

# Satellite Based Forest Fire Monitoring and Alert System

Mir Matin

International Center for Integrated Mountain Development (ICIMOD)

Regional Consultative Workshop on Cross-Boundary Cooperation in Fire Management in South Asia

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ICIMOD



SERVIR HINDU KUSH HIMALAYA

## Background



- There is a need for reliable and near real time fire detection and monitoring system.
- Satellite data is found to be quite useful in fire detection and monitoring on near real time basis.
- MODIS (MODerate Resolution Imaging Spectroradiometer) satellites of NASA is extensively used in active forest fire detection and monitoring across the globe.



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## Satellite based Forest Fire Detection and Monitoring in Nepal



- Department of Forest with the help of ICIMOD implemented the MODIS based forest fire detection and monitoring system for Nepal.
- The system has been developed under SERVIR-Himalaya Initiative supported by USAID and NASA.
- The system launched in March 2012 can send out SMS and Email fire alerts twice a day in the morning (around 10:30 A.M) and afternoon (around 1:30 P.M).



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## Forest Fire Monitoring and Alert System - Roles



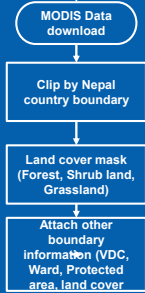
- Product initiation and design – DoF, ICIMOD, NASA, USAID
- Product development – ICIMOD, NASA
- Product dissemination – DoF, ICIMOD
- Product users – DoF, DNPWC, Community forest users, FECOFUN



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## FFMAS – Flow Chart

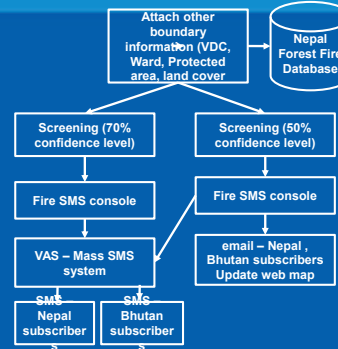


Acquisition

Processing and storage



## FFMAS – Flow Chart



Product development and dissemination



## Subscribers

- District Forest Officers from all districts
- District level FECOFUN members
- Officers of Department of Forest
- Officers of DNPWC and wardens of all protected areas
- ICIMOD Network



## SMS Alert

- SMS alerts sent to concerned subscribers containing following information:
  - district name
  - location details of individual fires in terms of latitude and longitude
  - VDC name and ward number
  - protected area identification in case fire is detected within a protected area



## Email Alert

Dear Subscriber,

Following fire incidents were detected on 2014-04-27:

Fire incidents with high confidence level (above 70%):

Lat	Lon	District	VDC	Ward No	Protected Area	Elevation (m)	Land Cover	Confidence (%)	Satellite
28.222	81.794	Barke	Mahadevput	2		234	Forest	77	Aqua
28.226	81.812	Barke	Mahadevput	2		239	Forest	76	Aqua
28.311	81.841	Barbisa	Barbisa national park		Barbisa	239	Forest	80	Aqua
28.435	81.506	Barbisa	Barbisa national park		Barbisa	251	Forest	85	Aqua
29.039	82.511	Radiyathura	Radia	8		1634	Forest	73	Aqua
28.955	81.440	Dabesh	Sigaud	5		890	Forest	73	Terra
27.855	82.188	Deung	Deung	9		362	Forest	74	Aqua
27.938	84.971	Dhadig	Dhadig	7		1200	Forest	74	Aqua
29.099	80.032	Dole	Lakmikapur	7		1449	Forest	87	Aqua
29.083	80.851	Dole	Lakmikapur	7		1189	Forest	71	Aqua
29.091	81.544	Dole	Chamara Chikara	8		834	Forest	79	Aqua
29.150	80.888	Dole	Saraswatabagar	4		1465	Forest	81	Aqua
28.795	87.869	Bamje	Bamje	2		451	Forest	74	Aqua
28.701	81.063	Kailali	Dododhara	6		234	Forest	71	Aqua
28.893	80.266	Kanchanpur	Shukla Phanta	208		208	Forest	75	Aqua
28.883	80.202	Kanchanpur	Shukla Phanta	203		203	Forest	77	Terra
28.895	80.270	Kanchanpur	Shukla Phanta	200		200	Grassland	60	Terra
28.919	87.589	Panchthar	Limba	4		937	Forest	100	Aqua
27.942	82.349	Pyuthan	Bansajun	5		605	Forest	80	Aqua
28.100	82.911	Pyuthan	Lung	9		979	Forest	82	Aqua
28.103	82.908	Pyuthan	Tikara	9		1385	Forest	91	Aqua
27.339	86.081	Ramechhap	Ramechhap	3		949	Forest	74	Aqua
28.077	82.004	Rasuwa	Randigarth	7		997	Forest	100	Aqua
28.079	85.215	Rasuwa	Haku	8		1110	Forest	100	Aqua
28.089	85.214	Rasuwa	Haku	8		1883	Forest	87	Aqua
28.324	82.155	Salyan	Hu alcha	2		1063	Forest	79	Aqua

