



# eForestFire

Himalayan Forest Fire Prediction

Project ID - NAeG/19-20/00110  
National Awards for eGovernance

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**Immediate Past!**



**Present...**



**Projects aims to go back to the glorious past!**



# BACKGROUND- Why present work?

- Forest fire destroys **millions of ha of world's forests** every year
- Fire is one among major threats for the world's forests
- Problem has compounded with drought, hot weather etc.
- Arunachal Pradesh, over 80 % forests are Himalayan biodiversity.
- Topographical and metrological factors Vs **Shifting cultivation**
- **Right Method → Right Time → Right Place**

(How, When & Where to intervene to mitigate fire linked disaster!)

# Project OUTLINE

## GIS MAPPING

- Socio-economy
- Climatic-Environmental
- Geographical Factors

Limitations?

1. Lack of Public Participation
2. No distinction b/w Forest/Revenue Area
3. Too late to report (4 hr)
4. No prediction/forecasting
5. False Reporting



## PREDICTIVE MODEL

← Mobile App  
WebGIS Portal →



ABOUT MODEL

FIRE HOTSPOTS

REPORT FIRE



## FOREST FIRE ARUNACHAL PRADESH

[Home](#) [About](#) [Download App](#)

### PREDICT & PREVENT FOREST FIRES

#### GIS MAPS

For GIS maps of Hotspot analysis, data has been taken from Satellite images and other online GIS data that is extensively used for international research purpose. It helps in prediction of priority areas.

[View Gallery](#)

#### FIRE EVENTS

Data for WebGIS forest fire event clustering are MODIS imagery fire points; there is possibility that all fire points are not forest fire points. It identifies previously recorded forest fires through satellite imagery.

[WebGIS](#)

#### LIVE MAPS

Data for realtime forest fire is shared by the user who report the live forest fire events, hence it has maximum accuracy. It is Admin controlled or we can say controlled update is available to avoid wrong information clicked by user by accident.

[Live Maps](#) [Activate W](#)



# MAJOR OBJECTIVES

1

- To integrate direct/indirect factors of forest fire to find initial hotspot & its correlation with FSI Data

2

- To develop predictive model by integrating **Socio-economy, Climatic-Environmental, Geographical Factors & FSI** data to extract hotspots at villages level

3

- **Strategic allocation** and optimal utilization of limited Govt. resources

4

- To link model, Android App and web GIS portal **to refine the prediction** with citizen centric inputs

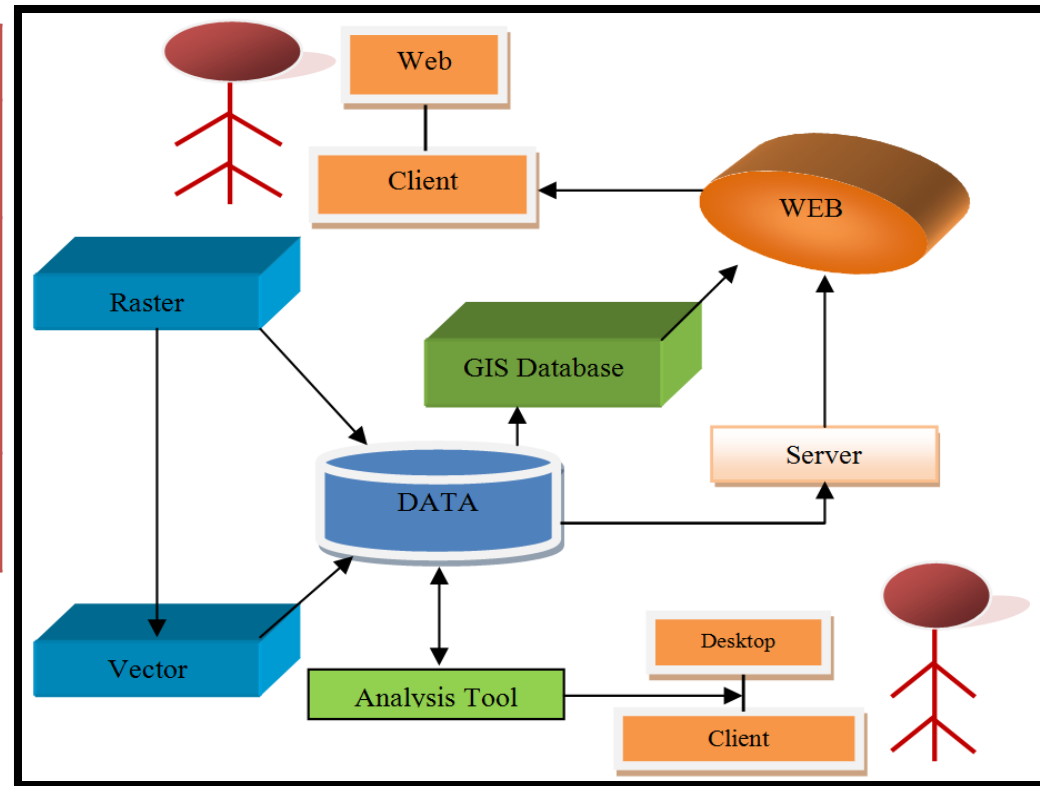
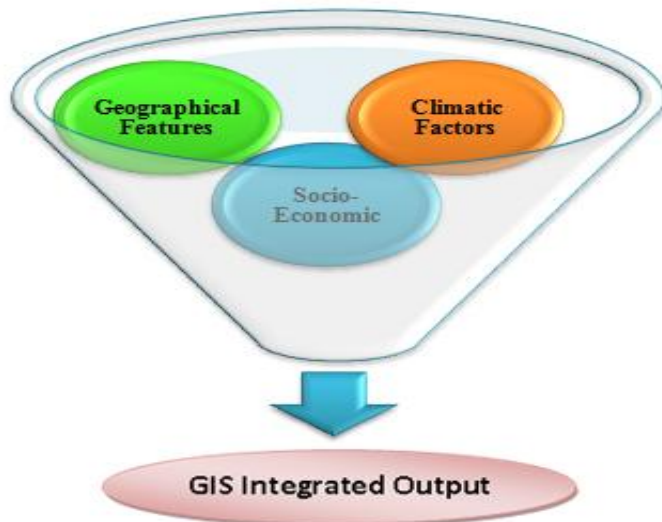
5

- To have an **efficient information dissemination system** & to have real time updation of forest fire data

# Integrated mapping: fire hotspot identification

- GIS is a **principal tool in fire mapping**, helps with **quick retrieval of information** and map generation to highlight hotspots of fire incidence.

| Data used                  | Attributes                       | Rationale                           |
|----------------------------|----------------------------------|-------------------------------------|
| <b>MODIS</b>               | Forest fire detection            | 36 spectral bands                   |
| <b>ASTER-DEM from USGS</b> | Topography (elevation and slope) | 30 m spatial resolution with 95% CI |
| <b>SPOT4</b>               | Vegetation                       | 1 km resolution                     |



