

Perspective of Department of Hydrology and Meteorology (DHM) in Nepal

(Submitted by Rajendra P. Shrestha, Meteorological Forecasting Division)

Summary and Purpose of Document

Department of Hydrology and Meteorology has a mandate from Government of Nepal to monitor all the hydrological and meteorological activities in Nepal. The scope of work includes the monitoring of river hydrology, climate, agrometeorology, sediment, air quality, water quality, limnology, snow hydrology, glaciology, and wind and solar energy. General and aviation weather forecasts are the regular services provided by DHM. DHM is also look network of all type of observation station. As a member of the World Meteorological Organization (WMO), DHM contributes to the global exchange of meteorological data on a regular basis.

Introduction

Government of Nepal started hydrological and meteorological activities in an organized way in 1962. The activities were initiated as a section under the Department of Electricity. The section was subsequently transferred to the Department of Irrigation and was ultimately upgraded to Department status in 1988.

The Department of Hydrology and Meteorology (DHM) is an organization under the Ministry of Environment, Government of Nepal. The department with headquarters in Kathmandu has three basin offices: Karnali Basin Office in Surkhet, Narayani Basin Office in Pokhara and Kosi Basin Office in Dharan.

DHM actively participates in the programs of relevant international organizations, such as, the UNESCO's International Hydrological Program (IHP) and WMO's Operational Hydrology Program (OHP). In the past, DHM has hosted several regional and international workshops, symposia, seminars and meetings on different aspects of meteorology, hydrology, sediment, and snow hydrology. The department is also a focal point for the Intergovernmental Panel on Climate Change (IPCC) and for the meteorological activities of the South Asian Association for Regional Co-operation (SAARC). The International Civil Aviation Organization (ICAO) has recognized DHM as an authority to provide meteorological services for international flights.

The Principal Activities of DHM

Collect and disseminate hydrological and meteorological information for water resources, agriculture, energy, and other development activities.

Collect and disseminate hydrological and meteorological information for water resources, agriculture, energy, and other development activities.

Issue hydrological and meteorological forecasts for public, mountaineering expedition, civil aviation, and for the mitigation of natural disasters.

Conduct special studies required for the policy makers and for the development of hydrological and meteorological sciences in the region.

Promote relationship with national and international organizations in the field of hydrology and meteorology.

Organizational Setup

The Director General heads DHM. The present Organizational Chart has four divisions headed by Deputy Director Generals: Hydrology Division, Climatology Division, Meteorological Forecasting Division and Co-ordination Division.

Hydrology Division has four major sections: River Hydrology Section, Flood Forecasting Section, Snow and Glacier Hydrology Section and Sediment and Water Quality Section. Similarly, the sections under the Climatology Division include: Climatology Section, Agrometeorology Section, and Wind and Solar Energy Section & Data Section.

The Meteorological Forecasting Division has three main units: the Communication Unit, Aviation Unit, and General Weather Forecast Unit.

Co-ordination Division is primarily responsible for developing policies and co-coordinating all the departmental activities including financial and administrative matters. Along with the three basin offices, the Co-ordination Division provides support to the following sections: Data Management Section, Planning Section, Instrument Section, and Training Section.

Hydrology Division

Hydrology division is responsible for collecting hydrological (river, lake, flood, snow and glacier) data, studying and analyzing them, publishing analyzed data and report, and run and manage hydrological project across the country. There are different sections under Hydrology division. They are

River Hydrology Section This section is responsible for following activities:

Nation wide study and analyze water level and discharge of different rivers and lakes.

Hydrological data collected from the basin offices is processed, corrected and validated.

Management and supervision of current meter calibration.

Publication of hydrological data.

Providing guidelines for abovementioned jobs.

Snow and Glacier Hydrology Section

Responsible for monitoring snow and Glacier Lake, river etc. of High- Mountain by establishing monitoring stations.

Publication of collected and analyzed snow and snow hydrology related data.

Estimation of snowmelt from high mountain region.

Providing guidelines for abovementioned jobs.

