

# HEALTH GUIDELINES FOR VEGETATION FIRE EVENTS

Teachers' guide

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This *Teachers' Guide* accompanies the WHO document *Health Guidelines for Vegetation Fire Events*. It provides teaching materials and recommendations for a four day training course, designed mainly for public health professionals and policy makers.

Note to the user:

The PowerPoint slides are available from the attached CD-ROM, the AMIS CD-ROM and, in part, the Web site of the World Health Organization (after October 1999, <http://www.who.int/>) and the Global Fire Monitoring Center (<http://www.uni-freiburg.de/fireglobe>)

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The authors alone are responsible for the views expressed in this document.

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## Preface

This *Teachers' Guide* compiles educational materials that can be used in training courses on the Health Guidelines for Vegetation Fire Events. It is a compendium to the WHO document *Health Guidelines for Vegetation Fire Events*, which is a more comprehensive handbook, and to the document *Health Guidelines for Vegetation Fire Events Background Papers*. All three publications form a set, which can be useful to handle this important public health issue in a practical manner. These are the first WHO publications providing global advice and guidance on the management of vegetation fire events. They build on the knowledge and experience gained in different scientific and managerial communities and are the result of an expert meeting held in Lima, Peru, 3-6 October 1998.

Management of vegetation fire events is an important public health issue since it involves major risks for the health of the people and the environment. WHO is, therefore, issuing this set of materials to provide operational tools for health care and environmental professionals, public health authorities, and manufacturers of health care products as well as policy makers. This training guide compiles basic information on management principles for vegetation fire events, and provides tools for training using appropriate educational materials such as overhead transparencies, handouts, tables and figures.

The set of documents on the Health Guidelines for Vegetation Fire Events (Guidelines, Background Papers and Teachers' Guide) aims to raise awareness on public health and environment. It has the goal to provide information on how to prevent health impacts from vegetation fire events. It helps to identify efficient, sustainable, economic and culturally acceptable prevention practices and to provide an early warning system for prevention of public health effects from vegetation fires.

This *Teachers' Guide* has been prepared as a practical response to the need for action with respect to the recurrent vegetation fires at local level and improved legislation, management and guidance at national and regional level. WHO will be pleased to see that this guide is used widely. Continuing efforts will be made to improve its content and structure. It would be appreciated if the users of this guide would provide feedback from its use and their own experiences. Please send us your comments and suggestions on the WHO *Teachers' Guide* for the Health Guidelines for Vegetation Fire Events direct to the Department of the Protection of the Human Environment, World Health Organization, Geneva, Switzerland (Fax: +41 22-791 4127, e-mail: [schwelad@who.int](mailto:schwelad@who.int)).

## Acknowledgements

The World Health Organization thanks all individuals who have contributed to the preparation of the document *Health Guidelines for Vegetation Fire Events* (WHO, Geneva, 1999) that served as a basis for the production of this *Teachers' Guide*. The international, multidisciplinary group of contributors to and reviewers of the Health guidelines are listed in the "Participant list" section of the Health Guidelines in Annex K. Special thanks are due to the chairpersons of the WHO-UNEP-WMO expert task force meeting held in Lima, Perú, in October 1998: The conference chair Dr Johann G. Goldammer, Max Planck Institut for Chemistry/Global Fire Monitoring Center, and the chairpersons of the two working groups, Dr Michael Brauer, University of British Columbia, and Dr Joel Levine, NASA Langley Research Center. Special contributions are gratefully acknowledged to those who provided the background papers and those who contributed to the success of the WHO-UNEP-WMO expert meeting:

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Dr Celso Bambarén, Ministerio de Salud, Lima, Perú  
Dr Michael Brauer, University of British Columbia, Vancouver, Canada;  
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Particular thanks are due to the Ministry of Health of Japan, which provided the funding to convene the WHO-UNEP-WMO expert task force meeting in Lima, Perú, in October 1998. These funds permitted WHO to

produce the Health Guidelines for Vegetation Fire Events including the Guideline document, the background papers document and the Teachers' Guide. Moreover, the funding could be used to convene two training courses on the Health Guidelines, the first one in Kuala Lumpur, Malaysia in December 1998, and the second one in Brasilia, Brazil, in May 1999.

The contributions of the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) in co-sponsoring the expert task force meeting on the Health Guidelines are gratefully acknowledged.

## 1. Introduction: An Overview of the Health Guidelines Document

Vegetation fires are phenomena observed in practically all parts of the world, recently in South East Asia and South America, but also often in North America, Australia, Africa and even Europe. Smoke or haze from forest fires consists mainly of fine and ultra-fine particulate matter and gaseous compounds. Gaseous compounds pose less of a health threat than the fine particulate matter (aerodynamic diameter below 2.5  $\mu\text{m}$ ), which constitutes a serious health hazard for the general population. It has been shown that increasing concentrations of fine particulate matter correlate with increases in a range of health-related issues, including the daily mortality, the number of hospital admissions due to respiratory and cardiovascular diseases, the number of outpatient visits, and all kinds of respiratory symptoms. The same effects have also been established for sulfates, which constitute part of the ultra-fine fraction of particulate matter. Transboundary smoke from vegetation fires is a recurring problem in many countries around the world, where it causes acute and potentially long-term respiratory health problems.