- Work is **union of 8+1 odd parameters**

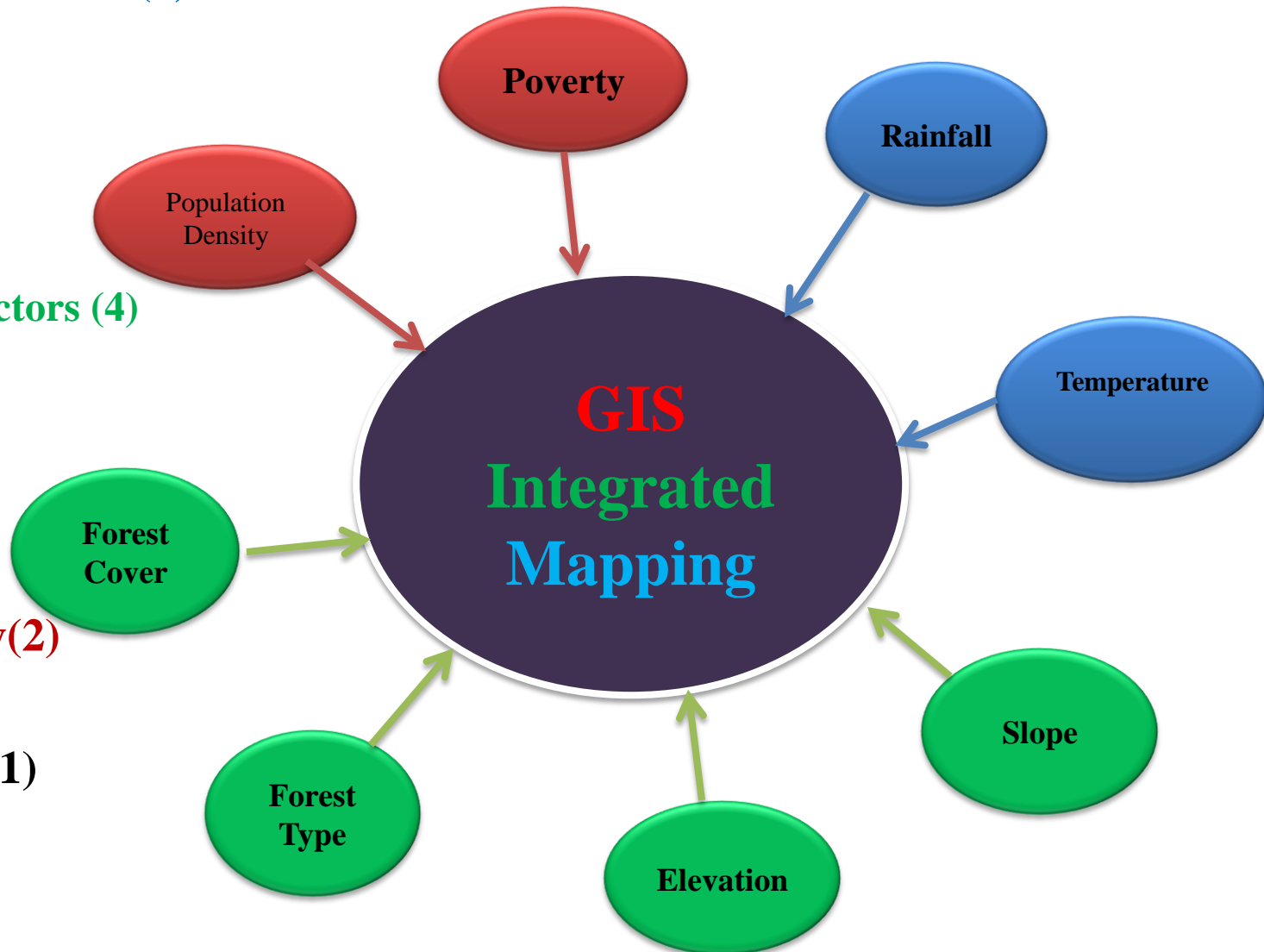
# Integrated mapping: COMPONENTS

## 1. Climatic-Env Factors (2)

## 2. Geographical Factors (4)

## 3. Socio-Economy(2)

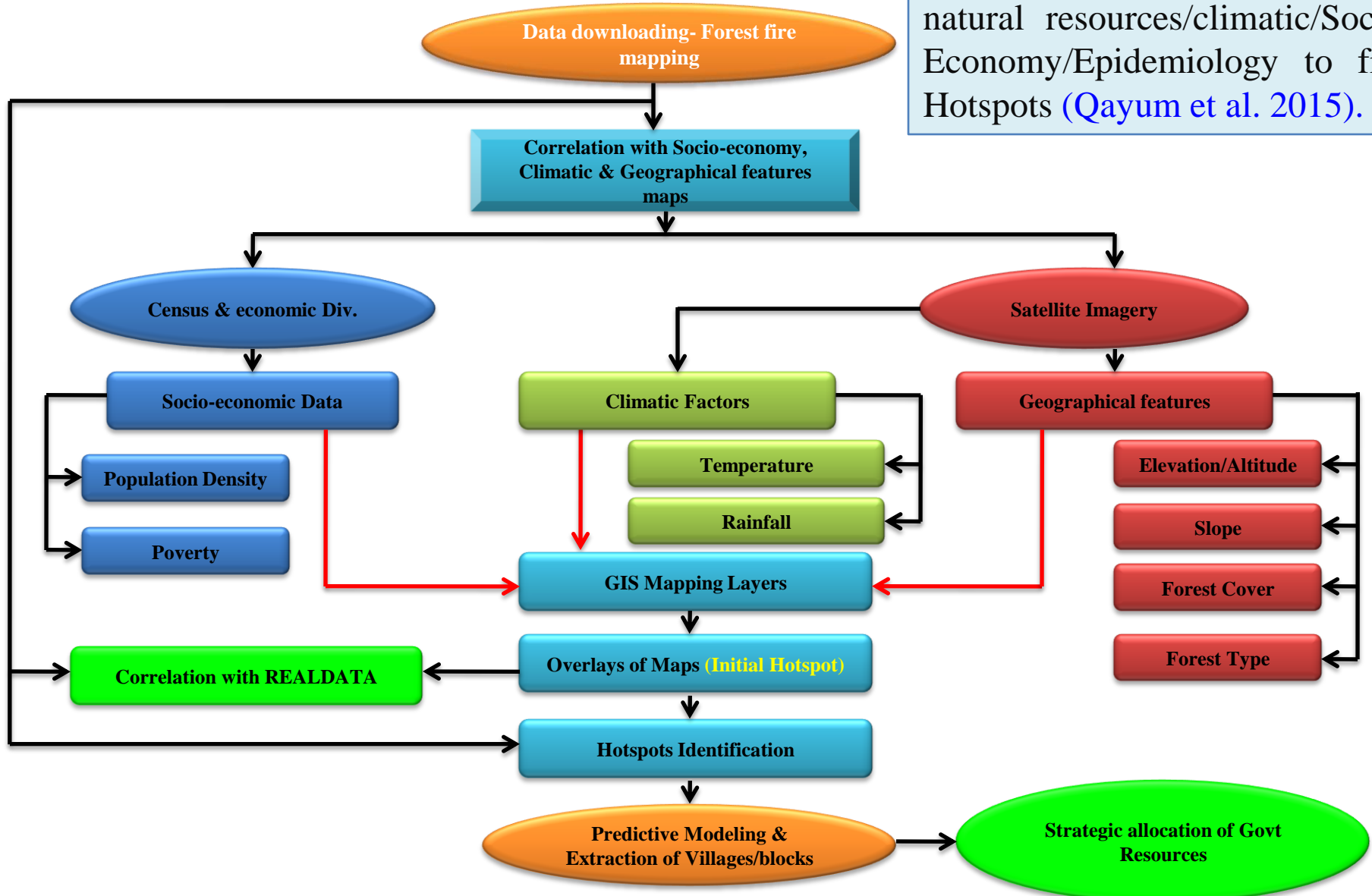
## 4. FSI Fire Data (1)