Sediment and Water Quality Section

Responsible for monitoring sediment in different rivers.

Regular monitoring of existing sediment stations and analyzes the data collected from them.

Publication of collected and analyzed sediment data.

Providing guidelines for abovementioned jobs.

Flood Forecasting Section

Collection and processing of rainfall, water level and discharge data from different flood station during flood season from radio set.

Preparation of forecasting models from analyzing the abovementioned data.

River water level will be forecasted according to these models.

Establish different flood stations and manage them.

Preparing guidelines for flood forecasting and running models.

Climatology Division

Meteorology division is responsible for collecting meteorological (rainfall, lake, flood, snow and glacier) data, studying and analyzing them, publishing analyzed data and report, and run and manage hydrological project across the country.

Climatology Section

According to geographical Different aspects of agriculture, water resource, environment change etc.

Study and investigation about climate change.

Collection and publication of air pollution data.

Preparation of climatic atlas of Nepal.

Agromet Section
Preparation of crop calendar of different weather to help agriculture.

Wind and Solar Energy Section
Technical and Human Resources

DHM maintains nation-wide networks of 337 precipitation stations, 154 hydrometric stations, 20 sediment stations, 68 climatic stations, 22 agrometeorological stations, 9 synoptic stations and 6 Aero-synoptic stations. Data are made available to users through published reports, bulletins, and computer media outputs such as hard copies or diskettes. DHM publishes data on an annual basis. Most of the sections under DHM are equipped with personal computer systems connected through a network. The computers are not only used for database management but also for hydrological and meteorological modelling and analyses. Hydrological and meteorological

studies are produced as reports every year. Recent publications include the reports on low flow analyses, flood risk assessment and integrated database developments.

DHM is equipped with several data collection facilities based on different technologies, such as, wireless communication, meteor burst, radiosonde, Satellite Distribution Information System (SADIS), Weather Fax, and satellite picture receiving system. Wireless system connects Kathmandu to 54 stations spread over Nepal for climatic and hydrological data whereas the Global Telecommunication System (GTS) links DHM to the global meteorological community. DHM employs a staff of 238 personnel. Eighty-four staff are employed at field offices, 48 at basin offices, and 130 at the headquarters. Sixty professional staff and 143 technicians serving the department are supported by 34 administrative staff.

Objective

Collect and disseminate hydrological and meteorological information for water resources, agriculture, energy, and other development activities.

Issue hydrological and meteorological forecasts for public, mountaineering expedition, civil aviation, and for the mitigation of natural disasters.

Conduct special studies required for the policy makers and for the development of hydrological and meteorological sciences in the region.

Promote relationship with national and international organizations in the field of hydrology and meteorology.

Function

The Department of Hydrology and Meteorology (DHM) is a central governing organization under the Ministry of Environment, Science and Technology. The major functions of the department are as follows:

Collect and disseminate hydrological and meteorological information for water resources, agriculture, energy and other development activities.

Issue hydrological and meteorological forecasts for public, mountaineering expedition, civil aviation and for the mitigation of natural disasters.

Conduct special studies required for the policy makers and for the development of hydrological and meteorological sciences in the region.

Promote relationship with national and international organizations in the field of hydrology and meteorology.

International Relation

DHM actively participates in the programs of relevant international organizations, such as, the UNESCO's International Hydrological Program (IHP) and WMO's Operational Hydrology Program (OHP). In the past, DHM has hosted several regional and international workshops, symposia, seminars and meetings on different aspects of meteorology, hydrology, sediment, and snow hydrology. The department is also a focal point for the Intergovernmental Panel on Climate Change (IPCC) and for the meteorological activities of the South Asian Association for Regional Co-operation (SAARC). The International Civil Aviation Organization (ICAO) has recognized DHM as an authority to provide meteorological services for international flights.

