

Forest Fire Detection and Monitoring System in Nepal



Rationale

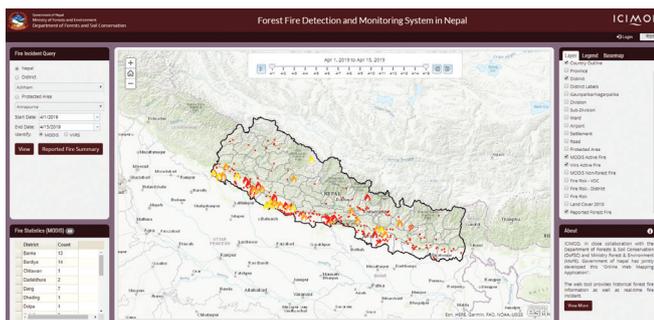
Forest fire has adverse ecological and economic impacts and is a major concern in many countries. In Nepal, forests in more than 30 districts annually face damage due to forest fires. An effective fire detection and monitoring system is an important component of forest fire management. In view of their large-area repetitive coverage, satellite data are useful for near real-time fire detection, monitoring, and burnt area assessment. Further, the Moderate Resolution Imaging Spectroradiometer (MODIS) sensors on board Terra and Aqua satellites of National Aeronautics and Space Administration (NASA) are already being extensively used for detecting and monitoring forest fires across the globe.

Using the forest fire data from MODIS sensors, the International Centre for Integrated Mountain Development (ICIMOD) has developed the Forest Fire Detection and Monitoring System for Nepal. The work was jointly carried out in close collaboration with the Department of Forests and Soil Conservation – Ministry of Forests and Environment, Government of Nepal, under the SERVIR Hindu Kush Himalaya (SERVIR-HKH) Initiative at ICIMOD.

The system carries out automated data acquisition, processing, reporting, and feedback on fire location. It provides location information at 1×1 km resolution on active fires present during the satellite's twice-daily overpasses.

Data acquisition, processing, and dissemination

The system assimilates active fire data generated by ICIMOD's MODIS receiving station, which adopts NASA's fire detection algorithm. The system automatically adds important information to these data such as administrative unit (district, urban/rural municipality, ward number, etc.); protected area identification; land cover type; elevation; and slope.



Online system showing fire locations in Nepal

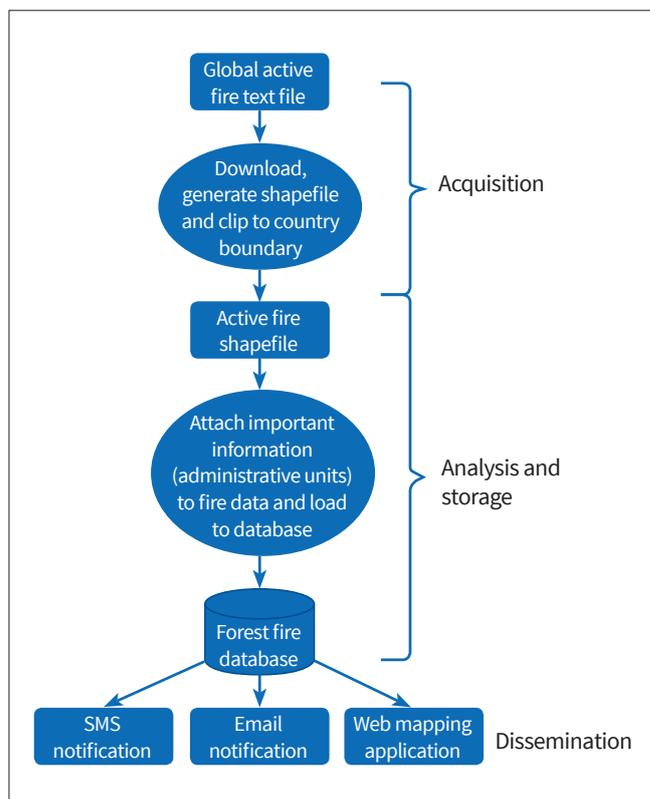
This system currently sends email notifications about active fires throughout Nepal to about 200 subscribers. Furthermore, about 200 subscribers – comprising divisional forest officers from 84 forest divisions and focal persons of the Federation of Community Forestry Users in all 77 districts – receive fire alerts on their mobile phones via SMS when a fire incident is detected in their area of subscription.

Information on detected forest fires is published on ICIMOD's website for users in Nepal (see <http://servir.icimod.org/science-applications/forest-fire-detection-and-monitoring-in-nepal>) and is made available for download through ICIMOD's Regional Database System. The system allows dynamic visualization of fire locations on any given day or in a user-specified time period of the fire disaster.

The forest fire detection and alert information system is currently being actively utilized at the Department of Forests and Soil Conservation (DoFSC) headquarters in Kathmandu, Nepal, with a screen visualizing near real-time data on current fire conditions. The DoFSC has set up a dedicated forest fire control room, which consolidates action on the ground and updates and manages the system in-house. ICIMOD provided technical support in setting up the control room and trained DoFSC staff on assessing forest fire risk using geospatial tools. Forest fire risk maps are now available for all seven provinces and 77 districts of Nepal.

System upgrade

As an upgrade, ICIMOD has incorporated data from the Visible Infrared Imaging Radiometer Suite – a sensor on NASA's Suomi satellite – to complement the MODIS data. The result is both enhanced spatial resolution over fires



Forest Fire Detection and Monitoring System work flow

of relatively small areas and improved mapping of large fire perimeters. A damage assessment form has been integrated in the web-based system that allows DoFSC officials to capture information on reported fire incidences, estimated damage, and fatalities from forest fires. A mobile application – Nepal Forest Fire Detection and Alert – supports citizen reporting on fire incidences in Nepal.

In the years ahead, the system will continue to play a major role in improving management of the region's valuable forest resources.



SERVIR connects space to village by helping developing countries use satellite data to address challenges in food security, water resources, weather and climate, land use, and natural disasters. A partnership of National Aeronautics and Space Administration (NASA), United States Agency for International Development (USAID), and leading technical organizations, SERVIR develops innovative solutions to improve livelihoods and foster self-reliance in Asia, Africa, and the Americas.

The International Centre for Integrated Mountain Development (ICIMOD) implements the SERVIR Hindu Kush Himalaya (SERVIR-HKH) Initiative – one of five regional hubs of the SERVIR network – in its regional member countries, prioritizing activities in Afghanistan, Bangladesh, Myanmar, Nepal, and Pakistan.

For further information

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