# Methodology: Forest Fire Hotspot Identification

## Schematic flowchart for PREDICTIVE MODELING

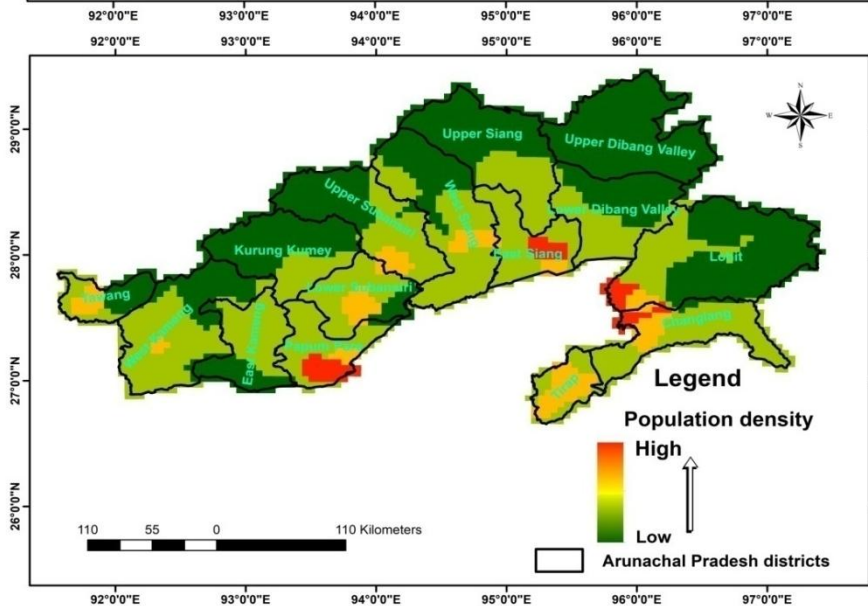
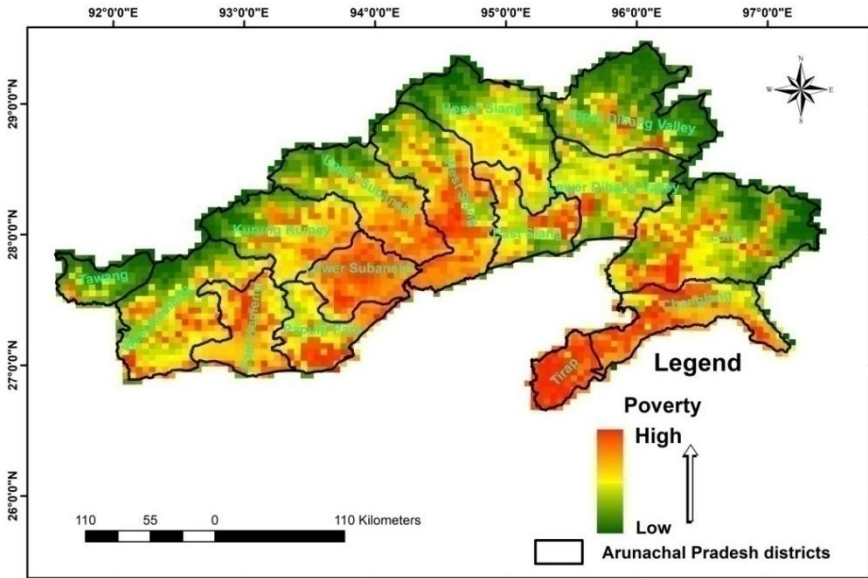
ArcGIS 10.1 was used to map natural resources/climatic/Socio-Economy/Epidemiology to find Hotspots (Qayum et al. 2015).



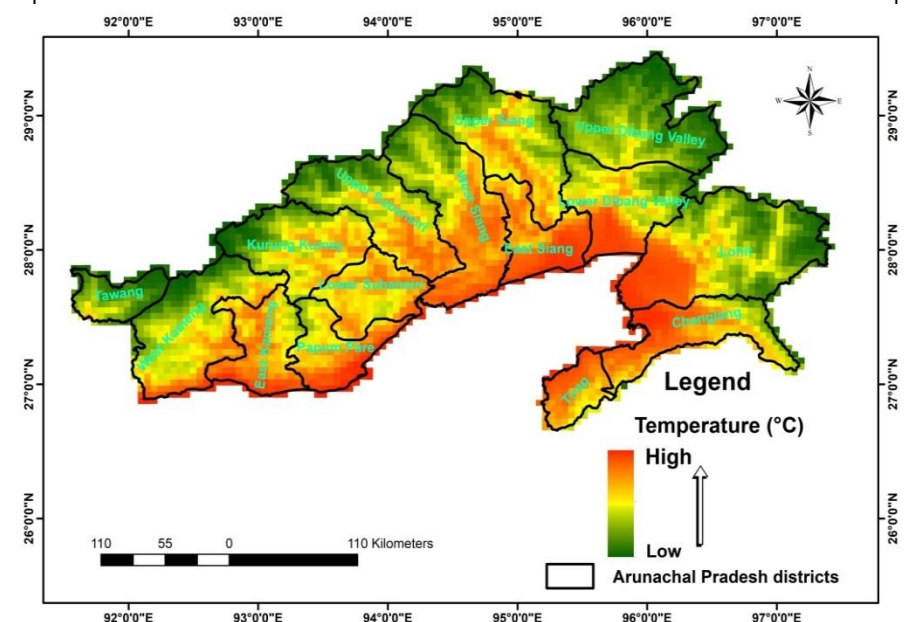
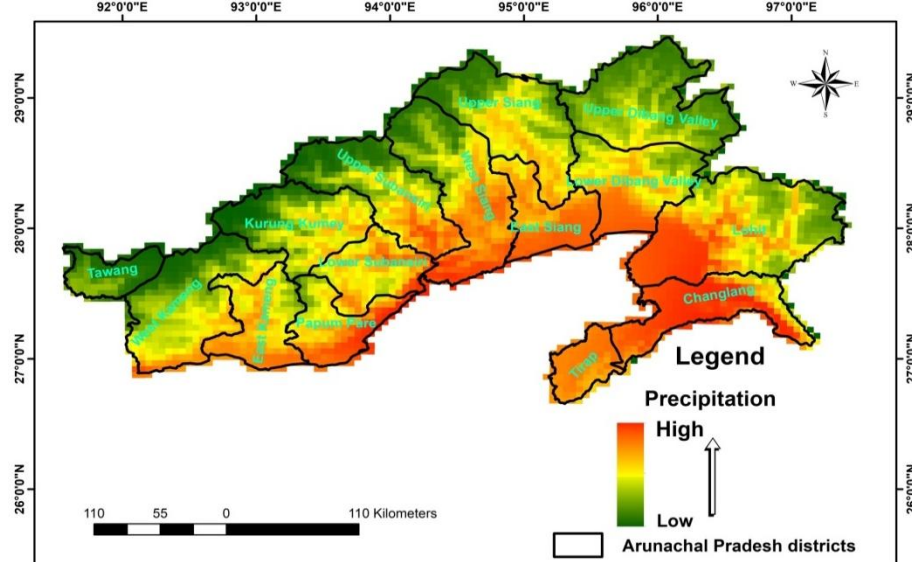