To combat this issue, a comprehensive strategy based on international consensus is required. Such comprehensive strategy must include:

- Rapid detection of uncontrolled vegetation fires globally.
- Data gathering from satellites, aircraft and ground-based air sampling networks.
- Assessment of short- and long-term health impacts on the exposed population.
- Dissemination of information to all affected parties for appropriate decision making.
- Development of national, or regional, environmental and health response plans for vegetation fires. These plans should include the preservation of natural resources.

The Guidelines document is intended to advise national, regional and international bodies on how to prepare for, and respond to, vegetation fires. It was felt that guidance was needed in:

- Characterisation of smoke emissions.
- Assessment of health risks related to downwind air quality.
- Development of contingency plans in case of emergency, including:
  - how to inform the public.
  - use of protection devices such as masks and respirators.
  - the application of mitigation measures.
  - practical advice to, and training of, involved stakeholders.
- Methodology for assessing the effects of vegetation fires (i.e. epidemiological studies).
- Application of short-term air quality standards or guidelines (or pollution indices).
- Understanding factors that influence health outcomes such as altitude, humidity, tropical climate, social environment; and how these factors influence the emergency response (use of respirators in tropical countries, influence of indoor air pollution due to open stove cooking and heating).
- Development of environmental and health policies by regional, national and international bodies, to prevent the health impacts of future vegetation fires around the world.
- Emergency response and technological tools to minimize or prevent the health impacts of smoke.

- Environmental data collection during future smoke/haze episodes; their use and interpretation by public health officials.

## **2. Scope and purpose of the Teachers' Guide**

This *Teachers' Guide* to the Health Guidelines for Vegetation Fire Events (hereafter referred to briefly as “Guidelines”) is based on the WHO-UNEP-WMO Health Guidelines for Vegetation Fire Events, published on behalf of WHO by the IEE, Singapore. The *Teachers' Guide* complements the WHO documents *Health Guidelines for Vegetation Fire Events - Guideline Document* and *Health Guidelines for Vegetation Fire Events – Background Papers*.

The goal of the *Teachers' Guide* is to enable national trainees on the Guidelines become trainers, and disseminate the information in the Guidelines to the staff of responsible ministries, national agencies, fire fighters and other stakeholders involved in the fighting, suppression and prevention of vegetation fires. It assists experts in public health issues, and in remote and ground-based air pollution monitoring and management, to prepare a four day course that includes a visit to a monitoring site and discussion of country reports. To increase the benefit for course participants, it is strongly advised that local issues be included in the programme. The course coordinator should plan the discussion of country reports according to the outline given in chapter 6 of this *Teachers' Guide*. In this case, presenters should be contacted well in advance and agree to their presentation.

There is resource material to initiate, organize, deliver and evaluate courses of different lengths. The course material includes overhead transparencies, handouts showing definitions, tables and figures and the material necessary for workshops. The *Teachers' Guide* contains PowerPoint slides used in a recent training course on the Guidelines in Kuala Lumpur, Malaysia. The slides closely follow the Guidelines and highlight the essential points of the training course material. They are, however, to be presented in conjunction with the material contained in the Guidelines, and with a thorough understanding of the principles and facts relating to the health effects of particulate matter and gaseous compounds from vegetation fires. The slides were compiled by Associate Professor Dr Lidia Morawska, Queensland University of Technology, Brisbane, Australia, Dr Dietrich Schwela, World Health Organization, Department of the Protection of the Human Environment, Occupational and Environmental Health, Geneva, Switzerland, and Dato' Dr Abu Bakar bin Jaafar, Alam Sekitar Malaysia Sendirian Berhad, Kuala Lumpur, Malaysia. The slides presented in this Teachers Guide and the corresponding PowerPoint files on the CD-ROM are intended to back the forthcoming training courses on the Guidelines, which are being organized by WHO. It is recommended that one of the three resource persons organizing the training course should live in the host country.

## **3. How to run the training course**

### **3.1 Contents of the training course**

The training course follows closely the outline and contents of the Guidelines. After a general introduction on the global occurrence of fires and the damages incurred, we discuss hazard assessment based on fire risk and the main ingredients of fire-weather forecasts are presented.

This is followed by a presentation of source characterization in elucidating emission and post-emission processes. The factors affecting incomplete combustion, the pollutants generated in the combustion process, the transformation of combustion products during transport, the use of emission ratios for criteria pollutants, and the exposure levels in air pollution events are the main issues of this section.

A discussion of ground-based monitoring addresses the objectives, background and network design considerations, the methods and instruments for monitoring aerosols, and issues of data collection, processing, and dissemination.

A summary and recommendations conclude these sections for the sake of clarity.

