

Book Review

K. Omasa, K. Kai, H. Taoda, Z. Uchijima, and M. Yoshino (eds.) : "Climate Change and Plants in East Asia". Springer-Verlag, Tokyo., 1996, XLIV+215 pages, with 122 figures, 61 in color, ISBN 4-431-70176-1.

East Asia has the highest botanical production capacity and most abundant flora and fauna in the world. Recently, however, East Asia has been suffering from deforestation and degradation of farm land due to increasing human population and abnormal weather. It is expected that Asia's population will increase by a factor 1.5 by the year 2050. Some of the causes of the abnormal weather changes are the appearance of El Niño and the increasing levels of "greenhouse" gases caused by human activities. Under these conditions, fundamental information of the effects of climate change on ecosystems plays an important role in choosing measures to adopt for preserving land and environments in the area. This book contains two large sections : I - Modeling and Prediction and II - Mountain Vegetation. The former part deals with future plant productivity changes caused by doubled CO₂ levels based on GCM experiments. Rice, as the food in East Asia, is also discussed with reference to intensive temperature gradient tunnel experiments with CO₂ changes. Biomes or vegetation changes in response to climate change are clearly discussed and predicted using reasonable

modeling and colorful figures of East Asia, the Tibetan plateau, China, and Japan as examples. In the example of Japan, phenological aspects, such as blooming of flowers, are predicted in detail. Pioneering works are included in this part, such as Global Warming Effects on a Lake Ecosystem. The latter part mainly deals with mountain vegetation in Japan from the field observations. Mountainous areas will be the most sensitive to climate change because the vegetation is distributed over a restricted area with severe environments. Snow and soils as the important factors are discussed mainly with regard to the subalpine zone in central Japan, and distribution of beech as a typical tree species in Japan is analyzed in relation to environmental gradients. Flora on islands will be more sensitive to environment changes due to their particular habitat. The flora of the Ryukyu Islands, southern Japan, is analyzed from the viewpoint of phytogeography and global climate change. Papers in this book are from the national research project : Evaluation of Global Warming Effects on Plants supported by the Japan Environment Agency. I rate this book highly as a contribution to researchers, policymakers, and students who are strongly interested in climate change crises.

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Book Review

Masatoshi Yoshino, Manfred Domrös, Annick Douguédroit, Janusz Paszynski and Lawrence Nkemdirim (eds.): "Climates and Societies - A Climatological Perspective". Kluwer Academic Publishers, (The GeoJournal Library Volume 36), Dordrecht, The Netherlands, 1997, hard-cover, xi+406 pages, Price NLG 290.00/GBP 108.00. ISBN 0-7923-4324-7.

This book is a conglomeration of contributions on global change and related problems prepared by the Commission on Climatology of the International Geographical Union. It consists of 19 topics divided into 4 parts. Five eminent scholars, who were also the full members of the Commission having considerable amount of contribution in the field of climatology and are well versed in the subject, have aptly edited the book.

Climatology has always been a subject of immense interest to human and environment. This book attempts to depict a retrospective view of climate, its impact on human activities and vice versa. The phenomenal change in global climate over the years has brought about some interesting facts and figures and this book is timely in bringing forth these findings.

The introductory part of the book touches upon a climatologist's view on human activities and environmental change. It also discusses about various problems, causes and consequence of human activities on environmental change. It also mentions about Japan's response to global warming.

The author contends the modeling and prediction of climate variability by effectively using temporal structure for estimation (topic 1 of Part 2). The general trend of climate change in Southeast and East Asia and tendencies in the post glacial period were observed closely in this book. The examples cited for the various analyses for approaches to climatic variations highlights variation that occurred in the historical era. The topic on statistical aspects of climate change discusses on the aspects of spectral statistics and the summary of the observed long-term trends including aspects of anthropogenic climate: the heat island effect of growing cities and the greenhouse effect. There has been increased the atmospheric concentration in greenhouse gases since the beginning

of the industrial era. The topic on climate of the future studies the mechanisms and feedback models. It also systematically reviews some of the uncertainties for climatic simulations.

The seven topics in Part 3 encompass the entire globe describing therein the regional scale climates. It is a pot-pourri of information relating to society, life, and possible impact on agriculture due to climatic change in Tropical Africa, the Caribbean Basin, South East Asia, Humid Tropical Area, South America, China and the Polar Regions. Most of the topics in this section also prognosticate the impact of global warming and various measures assigned to ameliorate the situation. The statistical data included in all the topics in Part 3 provide the reader to assimilate the topics described in this part.

The concluding part of this book deals with topics relating to local scale climates. Here local factors such as radiative properties, thermal properties aerodynamic properties hydrologic properties are taken into serious account. The baneful influence of urbanization on the local climate and its influence on mankind have been described succinctly. The formulation used and the inference thereof protrude to have strong correlation of the temperature measured to net radiation and the energy balance. Two other topics discussed are a) air pollution and b) agricultural land use and their implications on local climate have been broadly evaluated.