# RESULTS: Integrated Mapping

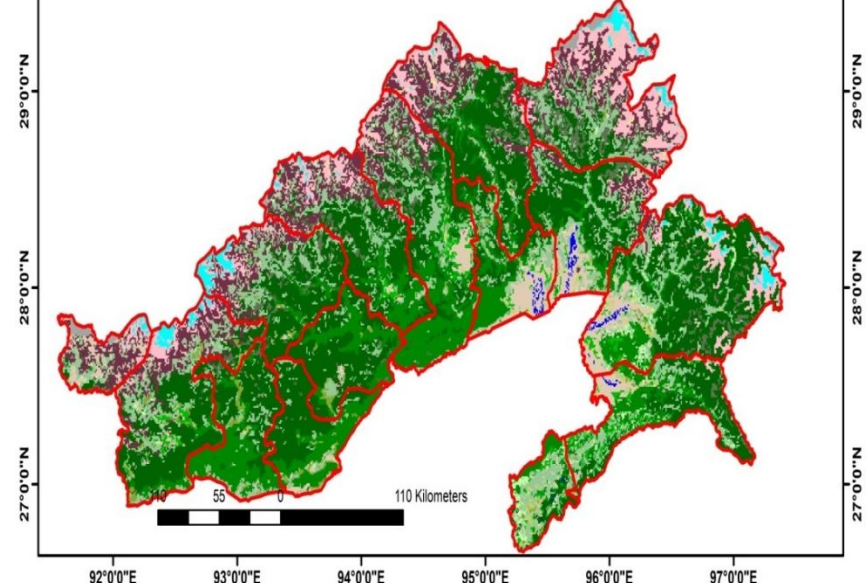
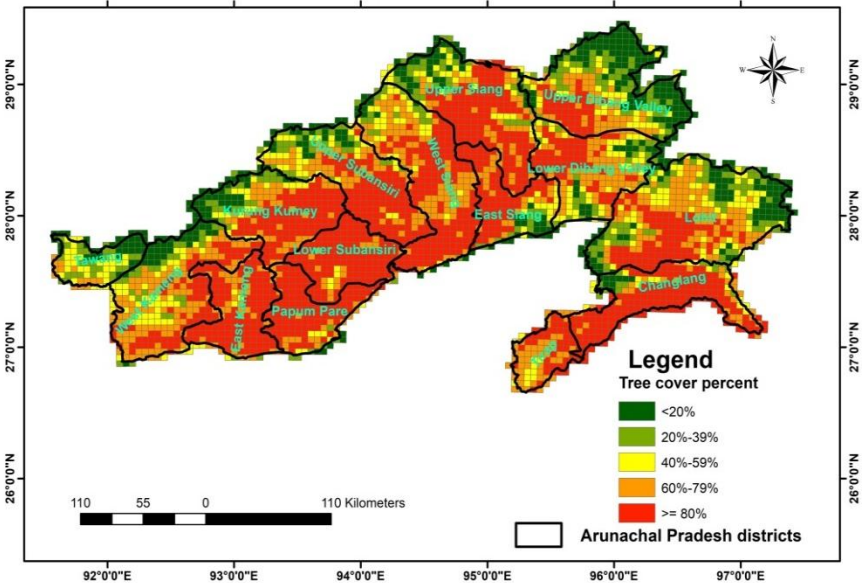
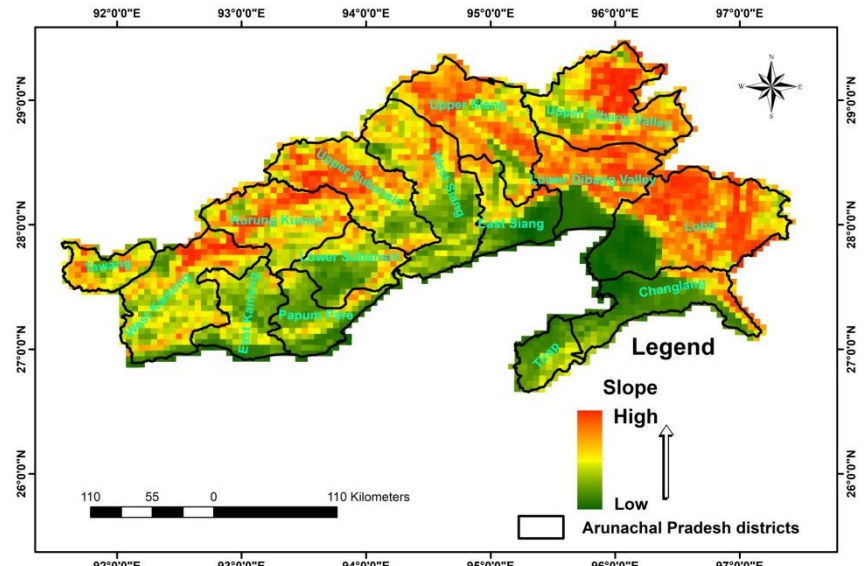
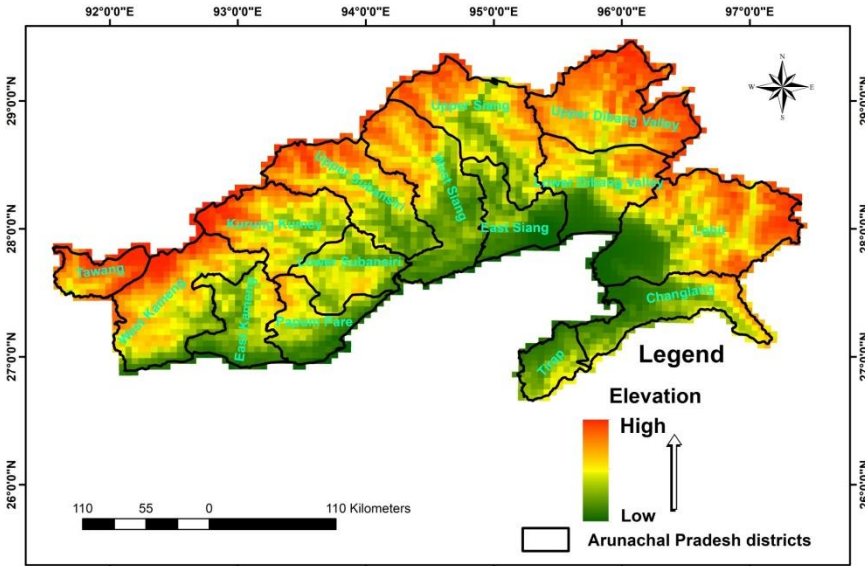
## Socio-Economy