Two presentations referring to chapter 2 of the Guidelines treat the problems of space monitoring, climate monitoring and modeling the distribution of fire products. In space monitoring, present capabilities, capabilities one or two years from now, and longer term planned capabilities are discussed in some detail, as are the implementation recommendations.

A subsequent presentation on climate monitoring and on modeling the distribution of fire products discusses the actions necessary before, during and after a major fire event. These actions include: identification of fire risks; provision of transport modelling; transfer of data to emergency response agencies; and review of transport modelling. Emergency response procedures include a review of national policies, emergency response mechanisms, and other possible legal issues. A summary and recommendation round out these presentations. Chapter 2 of the Guidelines is concluded by a discussion on how to use and apply the Guidelines in a national context with respect to pre-event, during-event and post-event actions.

The next presentations address the Guidelines proper with respect to Public Health Protection. In this set of presentations the health effects of biomass air pollution, especially its acute and chronic health impacts, are discussed in the framework of WHO's continuing work on the health effects of ambient and indoor air pollution.

A subsequent presentation refers to public advisories, including the dissemination of information to the public on ambient air quality, on national action, and on health effects and cautionary statements. Mitigation measures are an important part of this chapter and include remaining indoors, personal lifestyle modifications, the use of air cleaners, and the use of masks. Further measures refer to precautions to be taken outdoors, evacuation to emergency shelters, and limitations on school and business activities.

The Guidelines also include guidance on methodology for assessing the health effects of vegetation fires. The important potential components of all studies are enumerated. Study designs to detect health effects related to acute and chronic exposures are sketched, together with the means for evaluating data, and setting logical and cost-effective priorities. A concluding presentation addresses the application of short-term Air Quality Guidelines of the WHO in the framework of risk management and discusses factors that influence the health effects of vegetation fires.

The last presentations refer to chapter 4 of the Guidelines and discuss the prevention of future health-affecting events. This discussion addresses the underlying source of vegetation fire problems, from land-use policies and from the cultural use of fire in land clearing for agriculture

(replacing natural forest with plantation of pulp, palm oil tree and other). The presentations end with a set of recommendations for policies and scientific research.

An important ingredient of the training course is the presentation of country reports by participants. These country reports are performed on the last 1 ½ days of the training course and are important as they enrich the Guidelines with national experience and provide feedback to the lectures.

### 3.2 Duration of the training course

The training course is laid out to last four days according to the Agenda in Annex 1. However, it has turned out that presentations of the Guidelines can be performed within 2 ½ days, including extensive discussions. After the lectures some time is needed to finalize the country representations, since it is the common experience from training courses held in Kuala Lumpur, December 1998, and in Brasilia, May 1999, that participants prefer to prepare the final versions (mostly in PowerPoint) after having listened to the presentations on the Guidelines.

### 3.3 Number of participants and nationalities

Experience shows it is best to invite 20-25 participants from about 6-8 countries in a region, with some stronger representation of participants from the country in which the training course is convened. It is also useful to have one of the teachers originate from the host country as this allows special consideration of country- and region-specific issues.

### 3.4 Mode of conduct

The training should not be a series of monologues by the teachers. Rather, all participants and teachers should see it as a dialogue. Feedback by participants and, if necessary, their criticism should be appreciated. For this reason, participants are invited to ask questions during the lectures, to prepare country reports and present them at the end of the training course, and to assess the training course. The participants should be assured that their feedback is valuable for improving future versions of the guidelines and training courses.

As pointed out above, there should be three teachers to cover the different fields addressed in the guidelines. They must have a professional background in air pollution management, in remote sensing using satellite techniques, and in the public health impact of air pollution. Without these professional backgrounds, the information in the Guidelines cannot be satisfactorily taught in the training course. The trainees themselves should be specialised in various fields and wish to extend their knowledge to include the prevention of health impacts from smoke and haze, and the use of an early warning system for that purpose.

By experience from the training course in Kuala Lumpur it has been shown that the following distribution of the teaching load proved to be useful. The numbers given in this distribution refer to the individual chapters/sections of the Guideline Document.

Teacher 1:

1. Introduction.
- 2.1 Introduction to Air Pollution from Vegetation Fires and Health.

- 2.5 Climate monitoring and modeling of the distribution of fire products.
- 2.7 How to use and apply these guidelines.
- 3.4 Mitigation measures.
- 4.1 The source: Land-use and fire policies.

Teacher 2:

- 2.2 Source characterisation: Emission and post-emission process.
- 2.2 Ground-base monitoring.
- 3.1 Introduction to the Guidelines.
- 3.2 Health effects.
- 3.5 Guidance on methodology for assessing forest-fire induced health effects.
- 4.2 Recommendations: Addressing gaps in knowledge.

Teacher 3:

- 2.4 Space monitoring and modeling of the distribution of fire products.
- 2.6 Emergency response procedure.
- 3.3 Public advisories.
- 3.6 Application of short-term air quality guidelines.
- 3.7 Factors influencing health effects.

