

3rd GEOSS Asian Water Cycle Symposium
2-4 November, 2007
Beppu, Japan

CAPACITY BUILDING

(Bhutan)

Karma Chhophel
Hydro-meteorological Services
Thimphu: Bhutan

27 10 2007

Country Objectives

- Tokyo Meeting (2nd AWCS, January, 2006)
 - Development of a Flood Forecasting and Early Warning Systems
 - Needs
 - Material Resources
 - Strengthening of the Observational Network
 - Hardware and software support at the implementational level
 - Human Resources
 - Capacity building in enhanced observations, data integration, modeling and downscaling to local conditions

Issue Addressed

What Water Resource Management Issues are addressed?

- Floods including flash floods due to:
 - Glacial lakes burst (GLOF)
 - High intensity rainfall (especially during monsoon)
 - Landslide dam burst

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National Capacity Development Plan (2008-2012)

Sl.No.	Broad Field of Study	No. of Candidates	Duration
	PhD/Specialization		
1.	Effect of variability/change on water resources and its impact on hydropower development in Bhutan	1	3 years
	Masters	2	1.5 years
2.	Masters in Hydrology	1	1.5 years
3.	Masters in Meteorology	1	1.5 years
4.	Masters in Atmospheric Sciences	1	1.5 years
5.	Masters in ICT	1	1.5 years

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National Capacity Development Plan (2008-2012)

Sl.No.	Broad Field of Study	No. of Candidates	Duration
	Bachelors		
6.	BSc in Hydrology	1	3 years
7.	BSc in Meteorology	1	3 years
	PG Diploma		
8.	PGD in Operational Hydrology	1	1 year
9.	PGD in Meteorology		

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National Capacity Development Plan (2008-2012)

Sl.No.	Broad Field of Study	No. of Candidates	Duration
	Short Term Courses		
10.	Hydrological/Meteorological Database Management/Data Analysis	2	1-2 months
11.	Sediment Data Collection and Analysis	1	15-30 days
12.	Hydrological Meteorological Technician Training	2	15-30 days
13.	Weather/Flood Forecasting and Modeling	2	1-2 months
14.	Application of GIS/Remote Sensing in Water Resource Management	2	1-2 months

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National Capacity Development Plan (2008-2012)

Sl.No.	Broad Field of Study	No. of Candidates	Duration
	Short Term Courses		
15.	Radar Meteorology	2	1-2 months
16.	Satellite Data Processing, Interpretation and its Application in Flood Forecasting and Warning	2	1-2 months
17.	Training Course on Discharge Measurement of Large/Small Rivers with appropriate technology/methods	2	15-30 days
18.	Introduction to Water Resources Planning Using an Integrated Water Resources Management Approach	2	1-2 months

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Linkages Between National Capacity Plan and AWCI Plan

Sl.No.	National Plan	AWCI Plan	Collaborators
1.	Hydrological/Meteorological Database Management/Data Analysis	Data Integration Service, QC Service, Global Database	CEOP, GWSP
2.	Weather/Flood Forecasting and Modeling	Flood Inundation Modeling, Loss Estimation, Rainfall Downscaling and Forecast, Mathematical Modeling and Training	UNU, MRC

Linkages Between National Capacity Plan and AWCI Plan

Sl.No.	National Plan	AWCI Plan	Collaborators
	Short Term Courses		
15.	Radar Meteorology	Enhanced Observations	MAIRS
16.	Satellite Data Processing, Interpretation and its Application in Flood Forecasting and Warning	Data Integration, Quality Control,	CEOP, GWSP
17.	Training Course on Discharge Measurement of Large/Small Rivers with appropriate technology/methods	Enhanced Observations	MAIRS
18.	Introduction to Water Resources Planning Using an Integrated Water Resources Management Approach	Basin Management, Hazard Mapping, Emergency Management	ICHARM, MRC

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What Needs to be Done

- The national plan to fit into the AWCI framework;
- Development of a coordination mechanism with collaborators; and
- Grouping of countries with the same water resource management aspect (floods) so that capacity development effort is uniform.