Fire incidents with medium confidence level (50-70%):

Lat	Lon	District	VDC	Ward No	Protected Area	Elevation (m)	Land Cover	Confidence (%)	Satellite
28.098	81.871	Barke	Kachanapur	5		252	Forest	58	Aqua
28.101	81.888	Barke	Kachanapur	4		219	Forest	65	Aqua
28.435	81.434	Barbisa	Barbisa national park		Barbisa	251	Forest	68	Aqua
27.225	86.003	Kiokang	Salla	3		500	Forest	87	Aqua
28.666	81.365	Sunkeot	Paranga	3		715	Forest	81	Aqua

Please [click here](#) to download the fire map and visit <http://apps.geoportall.icimod.org/NepalForestFire/> to view the interactive web mapping application.

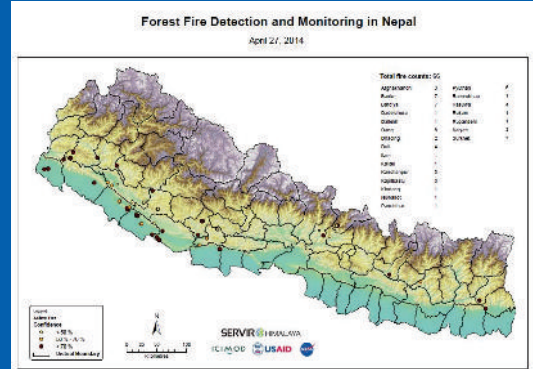
If you wish to unsubscribe from email fire alert please go to <http://apps.geoportall.icimod.org/Email/ForestFireUnsubscribe.aspx>.

Thank you.

- Email alerts sent to subscribers containing more detailed information



## PDF Fire Map



## Subscription to email

<http://apps.geoportall.icimod.org/NepalForestFire/register.aspx>

Forest Fire Detection and Monitoring in Nepal

Please fill up the following registration form with your email, full name, address and organization name to subscribe to email fire alert:

User Registration

First Name:  Middle Name:  Last Name:   
 Email:  Address:  Mobile:   
 Organization:  Designation:



## Web Mapping Application

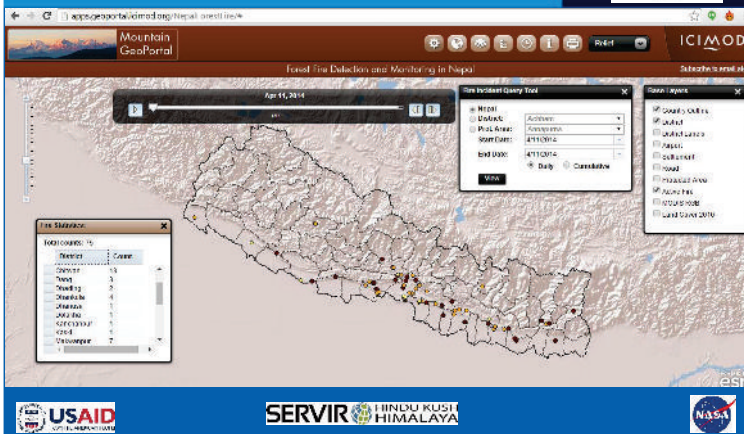
<http://apps.geoportall.icimod.org/NepalForestFire/>

- Store historical archive of forest fire from 2000 onwards
- Helps to analyse forest fire distribution
- Zoom in and Zoom-out facilities to look at fire incidence of individual district



## Web Mapping Application

<http://apps.geoportal.icimod.org/NepalForestFire/>



## Current Status

- Some 300 SMS subscribers receive fire alert in their mobile devices if a fire incident is detected in the district of their subscription.
- Email fire notification sent to more than 200 subscribers.
- Fire information also published on web application.

