

# Modelling, Monitoring and Management of Forest Fires

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# **Modelling, Monitoring and Management of Forest Fires**

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E-Mail: [infousa@witpress.com](mailto:infousa@witpress.com)

<http://www.witpress.com>

British Library Cataloguing-in-Publication Data

A Catalogue record for this book is available  
from the British Library

ISBN: 978-1-84564-141-2

ISSN: 1746-448X (print)

ISSN: 1743-3541 (on-line)

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## Preface

The present volume contains the papers presented at the first International Conference on Modelling, Monitoring and Management of Forest Fires (FIVA 2008) held at the University of Castilla-La Mancha campus in Toledo, Spain, 2008. The conference was jointly organised by the Wessex Institute of Technology, UK, and the University of Castilla-La Mancha and was sponsored by WIT Transactions on Ecology and the Environment.

Vulnerability is defined as the extent to which a natural or social system is susceptible to damage when exposed to a certain hazard. In this context, forest fires are natural hazards which continually affect the evolution of the surrounding local natural and social system.

Forest fires appear as a complex major problem, which is way beyond the simple relationship with climate, at the origin of many environmental social and economical consequences. The loss of habitats, erosion and CO<sub>2</sub> emissions are examples of the ecological consequences, while the impact on human health, agricultural and tourist activity as well as regional labour market are examples of social, economical and ecological effects.

The European Commission mentions that every year about 45,000 large scale forest fires occur in Europe destroying a huge area of forests and other rural lands. Between 1995 and 2008, more than 4.5 million hectares burnt in the Mediterranean region alone, corresponding to an area larger than the Netherlands. Besides the social (loss of lives and goods) and environmental damages, forest fires have also considerable economic consequences, not only because of the destruction caused, but also because of the enormous quantities of resources spent in fire fighting, prevention, and restoration measures. The increase in the number and extension of forest fires was predicted in the last IPCC 2007 report, with an average of 45000 fires and 0.6 million ha burnt per year. Forest fires in the Mediterranean basin represent a significant part of all fires that occur in the world. In fact, effects of fire can be noted in most forest ecosystems all over the world, but they are especially active in Mediterranean climate areas.

According to the 2007 FAO reports, the EU accounts for nearly 193 million hectares of forest, and nearly 52% is primarily designated for production. EU forests

produced about 272000 tonnes of food products in 2005 (about 6 percent of the world total); 6500 tonnes of raw material for medicine and aromatic products (5 percent); and 232000 tonnes of other plant products (18 percent). Despite fires, pests and diseases, there is a positive rate of expansion of land covered by forests of 0.4% per year. The maximum increase rate registered from 2000 to 2005 was reported in Portugal, Spain, Italy and Bulgaria. Not surprisingly, these are among the countries that have been suffering most from the consequences of large scale forest fires, paying high and unpredicted costs, including human lives. Hence, it is easy to conclude that there is a close complex relationship between vegetation growth, fire frequency, fuel accumulation, and social, ecological and economical impacts. Furthermore, several sources estimated that the total annual cost of fire fighting and safety devices in the region to be more than 1 billion euros.

This conference provided a forum for researchers, academics and stakeholders actively involved in the prevention, detection and suppression of forest fires, and the restoration of burned areas. The conference brought together engineers, scientists and other professionals from all countries, involved in research and development activities in a wide range of technical and management topics related to forest fires and its devastating effects.

The scientific topics presented at Modelling, Monitoring and Management of Forest Fires 2008 conference included: Computer models for fire propagation; Risk and vulnerability assessment; Fire combustion models; Computational methods and experiments; Case studies; Emergency response systems; Optimization models for fire mitigation; Environmental impact models; Air pollution and health risk; Interaction between meteorological and forest fires models; Economic impact models; Forest material characterisation; Eco remediation models; Decision support systems Monitoring systems; Data acquisition and analysis.

A fundamental aspect of the work presented at the conference was that it stressed not only mankind's active role in enhancing global change, but also recognizes mankind's opportunities to mitigate this change.

The editors would like to thank all the authors for their contributions, as well as the members of the International Scientific Advisory Committee for their invaluable help in reviewing the papers.

The Editors  
Toledo, Spain  
2008

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