center for Global Environmental Research  
National Institute for Environmental Studies  
Environment Agency of Japan**



## **The need for a global, authoritative index of scientific names**

**Rainer Froese**

*International Center for Living Aquatic Resources Management (ICLARM)*

*2<sup>nd</sup> Floor, Bloomingdale Building, 205 salcedo Street,*

*Legaspi Village, Makati City 1200 PHILIPPINES*

The Internet and bibliographic indexing services are shown to be inefficient in finding relevant information on species. One of the reasons for this is that scientific names keep changing, e.g. at a rate of 1% per year in fishes. The Species 2000 approach for an authoritative index for scientific names is presented and a prototype of the service is demonstrated.

**Trees and upland ecosystems-their diversity and performance:  
The role of greenhouse gases**

**Fred T. Last**

*Institute of Ecology and Resource Management, Edinburgh University, U.K.*

The lecture will be of 2 parts: one concerned with the potential effects of ozone and N-pollutants on root biodiversity and performance and the other related to the effects of N-pollutants on plant competition and the chemistry and biodiversity of freshwaters.

What is a tree? A seemingly simple question but it is now being accepted that trees will not survive, in the absence of available nutrients, without effective mycorrhizal associations. It will be shown that trees without mycorrhizas are exceptional and unnatural. The implications for pollution research will be discussed. Knowing that root growth of some plants growing in atmospheres with ozone is decreased more than that of stems and foliage, how will the development and efficiency of mycorrhizal associations be affected? Will the different kinds of association be affected similarly? If not, how will tree performance and the diversity of mycorrhizal fungi be affected?

During the last 20 years the emissions of NO<sub>x</sub> and NH<sub>3</sub> have increased. In the UK 78% of N deposition to forests is attributable to reduced N and the remainder to oxidised N: in moorland and arable areas reduced N accounts for 65% of the total annual deposition of 16 kg N ha<sup>-1</sup>. These deposits are thought to have major influences on the growth of ground vegetation with significant effects on competitive ability. These differences in competitive ability are more obvious when the vegetation is grazed — there is an interaction with effects on the diversity of the associated fauna in addition to vegetation.



**Forest and land fires in Indonesia:  
A serious threat to the conservation of biodiversity**

**Herwint Simbolon**

*Research and Development Center for Biology  
The Indonesian Institute of Sciences  
Jalan Jaunda 22, Bogor, INDONESIA*

Wildfires, as an excess of traditional slash and burn agriculture or land-use conversion activities during the dry seasons in every year, have been warned since long time as a potential threat to the biodiversity. The potential threat of wildfire to the biodiversity was greatly proved in the last 20 years. In the last 20 years, the dry seasons were associated with five periods of strong ENSO, which caused much more severe and longer dry seasons in many areas of Indonesia, and devastating much more widely forest and land fires. The wildfires during the strong ENSO periods in 1982-1983; 1986-1987, 1991, and 1994 damaged about 3.5 million ha, 100,000 ha; 500,000 ha and 4,866,500 ha lands, respectively. The official figure for total area burnt in 1997-1998 was 931,250 ha. However, the recent findings reported that the total area burnt during 1997-1998 wildfire was 9.5 million ha. Burnt lands were including traditional ladang, shifting cultivation areas, transmigration lands, estate lands, logging concession areas, secondary forest and natural forests, spread mainly in Sumatra (Riau, Jambi, South and Lampung provinces) and in Kalimantan (East, Central and West provinces). The principal fire causes were due to the burning method on land-use conversion for commercial crops, and to the slash and burn agriculture practices. The land and forest fires have caused a spectacular damaged and loss on the biodiversity, directly (such as: wildlife species death or injury by fires, ecosystem and habitat destruction) and indirectly (such as: destruction of soils, nutrient and food), and also due to its "downstream" effects to the biodiversity (such as: increasing sediment and reducing solar radiation). The wildfires were also stroke natural forests within the conservation areas where the biodiversity were stored. Based on the ecological type, peat swamp forest ecosystem was the most affected of the recent wildfire. It was due to fact that peat swamp forest ecosystems in Sumatra and Kalimantan were drained and converted into agricultural lands in a very spectacular rate. Wildfires were believed to affect biodiversity, however, how much was biodiversity damaged and to what extent the remaining biodiversity was effected and how they could recover were still not much studied. This paper intends to overview the present forest and land fires and its threat to the biodiversity of Indonesia.

## **Wildfires in East Kalimantan, sources of the fires and effects of fire disturbances on lowland dipterocarp forests**

**Dadang Iman Ghozali**

*Tropical Rain Forest Research Center, Mulawarman University  
P.O. Box 1165, Samarinda, Kalimantan Timur, INDONESIA*