## Case Study

- To understand who are present and future user of the system
- To understand how users perceive the utilities of the system
- To understand the Sustainability of the system
- How to expand the system to wider users

## Method

- Data analysis on SMS and email
- Group Discussion
- Face to face interviews
- Telephone interviews

## Telephone Feedback Survey



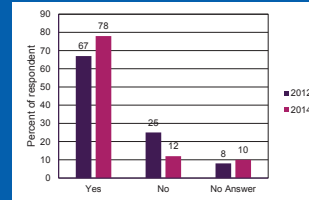
- People who received SMS alert
- Based on structured questions most of them has yes/no answers
- One survey was conducted after fire season of 2012
- Second survey conducted after fire season 2014



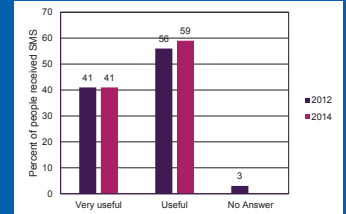
## Telephone Feedback Results



Have you been Receiving SMS?



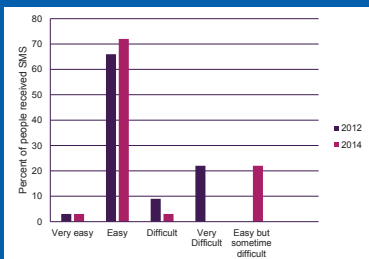
Do you find the alert useful?



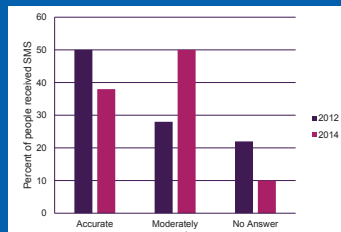
## Telephone Feedback Results



How easy to identify location from SMS?



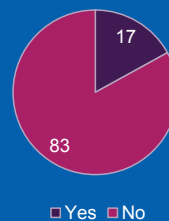
How accurate is the location?



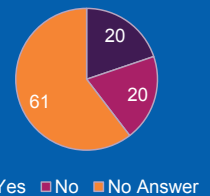
## Telephone Feedback Results



Do you receive email alert?



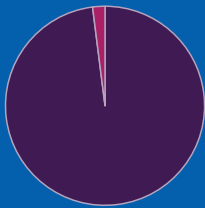
Do you use web map?



## Telephone Feedback Results

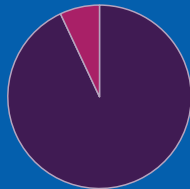


Do you like to receive email alert during evening?



Yes No Answer

Do you think alert should be disseminated to wider audience?



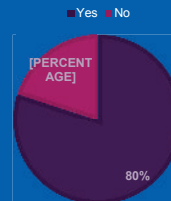
Yes No answer



## Telephone Feedback Results



Upon receiving the fire alert, do you use the information for verification and extinguishing of fire



## Outcome



- High level of interest from people
- All DFOs and Park Warden expressed interest
- Recommended to include Ilaka staff, CDO and DSP offices, local Police and army units
- Suggested to receive evening time alert



## Challenges



- Enrolment for SMS and email subscriptions
  - No systematic handover of subscription during staff change
  - Lack of awareness among staff members
- Slower internet
- Fewer people using the system than expected
  - Official mobile not functioning
  - No systematic process of learning about the system
  - Lack of training on the system
- Very few people are aware of the email alert and web mapping system



## Issues



- Expansion of alert subscription
  - Identification of new subscribers
  - Updating phone number and email addresses
- Human resources at DoF
- Cost sharing for maintenance and SMS
- Capacity building
- Inclusion in annual management plan of DoF
- Partnership with other programmes



## Recommendations



- Improve communications and orientation to users of the system
  - Training
  - Communication materials
- Develop and implement active user expansion agenda
  - Ilaka offices, Polices, Army, CDO and DSA offices
  - Community user group members
  - FM radio stations



Discussion

THANK YOU