### 3.5 Formal presentations

Lectures are an important way of disseminating information. Through lectures or presentations one person can inform a large number of participants about the content of the course and the principles of the subject. Although the audience will have a limited attention span, proper planning can minimize the effects. A well-prepared lecture can be an extremely satisfying experience and a very efficient means of teaching. Thorough preparation is essential and the lecturer must be confident and have a thorough knowledge of the subject, particularly when opportunity is given for a question and answer session at the end of the lecture. However, instant answers are not always possible. Should the lecturer be unable to answer, every effort should be made to find the answer as soon as possible, or advise where the answer may be found. At the end of each lecture a discussion between presenter and participants is recommended, to address questions or applicability to the participant's situation. This enables new ideas to be introduced, particularly information on the national and local situation, which is not readily available in textbooks or other published material.

During the workshop sessions, small group discussions led by the lecturer or an assistant can be an effective method of learning. It widens the knowledge base and reinforces the information given in lectures.

Recommendations for effective communication of the lecture content to the participants are given below:

- ! *Face participants at all times.*
- ! *Maintain eye contact.*
- ! *Speak clearly and at a moderate speed.*
- ! *Pause for a few seconds at the end of making a point.*

- ! *Leave each slide on the screen for sufficient time to allow the participants to make notes (distribute handouts before the presentation).*
- ! *Engage in interactive question-and-answer style.*

### 3.6 Country reports

Participants of the training course should provide a country report and present its results in the second half of the course. Country experiences with respect to prevention, suppression and mitigation measures should be discussed and compared. The exchange of knowledge on success stories can help countries to improve action in future vegetation fires. The country reports should essentially follow the outline given below. Country reports should be concise and contain not more than ten pages. It is advantageous to present the results of the reports in PowerPoint slides.

The outline of country reports is as follows:

***INTRODUCTION/BACKGROUND***

Overview of forest fire incidents in the country.

**EXISTING NATIONAL GUIDELINES ON FOREST FIRES**

Government policies.  
Environmental, health and legal aspects.  
Monitoring.

**NATIONAL EXPERIENCE**

Case study.  
Problems encountered.  
Mitigation measures.

**IMPLEMENTATION PLAN**

Lessons learned.

**RECOMMENDATIONS**

What are the recommendations at the Global, Regional, National, Sub-national and Local levels?

### **4. Assessment of the training course**

Evaluation aims at assessing the extent to which course objectives have been attained and at determining the quality of the teaching. The evaluation results will allow the course to be improved or adapted for future use. A questionnaire following the assessment form in the attachment should be distributed to the participants on the third day of the training course, after the lectures have been completed. Participants are requested to return the filled questionnaire to the organisers before the end of the training course. The assessment form should be evaluated after the training course and the results of the evaluation attached to the report of the training course. Eventual criticism should be carefully considered by the

teachers and organisers of the training course to improve the presentations and organization of forthcoming training courses.

## **5. Report on the training course**

A report on the training course should be prepared within four weeks after the end of the training course. The report should address the issues compiled in the following outline.

### **Introduction**

### **Training Course Preparation**

### **Opening Ceremony**

### **Training Course Presentation**

### **Country Reports/Case Studies Presentation**

### **Visit To Air Quality Monitoring Station**

### **Course Evaluation**

### **Financial Report**

### **Group Photo**

### **Appendices**

Training course invitation letter.

List of participants.

Training course agenda.

Speeches for the Opening Ceremony.

Training course material "Health Guidelines for Vegetation Fire Events."

Brief CVs of resource persons.

LCD slides of training course presentations.

Questions and answers during training course proceedings.

Country case report of participants.

Course evaluation form and summary.

## **6. Slides/Transparencies used in the training course**

With video display (LCD projectors), MS PowerPoint slides can be used. These are stored in a portable PC to be connected to the video display. Experience with previous training courses in Kuala Lumpur and Brasilia has shown that after some adaptation and customizing, laptops and video displays work together satisfactorily. The advantages of this procedure include: the capability of updating Powerpoint slides to the regional situation; easy re-ordering and revision of slides; and the ability to update slides with the most recent information. Moreover, with access to the Internet, the most recent information on vegetation fires at web sites like those of the WHO, WMO, NASA, NOAA, the Global Fire Monitoring Centre, the Meteorological Services of some countries and others, can be included during the presentations. This capability renders the presentations very much up to date and prevents the material from becoming obsolete.

The following printouts of the slides used in the training course in Kuala Lumpur include a general introduction with an overview of the subject, followed by chapters 2, 3 and 4 of the Guidelines. The slides are to highlight the main points in these chapters. Explanations to these highlights can closely follow the text of the Guidelines. These slides are stored on the AMIS CD ROM, 3<sup>rd</sup> version that will be available by mid of 2000.

When LCD projectors are not available at the organising institution it is recommended that transparencies or slides accompany the lectures and workshops. The overheads shown in this Guide may be copied directly onto transparent plastic sheets and used with overhead projectors. Overhead transparencies can be produced with many photocopying machines. The use of a bright projector that does not require a darkened room is best. Overhead projectors are readily portable and not as expensive as slide projectors.