## Climatic-Environmental



# RESULTS: Geographic Features



*Forest Cover*

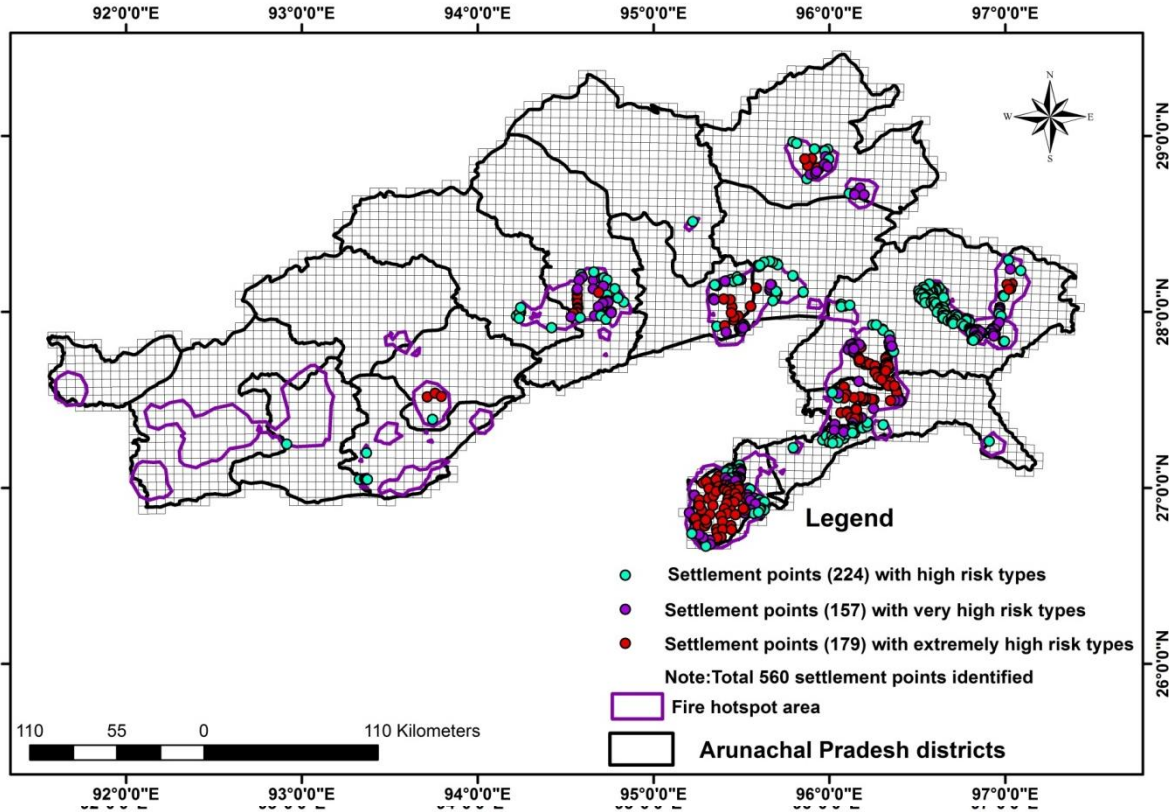
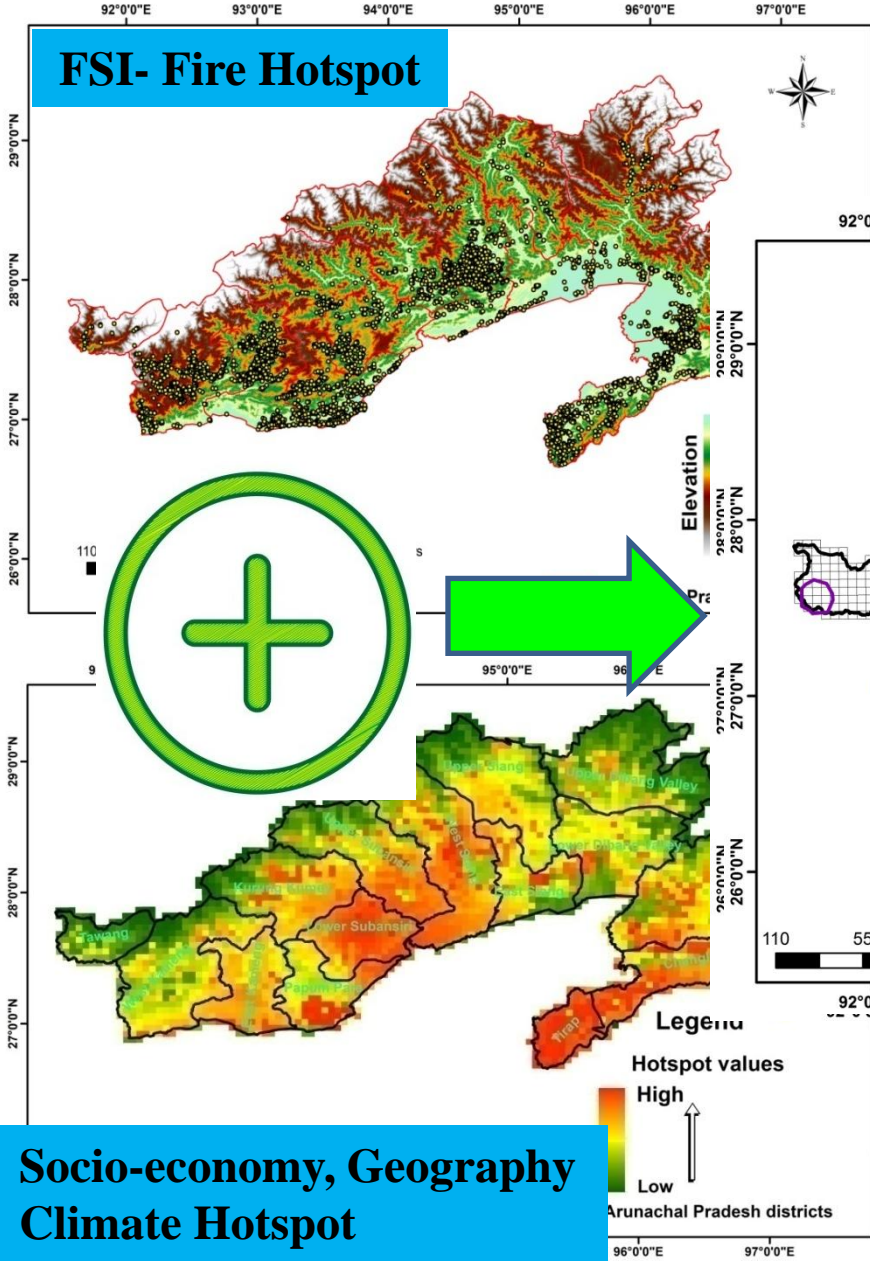
*Forest Type*