Observation network

Surface Observation

Number of station: RBSN, RBCN, GSN, manned station and AWS

	RBSN	RBCN	GSN	Manned Station	AWS
Number	15	68	2	83	15

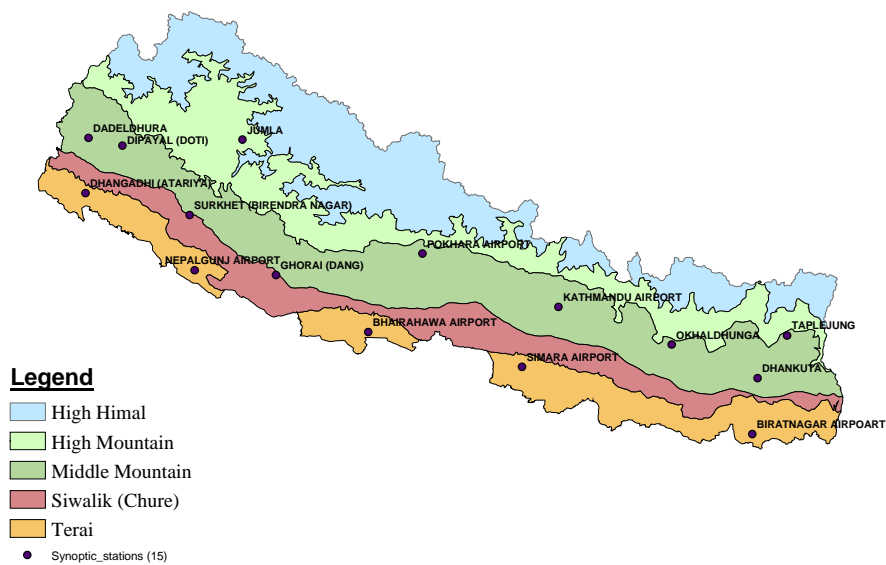


Fig: 1 Synoptic Station

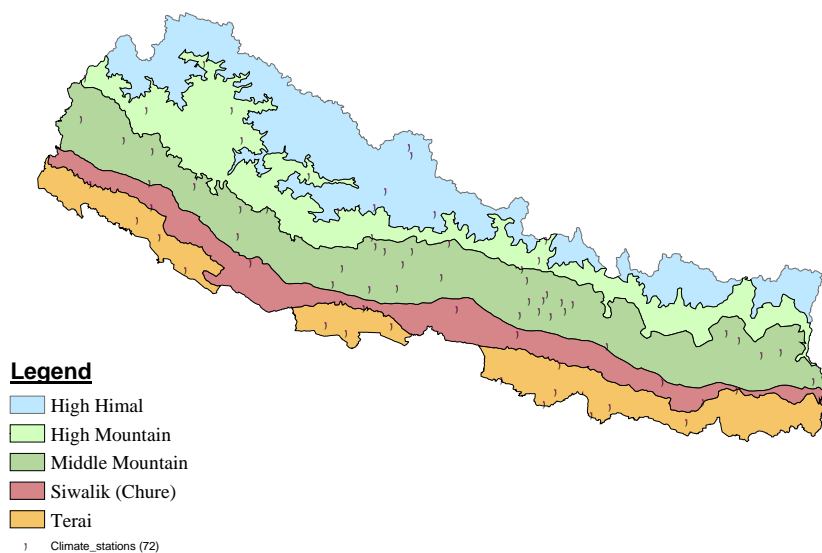


Fig: 2 Climatological Stations

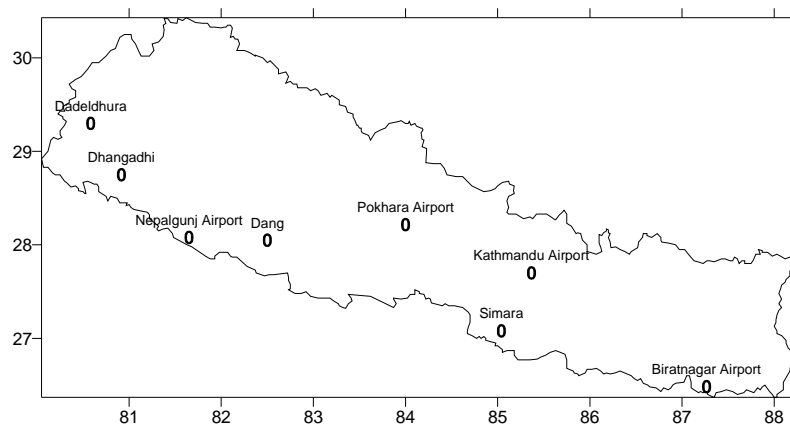


Fig: 3 Existing AWS Station

Time and Frequency of Observations

Synoptic observations at Kathmandu (capital) are made 8 times per day and 5 times per day in the rest of the stations. All observations are taken in WMO Standard time.

Data flow to users and archives

All synoptic observation data are transmitted to Meteorological Forecasting Division via Code Division Multiple access (CDMA) as well as HF Transceiver system (SSB) (Conventional) to analyze and weather forecasting. Data receiving from all stations are archived electronically and hard copy too. Necessary data are given for users on request. Temperature and rainfall data has also been posted in website.

Siting and Meta data:

Location of stations (Latitude, Longitude and Altitude) is routinely checked every year.

Instruments, Sensors, upgrade, maintenance instruments intercomparison and traceability:

Regular inspection of observing stations and maintenance of instruments are conducting, Apart from this, when problems are reported then maintenance would be conducted.