All presentations should be prepared well in advance of the course to avoid loss of time or distraction from the objectives of the presentation.

## **7. Attachments**

### **7.1 PROVISIONAL AGENDA**

**Sunday: Arrival of participants**

#### **Day 1**

Monday

- 8:30 am Registration of Participants
- 9:00 am Opening Ceremony
- 10:00 am Break
- 10:30 am Introduction
- Air Pollution from Vegetation Fires and Health
- 1:00 pm Lunch
- 2:00 pm Air Pollution from Vegetation Fires and Health (cont.)
- 3:30 pm Break
- 3:45 pm Air Pollution from Vegetation Fires and Health (cont.)
- 5:00 pm End of Day 1
- 8:00 pm Dinner

#### **Day 2**

Tuesday

- 8:15 am Depart to Monitoring Station
- 9:00 am Briefing on operation of monitoring station
- 10:00 am Depart to venue
- 10:30 am Break
- 10:45 am Question and Answer session
- 11:45 am Guidelines for Vegetation Fire Events for Public Health Protection
- 1:00 pm Lunch
- 2:00 pm Guidelines for Vegetation Fire Events for Public Health Protection (cont.)
- 3:30 pm Break
- 3:45 pm Guidelines for Fire Events for Public Health Protection (cont.)
- 5:00 pm End of Day 2

### **Day 3**

Wednesday

- 9:00 am Prevention of future health-affecting events
- 10:30 am Break
- 10:45 am Prevention of future health-affecting events
- 1:00 pm Lunch
- 2:00 pm Country presentations
- 3:30 pm Break
- 3:45 pm Country presentations (cont.)
- 5:00 pm End of Day 3
- 8:00 pm Social event

### **Day 4**

Thursday

- 9:00 am Country presentations (cont.)
- 10:30 am Break
- 10:45 am Country presentations (cont.)
- 1:00 pm Lunch
- 2:00 pm Question and answer session
- 3:30 pm Break
- 3:45 pm Question and answer session
- 4:45 pm Closing and presentation of Certificates
- 5:00 pm End of Training Course

Friday Departure of participants

## 7.2 Draft Letter of Invitation (*insertion to be adapted in bold italics*)

Dear

**Subject: Training Course on the WHO/UNEP/WMO Health Guidelines on Vegetation Fire Events in *City, Country*, from *day1 month1 to day2 month2 year***

As a follow-up of the recent publication of the WHO/UNEP/WMO Health Guidelines for Vegetation Fire Events, WHO has taken the initiative for organising several training courses in the various regions of WHO. The purpose of the training course series is to report on the recommendations and guidelines on global vegetation fire situation. It is also to highlight the major areas of concern including emergency response and environmental health plans for action by governments, inter-governmental organisations, non-governmental organisations, and private enterprises in every region of the world.

For the *NN* region, WHO in collaboration with its *country representative*, and the *Organisation* (an agency of the *Ministry of Health/Environment*) will organise the training course on WHO Guidelines on the Health Guidelines for Vegetation Fire Events from *day1 month1 to day2 month2 year in City, Country*. Among other issues the objectives of the training course are to introduce the guidelines, to discuss their implementation in various countries of the region and to raise awareness on prevention of significant health impacts. Officials and experts from relevant government agencies including Health, Environment, Meteorological Services, Agriculture and Forestry are invited to follow the course.

In view of the importance of the Guidelines, we would like to invite you or your representative to participate in this training course. WHO through *its country representative* will bear the cost of the most direct economy class airfare to and from *City* and provide daily subsistence allowance at established WHO rates for *City* during the duration of the course. Should you require any assistance or any information on your travel and other arrangements, please do not hesitate to contact *Mrs/Mr Name, country representative (address, tel, fax, email) or Mrs/Mr Name, Organisation, (address, tel:, fax:, e-mail:)*.

To ensure that the course and thus the Guidelines would be of relevance to the *NN* region, we would be grateful if you or your representative could prepare a country report on the subject and present the case at the training course. You may be guided by the outline and format as per attachment.

We look forward to your keen interest to participate in the course or to hearing from your representative at your earliest convenience, by returning the attached registration form

With best wishes.

Yours sincerely,

WHO Country representative

Organisation

WHO/RO/HQ

### Attachments

1. Outline of Agenda
2. Outline and Format of Country reports

### 7.3 Terms of Reference

#### **TERMS OF REFERENCE FOR THE ORGANISATION/ CITY IN COLLABORATION WITH WHO REPRESENTATIVE/CITY FOR PREPARING A TRAINING COURSE FOR COUNTRIES OF THE NN REGION ON THE WHO/UNEP/WMO HEALTH GUIDELINES ON VEGETATION FIRE EVENTS IN CITY/COUNTRY, DAY1 MONTH1 – DAY2 MONTH2, YEAR.**

#### **Background**

Following a meeting of the WHO Task Force on Guidelines for Forest fire Emergencies, held 5-10 October 1998 at CEPIS, Lima, Peru, the final draft of the Guidelines has been available since 31 January 1999. The guidelines address the following issues:

1. Review and summary of globally available information and case studies on the health impacts of forest fires;
2. Review and summary of globally available monitoring information and data from measurement campaigns on forest fires;
3. Characterization of air pollutant components in forest fires and their associated health effects;
4. Recommendations on the interpretation and use of monitoring data, global and regional meteorological data, and atmospheric mass transport modeling to determine source apportionment of smoke episodes (i.e., large area source emissions characterization) and determine or predict down wind air quality impact on human population;
5. Review and summary of existing national guidelines on forest fire emergencies;
6. Guidance on scientific methodologies for studying forest fire induced health effects;
7. Guidance for contingency plans, including a series of recommended steps to be used in decision making during a forest fire episode and actions to taken;
  - a) Protective devices
  - b) Information of the public
  - c) Practical advice
  - d) Training
8. Guidance on regulatory environmental and health governmental policies and legal aspects.

These recommendations and guidelines should be brought to the attention of the responsible national, regional (e.g. ASEAN, ECO) and international bodies (e.g. UNCSD, UNEP) by the WHO Director-General. These recommendations should also form the basis for suitable arrangements and mechanisms (e.g. emergency response, vulnerability reduction, environmental health action plans, etc.) within WHO – at country, regional, interregional and global levels. In order to achieve the latter objective, several training courses are to be planned and implemented in the various regions of the WHO.

The objectives to be achieved in the training courses are to

- report on the global forest fire situation, describe the health effects related to it and the problems encountered in fighting forest fires;

- introduce the guidelines and discuss their implementation in the various countries with the participants;
- raise awareness for prevention of health impacts of haze/smoke from forest fires;
- provide the necessary information for prevention of significant health impacts under haze/smoke conditions;
- establish an early warning system as an information network among the governmental and scientific key players.

The target audiences of the training courses include officials from the Ministries of Health, Ministries of Environment, Meteorological Services, Health Services, environment monitoring experts, and environment managers.

This is the nth training course of a series of forthcoming training courses in different regions. It is to be organised and implemented by the ORGANISATION in collaboration with WHO REPRESENTATIVE/CITY and WHO/HQ on DAY1 MONTH1 – DAY2 MONTH2 YEAR in CITY/COUNTRY . Participants to be invited using the funding made available to WHO REPRESENTATIVE/CITY should include 2 from Country1, 2 from Country2, 2 from Country3, 2 from Country4, 2 from Country5, 5 from Country. If funding is sufficient, more participants can be invited. Participants should work in the area of vegetation fires and be able to provide a country report. Teachers are Associate Professor Dr Lidia Morawska, Queensland University of Technology, Brisbane, Australia, to be invited and funded by WHO/HQ, NN, National of country , to be invited by WHO REPRESENTATIVE/CITY, and Dr Dietrich Schwela, WHO/HQ.

The WHO REPRESENTATIVE and His Excellency, the Ambassador of Japan should also be invited to the Opening Ceremony.

### **Implementation**

**The following tasks have to be completed by ORGANISATION in collaboration with WHO REPRESENTATIVE/CITY:**

1. Organisation of the training course including:
  - Identifying appropriate participants
  - Refining provisional agenda
  - Commissioning of country papers
  - Drafting invitations to participants according to draft invitation letter
  - Local technical organisation including
    - Organisation of meeting rooms
    - Hotel accommodation, meals and drinks
    - Transport from hotel to venue
    - Copying and distribution of training material
    - Provision of overhead and LCD projector
    - Social events, visit to ORGANISATION and other monitoring sites etc.
2. Preparation of a report on the training course;
3. Printing and distribution of the report to participants and other interested people;

## **WORKPLAN AND TIMETABLE**

- |  |                              |
|--|------------------------------|
| 1. Sending Memorandum with TOR to<br>WHO REPRESENTATIVE/CITY | DAY MONTH YEAR               |
| 2. Drafting invitation letters by ORGANISATION               | DAY MONTH YEAR               |
| 3. Technical organisation of training course                 | MONTH1-MONTH2 YEAR           |
| 4. Delivery of guidelines to WHO REPRESENTATIVE              | DAY MONTH YEAR               |
| 5. Training course   | DAY1 MONTH1-DAY2 MONTH2 YEAR |
| 6. Report  | DAY MONTH YEAR               |



5. Used time and facilities well.	<input type="checkbox"/>				
6. Effectively integrated and summarised materials.	<input type="checkbox"/>				
7. The overall quality of instruction.	<input type="checkbox"/>				

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**C. ENVIRONMENT OF THE TRAINING VENUE**

1. The venue environment was conducive to learning.	<input type="checkbox"/>				
2. The catering (if applicable) was adequate.	<input type="checkbox"/>				
3. The accommodation (if applicable) was adequate.	<input type="checkbox"/>				
4. The program's administration was satisfactory.	<input type="checkbox"/>				

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**D. PARTICIPANT'S SUMMARY COMMENT**

1. The knowledge and skills I have gained are relevant to my job.	<input type="checkbox"/>				
2. The program has increased my confidence in applying the skills/knowledge covered.	<input type="checkbox"/>				

**E. OVERALL RATING OF THE TRAINING COURSE**

**F. OVERALL IMPRESSION OF THE GUIDELINE**

G. Describe your earlier exposure to the subject:

- Excellent
- Good
- Fair
- None

H. The duration of the training course was appropriate?

- Too long
- Appropriate
- Too short

The ideal duration is \_\_\_\_\_ days.

