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Development and structure of the Turkish National Fire Weather Index System's Software

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Abstract: Effective forest-fire management is based on sound information of the potential for ignition, fire behavior, difficulty of control, and impact of fire in a given situation. Decision support systems such as fire danger rating systems (FDRS) provide a framework for organizing and integrating scientific knowledge and operational field experience. Today, FDRS have long been a part of fire management organizations in many countries around the world to help fire managers to make sound decisions concerning fire management activities. Fire danger rating systems implemented in many countries help predict fire danger potential taking into consideration the environmental factors that have an effect on fire potential and danger. These systems have been successfully used especially in USA, Canada and Australia and are being implemented in countries such as New Zealand, China and some countries in Europe. Although there is a great need for such a system, except for a few studies conducted in recent years, there has been no major undertakings in Turkey to provide a comprehensive solution to the problem soon. In this study, the structure and development of the Turkish National Fire Weather Index System (TFWI), the concept behind it, its mathematical structure and the basis of the system's software are described. TFWI system software is being unofficially used by Turkish Fire Service. The system consists of five components: two primary sub-indexes representing fuel moisture codes (FFMC and DMC), two intermediate sub-indexes representing relative rate of spread (ISI) and fuel consumption (BUI) and fire weather index (FWI) component representing fire intensity as energy output rate per unit length of fire front. While the TFWI system refers primarily to a standard fuel type (*Pinus brutia*), it is a useful measure for forest fire danger rating in Turkey. The system uses as inputs hourly weather readings (temperature, relative humidity, wind speed and rain) from online weather forecast providers. System allows for hourly predictions of fire danger and results are displayed as a map output. The system is now being used as a prototype to forecast hourly fire danger rating and a mapping software. The software improvement process is currently underway. The successful implementation of TFWI system will be invaluable in fire training programs, raising public awareness and using fires as a management tool.
Keywords: Forest fires, Fire danger, Fuel moisture, Decision support system