# RESULTS: Hotspots

## FSI- Fire Hotspot

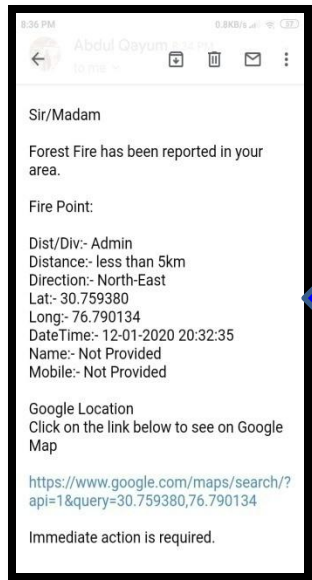
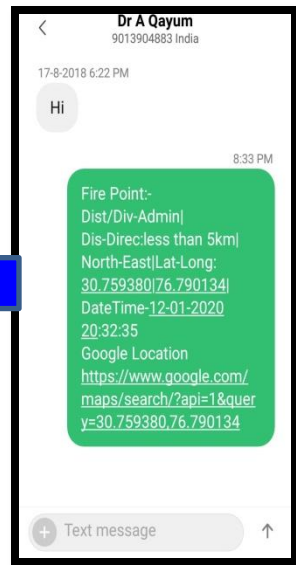
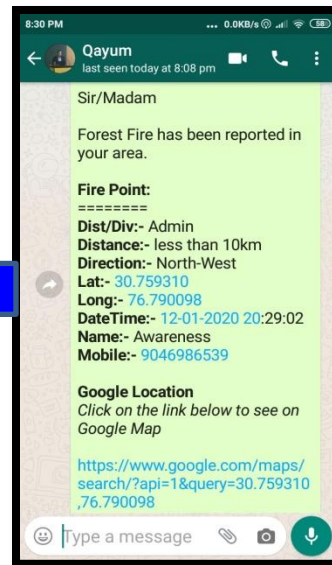
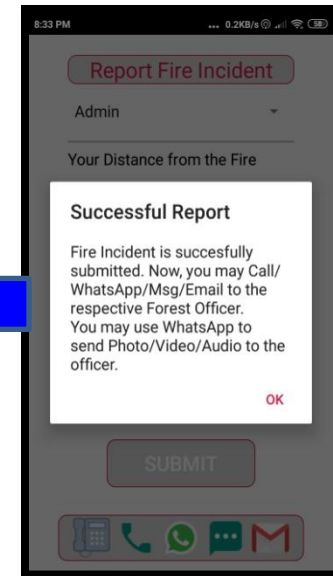
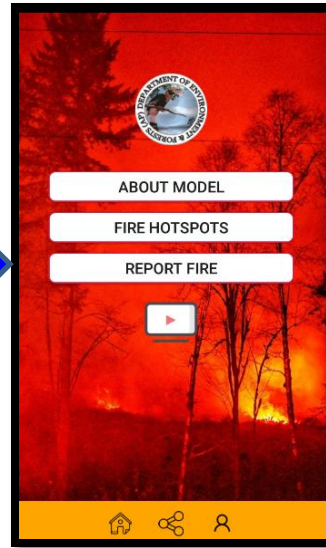
560villages/settlement unit out of 5258



Socio-economy, Geography  
Climate Hotspot

# Information Dissemination System

→ Mobile App (eForestFire)- Offline Mode & User Friendly





# Web GIS Portal

- For Real time updation
- Bird's eye view of state forest fire

<https://www.webgis.co.in/>

The screenshot shows the webgis.co.in website. The header is dark blue with the text 'FOREST FIRE ARUNACHAL PRADESH' in white and green. A navigation bar contains 'Home', 'About', and 'Download App' in a light blue rounded rectangle. The main content area is white with the heading 'FOREST FIRES'. Below this are three dark blue cards: 'GIS MAPS' (describing hotspot analysis from satellite data), 'FIRE EVENTS' (describing MODIS imagery fire points), and 'LIVE MAPS' (describing real-time fire reporting). Each card has a corresponding button: 'View Gallery', 'WebGIS', and 'Live Maps'. A watermark 'Activate Windows' is visible in the bottom right corner.

webgis.co.in

FOREST FIRE  
ARUNACHAL PRADESH

Home About Download App

FOREST FIRES

**GIS MAPS**

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[Live Maps](#)

Activate Windows

# Web GIS Portal

- Different Thematic Layers
- Live Maps
- Fire Data History

Forest Fire

Live Reporting of Forest Fire Events...  
71 views  
SHARE

User Responses

- Admin
- Along
- Shergaon
- Banderdewa
- Hapoli
- Tawang
- \*Select District/Division
- Select District/Division
- Bomdila
- HQ Office
- Itanagar
- Kamlang WL
- Namsai
- Seppa

Map data ©2020 Terms 20 km

Not secure 35.200.253.234

Apps Bookmarks The Social Science I... MyStart by IncrediB... Prep to IX Google Search MapLibrary

Surface Temperature

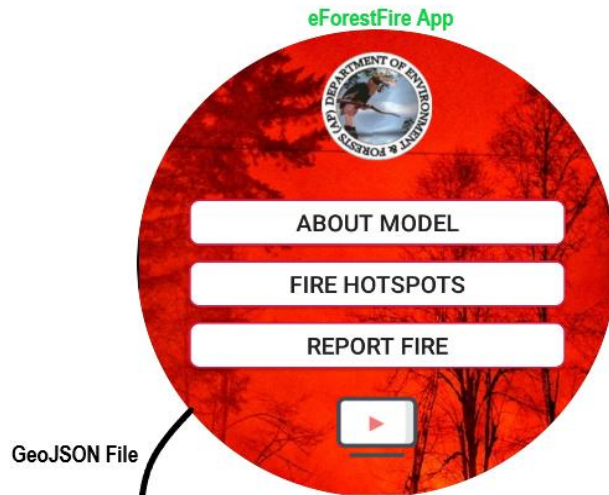
- Arunachal Settlements
- Live Reported Fire
- Fire Event 2017-18
- Arunachal District
- Drawn Items