I. **SUMMARY QUESTIONS AND COMMENTS:** Your comments are very useful in tailoring the content and administration of future programs. Please be as complete as possible.

1. What were the key strengths of the training course \_\_\_\_\_  
\_\_\_\_\_

2. How could the learning course be improved? \_\_\_\_\_  
\_\_\_\_\_

Additional comments \_\_\_\_\_  
\_\_\_\_\_

## 8.4 Slides and handouts

The Powerpoint slides that can be used in the presentations of the Guideline Document are contained in the following files

General overview of the Guideline Document:	Introduction.ppt
Chapter 2.1	Guide21.ppt
Chapter 2.2	Guide22.ppt
Chapter 2.3	Guide23.ppt
Chapter 2.4	Guide24.ppt
	Guide241.ppt
Chapter 2.5	Guide25.ppt
Chapter 2.6	Guide26.ppt
Chapter 2.7	Guide27.ppt
Chapter 3.1 + 3.2	Guide312.ppt
Chapter 3.3	Guide33.ppt
Chapter 3.4	Guide34.ppt
Chapter 3.5	Guide35.ppt
Chapter 3.6	Guide36.ppt
Chapter 3.7	Guide37.ppt
Chapter 4.1	Guide41.ppt
Chapter 4.2	Guide42.ppt

## **General overview of the Guideline Document: Introduction.ppt**

This general introduction covers in a summary form the contents of the whole Guideline Document. It describes the global fire occurrence in qualitative terms, show the instruments of firefighters in developing and developed countries, the fumes from vegetation fires, and mitigation measures. Introductory remarks refer to the compounds of smoke and their direct and indirect health effects. The introduction closes with a discussion of the outline of the Guideline Document.

## **Chapter 2: Air Pollution from Vegetation Fires and Health**

### **Chapter 2.1 Introduction Guide21.ppt**

After introductory remarks on the global extent of the fire problem, databases for reliable statistics are introduced. A discussion of the various types of vegetation fires - wildfires, tropical grass fires, forest conversion fires, and agricultural residue burning and prescribed burning follows. The seasonality of forest fires in the Northern and Southern Hemispheres is discussed and examples for the most recent major fire events presented. Associated losses are tabulated. The lecture concludes with a general consideration on the necessity of early warning systems in order to assess hazards from estimates of fire risks.

### **Chapter 2.2 Source characterisation: Emission and Post-emission processes - Guide22.ppt**

This chapter covers the issues of the factors that affect incomplete combustion of biomass, flaming and smouldering combustion, combustion efficiency, and the pollutants that are generated in the combustion process. Compounds emitted in the combustion process include coarse and fine particles, volatile organic compounds, polynuclear aromatic hydrocarbons, carbon monoxide, aldehydes, acrolein, organic acids, nitrogen- and sulfur based compounds, free radicals and ozone. The transformation of these combustion products during transport, changes in particle size distributions, and residence times of particulate and gaseous compounds are considered. The use of emission ratios is explained.

### **Chapter 2.3 Ground-based monitoring Guide23.ppt**

The topics of ground-based monitoring include the discussion of the objectives of monitoring, the role of monitoring in forecasting haze events and emergency response and network design considerations. The methods and instruments for monitoring aerosols are discussed, and data collection, processing and dissemination. Recommendations are given with reference to existing international networks, management of programmes, priority compounds. Information on quality control and assurance and the use of air pollutant indices is provided in this lecture as well.

## **Chapter 2.4 Space monitoring and modeling of the distribution of fire products** **Guide24.ppt, Guide241.ppt**

The content of this presentation refers to the issues of fire susceptibility, fire monitoring and the detection of emissions. Sources of information for the vegetation index from satellite images are discussed. The four different types of satellites that provide images for fire detection are presented. Their advantages and limitations in the detection of fires and determination of the magnitude of emissions are elaborated. An outlook is given on the capabilities of satellite generations that are launched in 2000 and 2001 and on the longer term. Implementation recommendations for the establishment of regional fire activity centres, data availability, software development, and the increase in data reliability round up this presentation. As an example for an early warning system,

## **Chapter 2.5 Climate monitoring and modeling of the distribution of fire products** **Guide25.ppt**

With respect to climate monitoring and modeling, the work is summarised that is to be performed before, during and after a major fire event. Before a major fire event preparatory studies are necessary that provide early warning indicators, a framework for monitoring fire plumes, records of major fire events and their temporal and spatial distribution, and the correlation between occurrence of major fire events and climatic variables. Preparatory studies also include information on the use of fire prediction systems, large-scale transport models and the calculation of long range trajectories. During a major fire event information on the emissions, impact areas and pollutant concentrations must be readily available. Atmospheric transport modeling, numerical weather prediction and the acquisition of the necessary data to run the models are another issue to be discussed in detail. The validation of the models during and after a major fire event is also an important topic in this presentation. The presentation closes with recommendations to responsible agencies.

