Regional Stakeholder Consultation on Climate Services for the Third Pole Region
Jaipur, Rajasthan, India
9-11 March 2016

Sectoral Breakout Groups
Session VI, 10 March 2016

Development of climate services for the Energy sector

Product/Service:
Climate Services for Hydro Power Sector in Eastern Bhutan

Geographic scope:
Eastern Bhutan (Trashiyangtse District)

Product Description:

- **Quality controlled, real time monitoring and forecast of water level, sediment and flow**
- **Early Warning information for expected and warning danger level**
- **Time series data of meteorological-hydrological variables**
- **Seasonal forecast of rainfall & temperature**
- **Contribution of snow and glacier in the flow**
- **Impact in the flow due to climate change and variability**

Objective:
Ensure safe, efficient and effective construction and operational phases of the hydropower plant

Beneficiaries:
Hydro- power Plant operator
Ministry concerned with Hydropower
Power Cooperation and Authorities
Construction Companies

Local Community (civil protection)

Benefits:

- **Efficient & effective operation of hydropower plants (SOPs)**
- **Increased flexibility in balancing power generation**
- **better risk management/assessment**
- **Increase resilience for preparedness of hazard downstream of dam**
- **Maximize generation of power (using the forecast data)**
- **Sustainable power supply (Augmentation wherever possible)**
- **Reduce the cost of maintenance of hydropower plants (Machine breakdown)**
- **Informed decision for energy investment (economical & political leaders)**

- **Contribute towards achieving the goal of self-sufficiency**

Outputs:

- **Precipitation time series including annual rainfall duration curve**
- **Soil moisture, River flow including duration curve, wind, temperature and humidity**
- **Soil type, Land use, Glacier volume and change data**
- **Sediment (composition of bed load) including sediment rating curve**
- **Landslide risk and prediction,**
- **Seasonal forecast of river run-off & sediment,**
- **Early warning systems**
- **Snow melt contributions**
- **Future climate scenarios of rainfall, water level/flow.**

Activities:

- **Downscale of reanalysis combined with in-situ observation for optimal interpolation**
- **Evaluate and apply the usefulness of remote sensing data**
- **Improve seasonal forecast (Regional and National Climate Outlook Forum products)**
- **Models assessment & development**
- **Analysis and use of global/downscaled models,**
- **Uncertainties and communication**

Inputs:

- **Capacity development of NHMS on climate services**
- **Capacity development of the hydropower sector on utility of the services**
- **Enhance analytical skills**
- **Climate projection model (RCM)**
- **River run-off, Sedimentation and Reservoir simulation models**
- **Historical data for verification of models**
- **Research on combination of different models/ information to have robust data**

Partners:

- **WMO**
- **NMHSs**
- **Regional Climate Centers**
- **ICIMOD, Nepal**
- **RIMES, Thailand**
- **Environmental Authorities**
- **Power Cooperation**
- **Electricity Authorities**
- **Decision makers , researchers, Regulators**
- **World climate research program**
- **IPCC**