Overall, this book provides a sustained interesting reading and useful information on certain aspects of climatology vis-à-vis societies. The topics were neatly placed and the editors have taken ample pains to suitably select the titles contributed by various authors. To sum up, the book attempts to make the reader aware of the grim picture of environmental impact of global warming, opens up debate on its futuristic view and strategies to mitigate the enigmatic dogma. Indeed, I can thoroughly recommended to keep a copy of this book on a shelf of libraries of every university and research institute related to atmospheric sciences/global environment problems.

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Book Review

Nishioka, Shuzo and Harasawa, Hideo. (eds.) : *Global Warming : The Potential Impact on Japan*. Springer-Verlag Tokyo, 1998, xiv + 244 pages. ISBN 4-431-70236-9

This book deals with the anticipated impact of global warming on Japan's environment and human activities. Thirty researchers contributed seven chapters : (1) Climate change projections, (2) Impact on natural ecosystems, (3) Impact on agriculture, forestry and fisheries, (4) Impacts on hydrology/water resources and environments, (5) Impacts on infrastructure and the socio-economic system, (6) Impacts on human health, and (7) Vulnerability of Japan to climate change.

Chapter 1 summarizes the result of an assessment based on seven transient simulations of atmospheric CO₂ increase with coupled atmosphere-ocean general circulation models : in annual means, surface air temperatures would increase 1-2.5°C and precipitation change from -5 % to +10 %. In the case of CO₂ doubling, sea level rises around Japan are estimated to be 10-20 cm along the Japan Sea, and about 15 cm along the coasts of the Pacific Ocean and the Sea of Okhotsk. The Kuroshio current would be a little stronger, the SST would rise 1.6°C along the coast of the Japan Sea, 1.2-1.6°C along the Pacific coast, and 1.8°C along the coast of the Sea of Okhotsk.

In Chapter 2, impacts on natural ecosystems are discussed first regarding mountainous regions with special reference to forest distribution and secondly, regarding grasslands, dry lands and wetlands. Biodiversity and nature conservation are mentioned, too. It is said that warming-induced changes will force various changes in biological species and ecosystems at a speed of 15-30 times those of the post-glacial periods. Urbanization has reduced suburban distributions of secondary forest with dramatic speed. Forest area has declined drastically. The composition and structures of the forests has changed greatly ; *e. g.*, tree species capable of invading isolated tree stands are limited to bird-dispersed species ; a rapid transition has progressed between existing species and the limited invading species ; subsequent invasion has been modest.

In Chapter 3, impacts on the agricultural sector are discussed first regarding production changes resulting from the high CO₂ concentration and high temperatures. It is shown that the yield of rice increases 30 % or more with doubling CO₂ without the other limiting factors. Production of rice is expected to increase sharply in North Japan : +6 to +22 % in Sapporo, -11 to +26 % in Sendai and -5 to +12 % in Niigata. In contrast, it decreases in West Japan : -37 to -8 % in Nagoya and -13 to +6 % in Miyazaki. Maize and wheat show the same tendency. Changes in forest production and fisheries are discussed in terms

of the ecosystem, rainfall, sea levels, ocean currents and predictions of the influence of global warming.

In Chapter 4, impacts on hydrology and water resources are presented. It is shown that (1) an approximate 10 % variation in precipitation affects flow conditions more than about 3°C temperature rise, (2) on average, a 10 % increase in precipitation coupled with a 3°C temperature rise does little to reduce flows in water-scarce areas but increases flows by roughly 15 % in water-abundant areas, (3) a temperature rise turns snowfall to rain and accelerates snow melting, increasing flows from January through March and decreasing flows from April through June. Freshwater ecosystems and coastal and marine environments are discussed too.

In Chapter 5, impacts on infrastructure and the socio-economic system are dealt with, in particular, effects of rising sea-levels frequency of typhoon hits in the coastal zone are adequately discussed, since population and industrialized areas are becoming more concentrated in the coastal zone of Japan. The quantitative analysis of the infrastructure, urban heat island effect and economic trends in Japan presents valuable results, which will be a source of information in the future for global warming.

Impacts on human health in Chapter 6 are more concerned with heat stress and sunstroke due to global warming. The regression analysis shows that the number of heatstroke patients increases exponentially when the daily maximum air temperature is higher than 32°C or mean daily air temperature higher than 27°C in Tokyo.

Each Chapter contains a lot of references to literature related to the topics, which may contribute to getting information on the results of studies in Japan. Most of these are written in English, which means in turn a valuable contribution to the impact studies on global warming by Japanese scientists has been made in the recent years.

The last chapter is dedicated to the topic of vulnerability of Japan to climate change. Extreme events such as heat waves, typhoons, and droughts, are discussed in detail.

IPCC have already published *1990, 1992 and 1995 Reports*. Also, a *Special Report* dealing within the regional context appeared in 1998. In these reports, the environmental problems in Japan and study results by Japanese scientists were not sufficiently represented. One reason for this was the language barrier, because they were reported only in Japanese in most cases. The present volume will help to resolve this. The editors and the writers should be congratulated for publishing these fundamental and informative monographs.

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