## **Chapter 2.6 Emergency response procedures** **Guide26.ppt**

After general remarks on the necessary management procedures for effective emergency response, a general review of policies is presented. Policy objectives are discussed in general terms and underlined with examples from countries in the Southeast Asian region. A framework for contingency planning and implementation of emergency response procedures is presented. The mechanisms for emergency responses are considered in the frame of national policies. When the training course is held in other regions this presentation should be adapted to the actual needs of the participating countries.

## **Chapter 2.7 How to use and apply the guidelines** **Guide27.ppt**

This presentation discusses the final section in chapter 2. It addresses practical aspects of the application of the Health Guidelines in pre-event, during-event and post-event action. The role of the different stakeholders is emphasised with respect to response planning multisectorial meetings and the necessity of defining the responsibilities for individual actions within response plans well before a major fire event occurs.

## **Chapter 3: Guidelines on Vegetation Fire Events**

### **Chapter 3.1 +3.2 Introduction and Health Effects Guide312.ppt**

The introduction give an overview of the topics of this chapter and goes on to elaborate on the health effects of the smoke from forest fires, with emphasis on the fraction of very small particles. Mostly acute health impacts on the respiratory and cardiovascular system are discussed. Susceptible groups of the exposed population are identified. Case studies and examples of health impacts of past events in Singapore, Australia, and the United States are presented. Some room is given to the discussion of the health effects of PM<sub>10</sub> with respect to daily mortality of adults and infants, hospital admissions and increased emergency room and outpatient visits. The role of the WHO Guidelines for Air Quality with respect to particulate matter is addressed as well.

### **Chapter 3.3 Public advisories Guide33.ppt**

Public advisories discussed in this presentation include the dissemination of information to the public on ambient air quality and health effects. The issues of cautionary statements and information on national or regional action are addressed. Information to the public includes the various stages of emergency response planning - Alert, Warning, and Emergency and Re-entry. The material is elucidated by various flow diagrams.

### **Chapter 3.4 Mitigation measures Guide34.ppt**

The mitigation measures presented in this section include remaining indoors, modifications of personal lifestyle, use of air cleaners and respirators, outdoor precautionary measures and evacuation to emergency shelters. Particular emphasis is given to the use of masks and respirators, their definition, classification and description. The topics of proper selection of respirators and existing regulations and certification procedures are discussed in detail. The limitations of potential mitigation measures are addressed as well.

### **Chapter 3.5 Guidance on methodology for assessment of vegetation-fire induced health effects Guide35.ppt**

This presentation summarises the critical factors in ascertaining health effects of exposure to air pollutants caused by vegetation fires. The types of study design are introduced and the necessary ingredients for such studies are enumerated and discussed. The important components of all studies are elaborated with respect to individual compounds. The personal factors affecting exposure to air pollutants and the outcomes of various types of epidemiological studies in relation to these factors are put into perspective. Various factors such as socio-economic, nutritional, health, occupational and smoking status in a population affect the health outcomes of air pollutant events. It is stressed that additional factors such as demographic distribution, structural types of housing, cooking practices, access to information, potable water and health care can also play a substantial role in health outcome of vegetation fire events.

Some time in this presentation is dedicated to the topic of adequate evaluation of the study data and priority setting needed for obtaining useful and reliable studies.

**Chapter 3.6 Application of short-term air quality guidelines**  
**Guide36.ppt**

This presentation addresses the use and application of existing national air quality standards and air quality guidelines during vegetation fire events. The discussion is performed within a general framework of air quality management. The role of transport and self-regulation of mobile sources during major vegetation fire event and the corresponding policies and plans are discussed. A no cost option of controlling air pollution in major vegetation fire events is also presented. The dual role of short-term air quality guidelines and the use of WHO's short-term air quality guidelines at the various stages of emergency are discussed.

**Chapter 4: Prevention of Future Health-affecting Events**

**Chapter 4.1 The source: Land-use/fire policies**  
**Guide41.ppt**

It is the objective of this section to stress that the present situation of national policy development is characterised by ad-hoc reaction rather than proactive action. Policies often do not consider the causes underlying fires. This is illustrated by discussion of various land-use policies and people habits. Recommendations to national Governments are presented with respect to policy development, systematic and integrated fire management, institutional co-operation, restoration and rehabilitation, and technology-research-information use. Recommendations for International Organizations are discussed as well.

**Chapter 4.2 Recommendation: Addressing gaps in knowledge, technologies, programmes**  
**Guide42.ppt**

The recommendations of the final chapter of the Health Guidelines indicate the research and information needs as identified in the expert task meeting in Lima in September 1998 and in the FAO meeting entitled "Public Policies Affecting Forest Fires" on October 1998.











































































































































