29.34866 · 97.98157  
50 mi

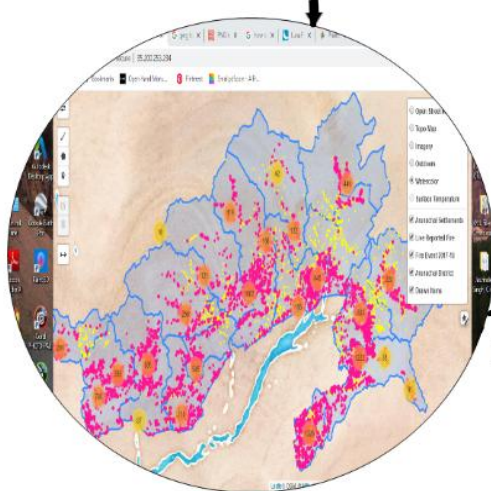
Leaflet | OSM, © Miller Mountain LLC, Tiles © Esri — Source: Esri, iCubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, UPR-EGP, and the GIS User Community



# Real Time Updation of Database linked to the project

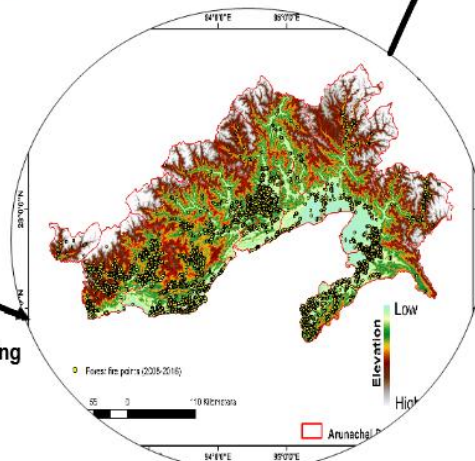


Geo.JSON File



Web Portal

Data Refining



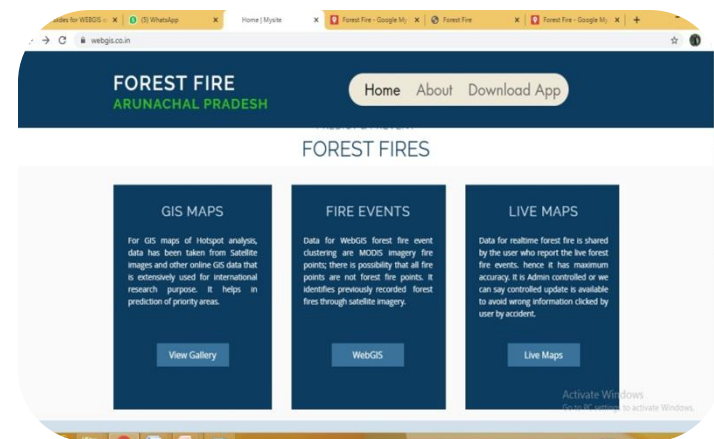
GIS Mapping

Fire Hotspots

PREDICTION

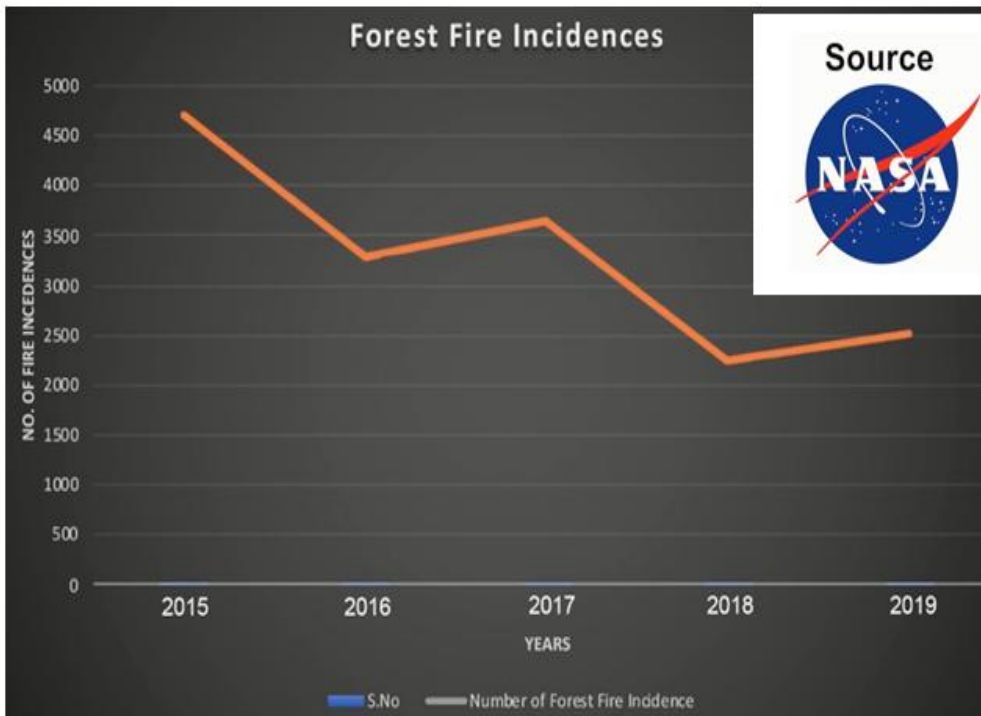
| List of villages/settlement for 'Extremely High' to High Risk' of Forest Fire Incidence (Total 560 out of 5285 Villages/settlement points) |                  |   |                   |  |                  |
|--|------------------|---|-------------------|--|------------------|
| List of Village with High Risk for Forest Fire   |                  | List of Village with Very High Risk for Forest Fire |                   | List of Village with Extreme High Risk for Forest Fire |                  |
| Sr. No.  | List of Villages | Sr. No.   | List of Villages  | Sr. No.  | List of Villages |
| 1  | Mimesipo         | 1   | Lelung            | 1  | Kamja            |
| 2  | Dapui            | 2   | Rushi             | 2  | Karhe            |
| 3  | Mebu             | 3   | Longper           | 3  | Clob             |
| 4  | Aimiy            | 4   | Biyakul           | 4  | Kurhe            |
| 5  | Namphor          | 5   | Nanaduna          | 5  | Brochu           |
| 6  | PASIGHAI         | 6   | Yadang            | 6  | Pahi             |
| 7  | Tapat            | 7   | Liruk             | 7  | Langbin          |
| 8  | Dambuk           | 8   | Belu              | 8  | Tuphi            |
| 9  | Lupung           | 9   | Kupu Rijo         | 9  | Manchi           |
| 10   | Lebung           | 10  | Siluk (Lukku)     | 10   | Manthi           |
| 11   | Moka             | 11  | Mebu              | 11   | Cab              |
| 12   | Nigelik Patang   | 12  | Aieng             | 12   | Topo             |
| 13   | Amji             | 13  | Mendi Shik Korang | 13   | Tilul            |
| 14   | Akoko            | 14  | Iliai             | 14   | Iliai            |
| 15   | Sending          | 15  | Tuling            | 15   | Tuling           |
| 16   | Sindika          | 16  | Dueli             | 16   | Dueli            |
| 17   | Nizamghat        | 17  | Nizamghat         | 17   | Nizamghat        |
| 18   | Bomjar MISHMI    | 18  | Bomjar MISHMI     | 18   | Bomjar MISHMI    |
| 19   | Tubur Patang     | 19  | Tubur Patang      | 19   | Tubur Patang     |

