1. INTRODUCTION

Wildfires and application of fire in land-use systems annually affect several hundred million hectares of forest and vegetation of the world. In some ecosystems fires play an ecologically significant role in maintaining biogeochemical cycles. In other ecosystems fires lead to the destruction of forests or to long-term site degradation. Fires in forests and other vegetation produce gas and particle emissions that affect the composition and functioning of the global atmosphere These emissions interact with those from fossil-fuel combustion and other technological sources, which are the major causes of anthropogenic climate forcing. Smoke emissions from wildland fires also cause visibility problems which may result in accidents and economic losses, and may also affect human health and lead to loss of human lives.

In most areas of the world wildfires burning under extreme weather conditions have detrimental impacts on economies, human health and safety, with consequences comparable in severity to other major natural hazards. Unlike the majority of the geological and hydro-meteorological hazards, however, vegetation fires represent a natural and human-caused hazard which can be predicted, controlled and, in many cases, prevented through the application of appropriate policies. The development of policies and guidelines to reduce the health impacts of smoke generated from burning vegetation must be linked with policies that address the smoke problem at its source.

The objectives of fire-related policies, e g. land-use policies, and fire management strategies, are to reduce the detrimental impacts of fire and to manage the beneficial effects of fire. They must address a broad range of elements and sectors of society, natural resources and environmental management, and technology development. Fire policies and strategies cannot be generalized, owing to the multidimensional effects of fire in the different vegetation zones and ecosystems, and to the manifold cultural, social, and economic factors involved. However, the general characteristics of large fires can be derived by combining climatological data with the historical record of large fires that produced health- and life-threatening levels of emissions Regional impacts, including the extent, direction and particle concentration of smoke plumes from the fires, provide the background for emergency planning and the design of monitoring networks.

Early warning systems are essential components of fire and smoke management. They rely on, an evaluation of vegetation dryness and weather; the detection and monitoring of active fires; the integration and processing of these data in fire information systems with other relevant information, e.g. vegetation cover and values at risk, the modelling capabilities of fire occurrence and behaviour, and, finally, dissemination of information. Early warning of fire and atmospheric pollution hazard may involve locally generated indicators, such as local fire-weather forecasts and assessment of vegetation dryness. Advanced technologies, however, which rely on remotely sensed data, evaluation of synoptic weather information and international communication systems are now also available for remote locations

These Health Guidelines for Vegetation Fire Events are organised as follows: In Chapter 2 air pollution generated by vegetation fires is discussed with respect to the global occurrence of recent major fires. The sources and their emissions are presented, including transformations of air pollutant during transport and exposure levels. Exposure levels can be determined through ground-based monitoring and remote sensing with satellite imagery. Space and

climate monitoring and modelling of the distribution of fire products before, during and after a major fire event are discussed. This chapter is rounded out by emergency response procedures and recommendations on how to use the Health Guidelines in pre-event, during-event and post-event action.

Chapter 3 deals with the acute and chronic health effects of smoke from biomass burning and on the acute health effects of particulate matter. Public advisories are given to inform on the ambient air quality, national action and health effects, as well as cautionary statements. Mitigation measures include remaining indoors, personal lifestyle modification, use of air cleaners, use of masks and respirators, outdoor precautionary measures and evacuation to emergency shelters. The sections on public advisories and mitigation measures end with clear recommendations to authorities. Guidance is also given with the methodology for assessing the health impacts of vegetation fire. The application of the WHO Guidelines for Air Quality in episodic situations is also discussed.

Chapter 4 deals with the prevention of future health-affecting fire events. The problem of prevention can be resolved through appropriate land-use practice and fire policies. Policy objectives, policies on development, assessment and management, and National Haze Action Plans are noted as a suitable means for prevention, and the lessons learned from previous fires are demonstrated Finally, scientific and technical research needs are pointed out.

Extensive bibliographical references are compiled in Annex A. The acronyms used in this document are collected in Annex B. Annex C presents an extensive glossary of terms to make the text better understandable. Annex D is devoted to a draft report from the ad hoc Group on the Long-range Transport and Dispersion Model Verification Database. Annex E reprints the Guidelines on Fire Management in Tropical Forest of the International Tropical Timber Organization. Annexes F, Annex G, and Annex H refer to recent seminars and workshops of the FAO/UNECE/ILO, the WMO and the WHO, relating vegetation fires to climate change, regional transport and health impacts, respectively. Early warning for fire and other environmental hazards was the topic of an international workshop convened on behalf of the United Nations International Decade for Natural Disaster Reduction, the results of which are presented in Annex I. Annex J presents the Global Fire Monitoring Center established recently in the University of Freiburg, Germany The members of the WHO Expert Task Force on the Health Guidelines for Vegetation Fire Events are named in Annex K. The international programmes of the WMO (Global Atmosphere Watch) and WHO (Air Management Information System) are introduced in Annex L.