HYDROMET MODERNIZATION OF NEPAL

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South Asia Hydromet Forum
Geneva 18-20 September, 2018
A tiny Himalayan Country lies between China and India.
Area: 147,181 Sq. km
Population 29.3 M

Major Disasters:
Flooding, landslide, lightening, extreme weather (hailstorm, rainstorm, wind storm, drought, snow storm, persistent fog, cold wave, heat wave) GLOF, avalanche, epidemics etc.
Death: ~500/year
Loss: USD 20 M/year
3-days weather forecast using WRF with global model data.

Aviation weather services 1 Int. Airport and 6 Domestic Airport,

Agromet services of 25 districts out of 77

Flood early warning system is major rivers using rainfall runoff model as well as upstream downstream linkages

GLOF Early Warning System (2 major glacier lakes),

Insurance certification

Hydromet data collection, Processing & Storage and Dissemination

400 Meteorological and 180 Hydrological Observation Networks
Hydromet Modernization Investments or Plans

A Pilot Program for Climate Resilience (PPCR) is under Implementation:

Building Resilience to Climate Related Hazard

Project implementation start Date: 01 March, 2013

Project Effectiveness Date: 31st December 2019

Financing Source

Strategic Climate Fund Grant: 16 Million
Strategic Climate Fund Loan: 15 Million

Administered by

World Bank: US$ 31.0 Million
Counter Fund: About US$ 6 Million
Hydromet Modernization Investments or Plans

- Institutional Strengthening, Capacity Building and Sustainability of DHM
- Modernization of the observation networks and forecasting
- Building Resilience to Climate Related Hazard
- Enhancement of the Service Delivery System of DHM
- Development of Agriculture Management Information System (AMIS)
PROPOSED RADAR SITES (AFTER SURVEYING) THROUGHOUT NEPAL

Legend
- Udayapurgadhi
- Ribdikot, Palpa
- Gurase Tower, Surtket

Value
- High: 8753.09
- Low: 59

Prepared By: Er. Kapil Gnow
88 AUTOMATIC WEATHER STATIONS (AWS)
Upgrade of Snow & Glacier Monitoring Network

<table>
<thead>
<tr>
<th>Station name</th>
<th>Elevation (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tseram</td>
<td>3892</td>
</tr>
<tr>
<td>Dingboche</td>
<td>4411</td>
</tr>
<tr>
<td>Samdo</td>
<td>3830</td>
</tr>
<tr>
<td>Machhapuchchhre</td>
<td>3677</td>
</tr>
<tr>
<td>Panchamukhi</td>
<td>4155</td>
</tr>
</tbody>
</table>
Enable real-time and accurate registering and monitoring of individual cloud to ground (CG) and Cloud to Cloud (CC) lightening strokes induced by thunderstorms

Enable safety services by real-time availability of lightening information

9 Stations - completed activity
LIGHTING DETECTION STATIONS

GPS Antenna

Field Antenna

Kathmandu Airport

Simara Airport

Dhangadhi, Attaria

Sensor Processing Unit at each station site
RADIOSONDE AT KIRTIPUR

- Upper Air Station
- Measures wind, humidity, pressure, temperature, at different atmospheric layers
- Helps to increase accuracy of Meso-scale forecast
- Enhance safety services by realtime availability of upper air information
HIGH POWER COMPUTER (HPC) FOR NUMERICAL WEATHER PREDICTION

- Minimum 512 core
- RAM 128 GB
- Storage system 32 TB expandable up to 64 TB

**Calibration laboratory**

- To calibrate meteorological instruments such as temperature, humidity, pressure etc.
HIGH RESOLUTION LOCAL AREA NUMERICAL WEATHER PREDICTION SYSTEM

• To provide short term weather forecast by establishing an operational High Resolution NWP system

• To provide quantitative precipitation forecast (QPF) for flood forecasting thereby Increasing lead time for flood warning.
REMOTE SENSING AND GIS LABORATORY

- Already Established
- ERDAS Pro 2015 - image processing
- Intergraph GeoMedia Pro 2015 - GIS software
TV PRESENTATION SYSTEM AT DHM

• Weather Broadcast
• Meteorologists will present the weather forecast
• Timely information on risk involved with extreme hydro-
  Meteorological phenomena which will help for preparedness
Optimal network for snow and glacier monitoring sites in Nepal (23 stations)
Proposed DHM Office Building (60% complete)
SERVICE-DELIVERY APPROACH TOWARD USERS (CURRENT AND EXPECTED)

www.mfd.gov.np

www.hydrology.gov.np

www.dhm.gov.np

Operational service 24/7

Tel: 977-1-4486869, 4113191

Toll Free 1155

Notice Board Service: 1618-0707-33333
Role of private sector and/or non-governmental entities

- No significant role from the Private Entity but have shown willingness to support the operational cost.
- Non-governmental agencies have also supporting to automate the observational networks.
- They are mostly engaging with the community (awareness, logistic support, EWS).
Challenges, lessons learned, technology and innovations

- Sustainability (manpower, operating cost, maintenance, capacity building)
- Need highly skilled manpower for such modernization (preparation of specification, bid document, evaluation, training etc.)
- Not enough bidders for specific packages.
- Activities are linked one after another, therefore when designing Project, this should be considered.
Current engagement and opportunities for regional activities

Getting Some Support from

- Finish Meteorological Agency
- RIMES (Regional Integrated Multi-Hazard EWS)
- ICIMOD
- ADPC, Bangkok
- SAARC (SAARC STORM)
- JMA, CMA
- WMO
- WB
- BIMSTEC (Weather and Climate)
Thank you for your attention.