Quality assurance/quality control:

All data are checked for logical and statistical error at data processing centre as well as in real time.

Training:

There is no routinely training program although refreshing courses and training classes for new comers are conducted if necessary. During last five years we have conducted two training classes.

Future Plan:

- Installation of AWS in all synoptic stations during this year 2010 under SAARC_STORM project.
- One Doppler Weather Radar probably next year
- Two GPS Sonde Stations

- 16 telemetry rainfall stations will be installed in model basin.

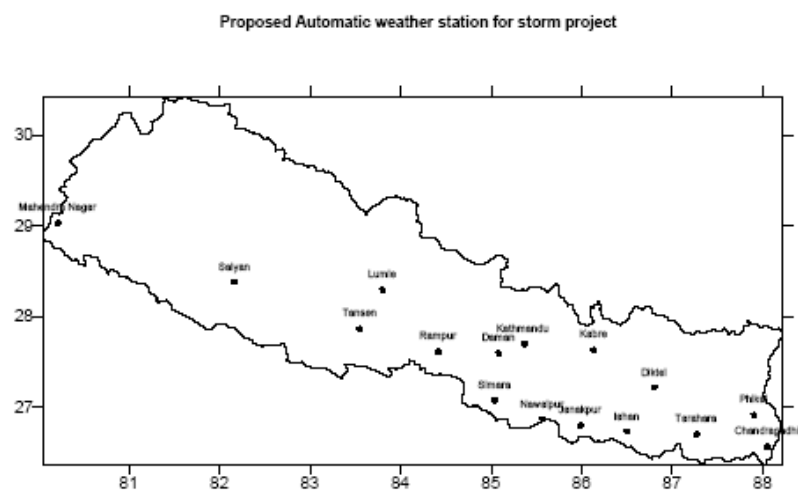


Fig. 1: Proposed locations of the AWS to be installed in Nepal under the SAARC STORM Programme.

Fig: 3

Proposed locations for the installation of AWS Network

S.N.	Name of station	Latitude	Longitude	Elevation (m)
1	Chandragadhi	26.57	88.05	120
2	Phikal	26.92	87.90	
3	Tarahara	26.70	87.27	
4	Diktel	27.22	86.80	
5	Ihan	26.73	86.50	138
6	Janakpur	26.80	85.98	93
7	Kabre	27.63	86.13	1755
8	Nawalpur	26.87	85.57	
9	Kathmandu	27.70	85.37	1320
10	Daman	27.60	85.08	2314
11	Simara	27.08	85.04	
12	Rampur	27.62	84.42	256
13	Lumle	28.30	83.80	1652
14	Tansen	27.87	83.55	1067
15	Salyan	28.38	82.17	1457
16	Mahendra Nagar	29.03	80.22	