Villages with High Risk of Forest Fire



# Benefits & Outcome

- As per report from NASA, Forest fire Incidences were **31 % less** in comparison of period before the start of project



Abdul Qayum <qayum.iitk@gmail.com>

## Fw: NASA FIRMS: Your Download Request for 2019

1 message

firoz ahmad <adfiroz@yahoo.com>  
Reply-To: firoz ahmad <adfiroz@yahoo.com>  
To: Abdul Qayum <qayum.iitk@gmail.com>

9 December 2019 at 16:12

----- Forwarded message -----

**From:** NASA FIRMS <noreply@modaps.eosdis.nasa.gov>  
**To:** "adfiroz@yahoo.com" <adfiroz@yahoo.com>  
**Sent:** Saturday, 7 December 2019, 11:40:56 GMT+3  
**Subject:** NASA FIRMS: Your Download Request

Greetings!

This is to confirm your recent request for NASA FIRMS Archive Download request. The details of your request are as follows:

**Download Id(s):** 90956 90957  
**Data Source:** MODIS C6 & VIIRS  
**Area of Interest:** India  
**Date Range:** 2019-01-01 to 2019-12-07  
**Data Format:** .shp  
**Request Time:** 2019-12-07 08:40:54

Once we process your request, we will send you an email with instructions on how to download the data. You can check the status of your request at any time with the [NASA FIRMS Archive Download](#).

**Submitted an incorrect request?** Visit the [archive download](#) to view your current requests and then click on 'Delete this request?' link for this request. *Please note that once your request starts processing, you cannot cancel it.*

If you have any questions or comments, please contact us at [support@earthdata.nasa.gov](mailto:support@earthdata.nasa.gov).

Thank you,  
NASA FIRMS Team



# Benefits & Outcome

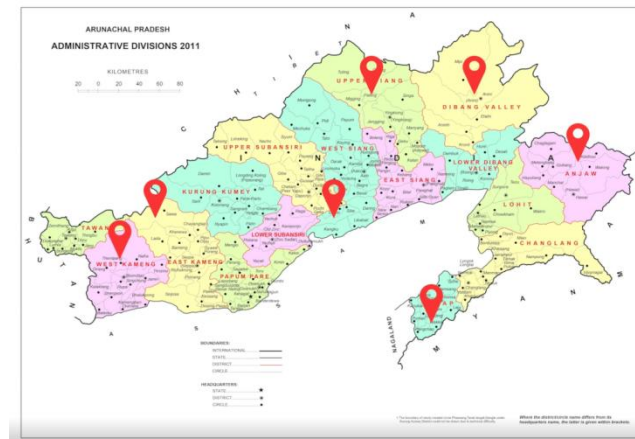
- Right **DECISION**, at right **TIME** & right **PLACE**
- **Strategic Allocation** of Govt resources
- **Efficiency** gone up due to Citizen centric approach
- Speedy **Service Delivery** and **Cost Minimization**
- Meaningful **People Participation- eGovernance**



People Participation



Engaging People  
Promote e-Governance



User Friendly App

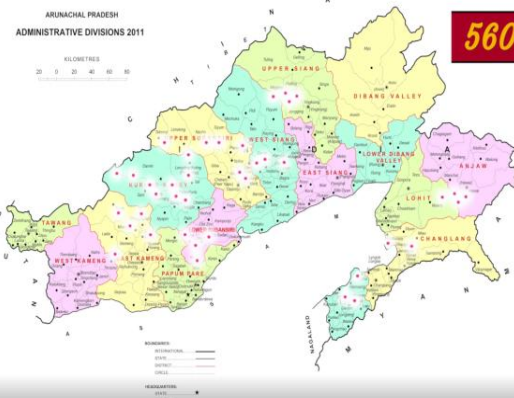
for strategic allocation of limited Government Resources.

# Benefits & Outcome


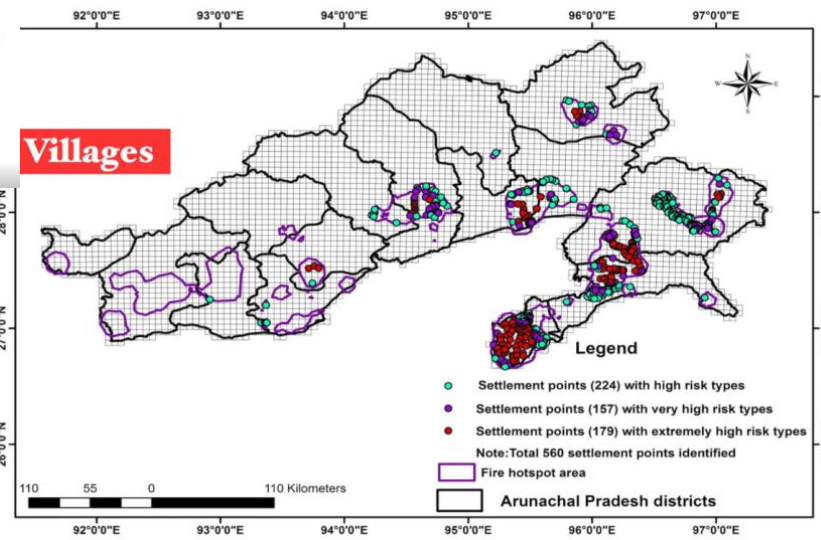
- Emphasis upon **Preventive Mechanism: Early Warning System**
- Hit on ‘**Jhum Cultivation**’ practices
- Predicts list of **560** priority villages
- Saved tremendous loss to **bio-diversity**

**flora-fauna, human life &** public

property



Barapton  
Kalamna  
Mepumna  
Tamegam  
Langkon  
Phrihagam  
Lang Hagan  
Dahmna  
Dingliang  
Duiiang



for strategic allocation of limited Government Resources,  
which ultimately leads to an early warning system.

Blaze or Flame we lose so much,  
But our lives remain the same.

We must learn from what is broken,  
Predict, Prevent & Grow Again.



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**THANK YOU**

