Geospatial Platform for Disaster Management

Santanu Dutta
Types Of Disaster

- Flood
- Landslide
- Lightning
- Cyclone
- Earthquake
- Drought
- Fire/Explosion
Life Cycle of Disaster Management and Application

Weather Forecasting
- Climate condition Analysis
- Flood Inundation Mapping During Flood
- Identify affected communities

Risk Assessment
- Identifying High Risk prone areas
- Visualize the scope of disaster
- Land Use and Land Cover mapping
- Human, Livestock, Crops and buildings at higher risk

Disaster Monitoring and Evaluation
- Damage Assessment
- Evacuation routes and Alternate / Best route for sending relief
- Availability of shelter facilities

Pre-Disaster Planning
- Relief shelter mapping
- Emergency Building mapping
- The risk of event & vulnerabilities
- Possible Impact of the event

PREPAREDNESS
- Prevention
- Monitoring
- Mitigation

RESPONSE

REHABILITATION
- Reconstruction
- Development

POST DISASTER

PREDISASTER

DURING DISASTER
Geo-spatial Disaster Management Platform

The key objective is to provide a **Common Operational Platform** for:

- Integration of MIS & GIS.
- Perform **Advanced Geospatial Modeling**
- Generate **Early Warning Alerts**
- Integrating **Live Feeds** from disparate sources.
- **Empowering Departments & Stakeholders for collaborative decision making**
- **Connecting** Government, Citizen and other Stakeholders
- **Enhancing overall efficiency and effectiveness of Disaster Management & Emergency Response**
Integrating all Type and Format of Geospatial Data . . . Making Them Directly Usable as Services

- CAD / BIM
- Vector
- Imagery
- Lidar / Point Cloud
- Terrain
- Tabular
- Unstructured
- Voxels
- Terrain
- 3D
- Big Data
- CAD / BIM
- Real-Time (IoT)
- Multidimensional Data
- Web Maps, Layers & 3D Scenes

DMA Geospatial Platform
Have a collaborative Platform to meet all GIS requirements! During any emergency...

Transportation  Urban  Public Safety  Governance  Healthcare  Communication  Utilities

Seamless Information Sharing

Disaster Management

Enabling
- Content Management
- Access
- Sharing
- Collaboration
- Apps

Maps  Apps  Data  Services  Models  Workflows

Network Bus

Transportation  PWD  Public Safety HLS / Police  Property Land Records  Health Facilities Health Deptt  Demography RGI  Toposheets Sol  Imagery NRSC/AGOL  Sensor / Weather IMD

DMA EOC
One System for Disaster — Organizations Are Increasingly Collaborating

**Planning**
- Key Department Systems & Feeds
  - DMS (Incidents, Resources, Shelters), Weather, Live Traffic, Cameras

**Operation**
- Authoritative “GIS” Data

**Server**
- Commercially Available Online Content & Services

**Portal**
- Desktop, Web, Device

**Monitoring**
- Emergency management team
  - Active Directory, SAML

**Decision Management**
- GIS Data

*Source: Esri India*
ArcGIS Includes Ready-to-Use Content
Base maps, Demography, Street Maps, Elevation, Topography, Imagery

• Millions of Maps, Layers and Datasets
• Billions of Requests Daily

Global Geographic Data . . . About Everything
Integrated Global Live Feeds For Early Warning

ArcGIS Living Atlas - Indicators of the Planet

- **Air Quality**
  - Today: 969 locations with poor air quality
  - Increased 14.97% in 24 hours

- **Drought**
  - This week: 18.9% of agricultural areas
  - Decreased 132,444 sq km in 24 hours

- **Wildfire**
  - Today: 56,353 thermal detections
  - Decreased 7,186 fires in 24 hours

- **Conservation**
  - This month: 54,734,053 sq km land & ocean area protected
  - Increased 327,537 sq km in a month

- **Deforestation**
  - Last week: 2,172 sq km forested area lost
  - 50,160 sq km lost this year

- **COVID-19 Cases**
  - Last 24 hrs: 12,910,357 confirmed cases
  - 14 day trend is increasing

- **Earthquakes**
  - This week: 86 major earthquakes
  - 5.7 magnitude, largest event this week

- **Cyclones**
  - Today: 1 active storms
  - 34 storms this year

- **Arctic Sea Ice**
  - Last month: -10.03% of normal extent
  - #3 lowest June since 1979

- **Coral Bleaching**
  - This week: 25 locations at risk of bleaching
  - Increased 5 locations in a month

- **Global Temperatures**
  - Last week: 0.95°C above 20th Century average
  - #1 warmest May since 1880

- **Women in Parliament**
  - Last month: 25.0% of National representatives
  - Increased 207 members in a year

- **Sea Level Rise**
  - This week: 2.96 mm average global increase
  - Decreased 1.96 mm from a year ago

- **El Niño**
  - This month: 0.28 ENSO Index
  - Neutral conditions in the Pacific

- **Carbon Dioxide**
  - Last month: 412.88 parts per million
  - Increased 2.77 ppm from a year ago

- **Ocean Health**
  - This year: 70.58 global average score
  - Decreased 0.09 points in a year

- **Piracy**
  - This month: 8 events that threatened shipping
  - Decreased 26 events in a month

- **Armed Conflict**
  - This week: 3,432 events
  - Increased 1,443 events in a week
Readily configurable, Device independent, Emergency Support Function

Emergency Management Activities

Mitigation
- Identify and analyze hazards, threats, and risks
- Deliver mitigation projects & outreach campaigns
- Hazard maps, grant status reports

Preparedness
- Create plans, train responders, and deploy scarce resources effectively
- Response plans, evacuation route plans

Response
- Command, control, communication, and coordinate during incidents and events
- Hazard maps, status maps, dashboards

Recovery
- Return a community to functioning state after an event as quickly as possible
- Funding dashboards, status maps

Emergency Management Agency Business Unit Gallery
Configurable Flood and other Disaster Management Tools
Spatial Analysis For Hazard Impact Assessment

Modeling & Scripting
Data Engineering
Geo-Enrichment
Visualization & Exploration
Spatial Statistics
Route Optimization
Predictive Modeling
Kernel Density with Barriers
Flood Modelling
Image Classification
Suitability Modeler
Machine Learning & AI
Big Data Analytics
2000+ Tools
Data Engineering
Voxels
Spatial Analysis
Colocation
Visualization & Exploration
3D Analysis For Hazard Impact Assessment

Visual Variables
- Edge Rendering
- Smart Mapping

BIM

Rich 3D Symbols
- Textures

3D Mobile Apps
- Urban

Massive Point Clouds
- Lidar

Augmented Reality / VR
- 3D Mesh

Global Scenes
- Mobile

I3S OGC Community Standard
Common Operational Picture (Operation Dashboard)


GIS has become a foundational, mission-critical technology for homeland security and emergency preparedness and response missions. The creation of the web map format coupled with the deployment of web GIS, was a game changer. Now, homeland security and emergency management professionals have unprecedented capabilities to obtain, share, make sense of, and use information in increasingly more effective ways.

Bring together a common view of the systems and resources you manage. Monitor real-time data feeds for large-scale...
To know more, visit us at:

www.esri.in

Or, write to us at:

info@esri.in