Descriptive Abstracts of occurring Wildfire Crisis

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# Article 1

A GIS based operational system for wildland fire crisis management I. Mathematical modelling and simulation

The introduction of the document describes how forest fires are one of the most important environmental crisis incidents along with a brief overview of the mathematical nomenclature used in the article. It further emphasizes on the use of modelling simulation systems and resource quantifying tools to estimate the fire spread during the incident and thus, better manage the available resources during the crisis. Furthermore, the article describes how mathematical models such as the curve expansion models are used to trace the progress of wildland fire perimeters for flatland terrain, however, struggles against more complicated topography due to the unpredictability of wildfire propagation of slopped terrain. The article then further proceeds with the use of digital elevation models for large-scale terrain elevation and the functionality of these models. Section 3 introduces the usage of artificial intelligence modelling tools namely neural networks and fuzzy logic modelling architectures to increase the speed of the simulations. Section 4 goes further in depth in the use of neural networks, its terminology and how the AI learns progressively to improve accuracy. Finally, section 5 concludes the article by summarizing the many solutions to the wildfire crisis and how such simulation tools may continue to further progress and evolve in the future. The last page provides the references and sources used in the document.

# Article 2

Wildfire Management in the United States: The Evolution of a Policy Failure

The introduction section of this article begins by explaining how wildfire fires pose severe threats to ecosystems and communities in America. It aims to explore the political processes that led to the failure of American wildfire policy and examines potential solutions for managing this national crisis. The first case of policy failure in American history can be traced back to the early 1900s when the federal government focused primarily on aggressive wildfire suppression without addressing the gradual accumulation of flammable materials (fuels) in ecosystems due to fire suppression. It continues to emphasize the damages caused by wildfires claiming that recent experiences have shown that wildfires can burn millions of acres in a single year, especially in the interior West, where approximately 39 million acres of national forest lands are at high risk of catastrophic wildfires. This is mainly caused by the dominant focus of US wildfire policy on suppressing wildfires, without sufficient support for programs to reduce wildland fuels, leading to their gradual accumulation in many ecosystems. Finally, the article explains the origins of such wildfire policies by applying the concepts of critical periods and bounded rationality where the transfer of federally owned forest reserves from the US Department of the Interior to the US Department of Agriculture in 1905 led to the USDA Forest Service assuming responsibility for managing national forests. Protecting natural resources from wildfire damage became a primary focus, and in 1908, Congress passed an appropriations bill enabling the Forest Service to receive advances of funds for emergency forest firefighting. The last page provides the references and sources used in the document.

# Article 3

A GIS based operational system for wildland fire crisis management II. System architecture and case studies

The introduction section of this article begins by explaining how the efficient management of crisis incidents, including forest fires, requires a generalized and integrated approach that utilizes scientific knowledge and technological achievements. Civil protection and operational agencies recognize that spatial information is crucial for analysing crisis management problems. One example of such technology is the geographical integrated systems (GIS) technology plays a significant role in storing, retrieving, and modelling spatial information to support decision making during crisis events. Section 2 introduces another type of technology called the spatial information system (SIS) and how it is used to handle the combination of geometric/cartographic and quality/descriptive data related to the forest fire and its consequences. The SIS allows for the collection, analysis, manipulation, and visualization of a large volume of data to assess the possibility of forest fire ignition, its potential spread, and the resulting impacts by facilitating the coordination of agencies and services involved in disaster response. Section 3 introduces the decision support system (DSS) and how it provides the user with the necessary capabilities to assess the situation of an incident and make the appropriate decisions. Finally, section 4 presents case studies where these innovative technologies have had an impact. In one case, the operational system was tested as a pilot application in the mountain area of Penteli, Greece, which is prone to frequent forest fires and has experienced significant damage over the years. The area is covered with highly flammable vegetation, including species like Pinus Halepensis, holm-oak, and Pistacia lentiscus. The system combines digital data on terrain elevation, vegetation flammability, residential areas, and road networks. The last page provides the references and sources used in the document.

# Article 4

A potential crisis in wildfire emergency response capability? Australia's volunteer firefighters

This article provides a brief overview on how wildfires are dealt with in Australia. The article begins by stating that Australia is immensely susceptible to wildfires due to its large area and low rainfall. As such, about 220 000 rural fire volunteers across eight states and territories volunteer for rural fire services. The article continues by explaining how economic and demographic changes makes it hard for the volunteers to abide by the community protection responsibilities. Furthermore, there has been a report of a decline in volunteer firefighter numbers. For example, the South Australian Country Fire Service reported in 2003 that during each of the past 5 years, about 400 more volunteers left than joined, resulting in a decline of about 14 per cent over the period. Economic changes such as an alter to the structural nature of work and industry has heavily affected this domain. As a result, these changes may have profound effects on the future of volunteer rural fire agencies despite each emergency service volunteer saves the government approximately $9000 per year.

# Article 5

Damned if you do, damned if you don’t: Media frames of responsibility and accountability in handling a wildfire

The introduction of this scholarly article emphasizes the role of mainstream media in shaping public perception and understanding of the wildfire crisis. Media framing refers to how media present and define an issue, highlighting specific connections and promoting interpretations. It can influence public opinions, attitudes, and responses to the crisis. Media frames perform various functions, including problem definition, causal analysis, moral judgment, and remedy promotion. Previous research shows that media framing significantly impacts crisis evolution, attributing meaning to events and influencing risk perceptions and policy-making. In section 2, the article describes a set of methods used to study how media influenced a wildfire crisis located in Sweden. The first method is using data collection: a deeper look upon the “prestige press” which incorporates mass-market newspapers. The second method involves data analysis: a thorough examination and analysis of media articles of a wildfire event to identify portrayals of the public and authorities’ responses. Section 3 looks into the results of mainstream media involving mainly two themes: the reason behind the fire occurred and the management behind an escalating wildfire crisis. Finally, section 4 deals with discussion and to analyse key media frames relating to the portrayals of authorities’ and the public's response during and after a wildfire crisis based on two concepts: responsibility and accountability.

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