Bukit Soeharto Education Forest (BSEF) of Mulawarman University locates in East Kalimantan and has been burnt twice, during the droughts in 1982-83 and in 1998. Both droughts were related to strong ENSO events. The fires are known to be the largest forest fire in the world, however, information about the 1982-83 fires in East Kalimantan is limited. On the contrary, there are various information on the 1998 forest fires in BSEF, before, during and after the fire. The present paper deals with two main topics, source of wildfire and effect of fire disturbance on dipterocarp forest. Both of them are the parts of Tropical Rain Forest Research Project, Ministry of Education and Culture, Indonesia and Japan International Cooperation Agency (JICA). There are many kind of fire sources in Indonesia, fires used for land preparation at commercial plantations and at farm lands for slash-and-burn agriculture, fires due to illegal logging, carelessness, etc. Adding to those fires from human activities, there is a natural fire source in East Kalimantan, which is long-lasting fires of coal seams. The coal seams extend to near the ground surface, widely extend on the low hills along the east coast of Kutai district, where the BSEF locates. About 15 places of burning coal seams were present in the BSEF before the 1998 fire, which were ignited by the former great fires in 1982-83. Some of them acted as natural fire sources during the dry period of 1998, however, the number of forest fires ignited by the burning coal seams was much less than the number of the fires due to human activities. After the 1998 fires, the number of burning coal seams in the BSEF increased to be more than 60. Most of these fires have been extinguished by the activity of the JICA project. We have been monitoring recovering process of forest which was suffered from the 1983 fire. In lightly disturbed site, the top canopy was composed of remaining dipterocarp trees. On the contrary, heavily disturbed site was dominated by a few pioneer species, *Macaranga* spp. which established after the 1982-83 fires. BSEF was a mosaic of the remaining dipterocarp stands and pioneer *Macaranga* dominating stands. *Macaranga* stand were characterized by a small number of tree species in a unit area and high dominance of a few single species. Even in *Macaranga* stand, not a few species survived, however, the low tree densities of the species made it difficult to find them in a small sampling plot. Dynamic changes in tree density and basal area were observed in *Macaranga* stand. Tree density of *Macaranga* increased until 1990 and have decreased since 1991. Tree density in dipterocarp stand were kept constant and less than that of *Macaranga* stand from 1988 to 1997. Basal area of the *Macaranga* stand increased until 1991 and became constant. The basal area of *Macaranga* stand was much less than that in the dipterocarp stand in 1997. The fire in 1998 resulted in drastic changes both in dipterocarp and *Macaranga* stands. The ratio of died trees to the total trees before the fire was 43% and 91% in dipterocarp and *Macaranga* stands, respectively. The number of species in dipterocarp and *Macaranga* stands reduced to be 77% and 57% of those before the fire, respectively.

大気環境学会関東支部  
植物影響部会  
平成 11 年度講演会

『植物による環境評価－長期・継続の事例を中心に』

主催：大気環境学会関東支部植物影響部会  
国立環境研究所地球環境研究センター

1999 年 12 月 3 日(金)

於 国立環境研究所中会議室

プログラム

開会挨拶

大気環境学会関東支部植物影響部会長 河野吉久

講演

- |             |   |
|-------------|---|
| 14:00-14:50 | 25 年間にわたる関東甲信静地域での光化学スモッグによる<br>植物被害調査<br>岡崎淳（千葉県環境研究所）   |
| 14:50-15:40 | 福岡県環境指標の森調査<br>須田隆一（福岡県保健環境研究所）   |
| 15:40-16:30 | Effects of Air Pollution on Vegetation in China<br>－Past, Present and Future－<br>鄭 有斌・清水英幸<br>(国立環境研究所地球環境研究センター) |
| 16:30-17:00 | 総合討論<br>司会 清水英幸（国立環境研究所）  |

閉会挨拶

清水英幸(国立環境研究所)

# **The Workshop of Environmental Evaluation by using Plants -Long-term case study-**

**Date:** Friday 3 December, 1999

**Venue:** Middle Size Meeting Room, NIES (National  
Institute for Environmental Studies)

**Organized by:** Center for Global Environmental Research (CGER)/ NIES,  
Sub-committee of Vegetation, Kanto Branch, Japan Society  
for Atmospheric Environment (JSAE)

## **-Programme-**

**Opening Address:** Yoshihisa Kohno, Dr. (JSAE)

- 14:00-14:50 “Using Indicator Plants to Assess Vegetation Damage by  
Photochemical Oxidants in Region Around Kanto Districts  
from 1973 to 1997.”  
Jun Okazaki (Chiba Prefectural Institute for Environmental  
Science)
- 14:50-15:40 “Survey of Environmental Indicator Forests in Fukuoka  
Prefecture”  
Ryuichi Suda (Fukuoka Institute of Health and  
Environmental Sciences)
- 15:40-16:30 “Effects of Air Pollution on Vegetation in China  
-Past, Present and Future-”  
Youbin Zheng, Hideyuki Shimizu (NIES)
- 16:30-17:00 General Discussion (Chairperson: Hideyuki Shimizu, Dr.)

**Closing Address:** Hideyuki Shimizu, Dr. (CGER/NIES)

# Effects of Air Pollution on Vegetation in China

## — Past, Present and Future —

Youbin Zheng and Hideyuki Shimizu

*Center for Global Environmental Research, National Institute for Environmental Studies,  
16-2 Onogawa, Tsukuba, Ibaraki 305-0053, Japan*

China has been experiencing a rapid economic development since the beginning of 1980s. This rapid expansion in the economy and in the population has resulted in a growing demand for energy. In China, more than 75% of its primary energy is domestic coal. This, with the rapid increasing vehicle numbers, has been resulting a large air pollutant ( $\text{SO}_2$ ,  $\text{NO}_x$  and  $\text{CO}_2$ ) emission. The ambient air pollution has already reached an alarming level in many cities and industrial areas. The air pollution problem is so severe that it is believed to be responsible for more than 1 million deaths per year across the country and the total economic loss resulting from acid rain and  $\text{SO}_2$  was equivalent to 2% of the gross national product in 1995. As the economy continuously increase, the amount and structure of energy consumption are predicted to change as well. These changes are very likely going to cause changes in the ambient air pollutant levels and compositions, sequentially it is expected that the impacts of air pollution on vegetation will be different from present. This paper gives a brief introduction of the air pollution, acid precipitation and their effects on vegetation in China in the past and present, the same time gives suggestions for the future research in this field in China.

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