

## Introduction

Because of the high time and space variability of rainfall and uncertain nature of monsoon in India, reservoirs form one of the most important components of a water resources development project. More than 4000 major and medium dams have already been constructed in India to tap and utilize the available water resources. The efficient use of water resources requires judicious design and proper management and operation of reservoir systems. In this context, reservoir operation for conservation and flood control purposes forms a very important part of the planning and management of water resources system.

A large number of hydrologic analyses are required for planning, design and operation of reservoirs. Many times, a lot of time of the design engineers is wasted in looking for the right tools. In view of the importance of reservoir operation problem in Indian context and due to non-availability of generalized software for reservoir analysis, a WINDOWS based software named “*NIH\_ReSyP – Reservoir Systems Package*” has been developed at NIH. The developed software links a number of individual computer programs for carrying out various kind of reservoir analysis such as capacity computation, storage yield analysis, hydropower simulation, reservoir routing, EAC interpolation, inflow estimation using rate of rise method, probable flow estimation, initial rule curve derivation, and operation of system of multiple reservoirs for conservation and flood control.

The software has been developed in Visual BASIC platform and provides a user-friendly environment for carrying out various hydrological analyses related to reservoirs. The software has graphical user interfaces for various analytical modules and on-line help to guide the user for each module. The package includes interfaces for easy preparation of data files

and many tabular and graphical options facilitating efficient analysis and reporting.



The screenshot shows the NIH\_ReSyP software interface. It features a table with the following data:

| Parameter           | Elevation | Area    | Capacity |
|---------------------|-----------|---------|----------|
| Starting Year       | 170.00    | 10.00   | 10.00    |
| Starting Month      | 173.74    | 11.929  | 28.808   |
| Number of Months    | 174.78    | 18.333  | 102.202  |
| Dead Storage Cap.   | 175.82    | 33.189  | 180.864  |
| Initial Reservoir E | 182.88    | 50.640  | 304.008  |
| YIELD Reservoir     | 185.92    | 73.358  | 447.322  |
| Specify Annual Ev   | 188.96    | 100.123 | 782.120  |
| Specify Storage (M  | 189.58    | 105.621 | 828.412  |
| No. of Data Points  | 190.50    | 113.714 | 704.847  |
| Required Relieff    | 192.22    | 125.042 | 1188.188 |
| Evaporation Area    | 193.58    | 131.875 | 1308.163 |
| Overall Accuracy    | 194.26    | 142.002 | 1420.002 |

Below the table, there are several input fields and buttons:

- Factor for Convert: [Go Back]
- Factor for Convert: [Retrieve]
- Factor for Convert: [Save]
- Factor for Convert: [Clear]
- Factor for Convert: [Clear]

On the right side, there are buttons for "E-A-C Table", "Evaporation Depths", "Monthly Yield Factors", and "Inflow".

## Objectives

The main objective of this short-term course is to focus on the application of *NIH\_ReSyP* software for analysis, operation, and management of reservoir systems. It is intended to interact with field personnel engaged in reservoir operation and management in the country, and train them in the use of the software.

This course is also being planned as two-way interaction with the participants so that requirements of the field organizations are clearly identified, experiences are shared, and requirements for further modification and additional modules can be discussed.

## Course Contents

The course will consist of lectures on the various modules of the *NIH\_ReSyP* software. The lectures will be supported by tutorials, computer sessions, and hand-on training. The faculty will comprise of scientists from NIH, Roorkee and experts from IIT Roorkee. The course contents mainly comprise of the following topics:

- Introduction to reservoir systems
- Reservoir capacity computation
- Storage-Yield analysis
- Statistical analysis of flow data
- Initial rule curve derivation
- Hydropower analysis
- Reservoir routing
- Reservoir sedimentation
- Operation of a multi-reservoir System for Conservation Purposes
- Flood operation of a multi-reservoir System.

## Participants

The course is intended for middle/senior level engineers and officers working in water resources/irrigation/reservoir analysis and management and other related departments of Central/State Govt. and those who are in Academic Institutions. The number of seats is limited to 40 participants. The registration shall be done on the first come first serve basis.

## Registration

The registration fee per participant is Rs.10000/- (Rs. Ten thousand only) for Govt. Institutions and Rs. 12000/- (Rs. Twelve thousand only) for Private Institutions & SAARC Countries. The fee includes registration kit and working lunch. For regular research scholars from Academic Institutions, registration fee is relaxed to Rs.8000/- (Rs. Eight thousand only) per participant. Each participant will be provided with a CD of the software. A field trip is planned to a nearby station. The participants need to arrange for TA/DA from their own Organisation. Participants are requested to register themselves by filling and mailing the registration form latest by 15<sup>th</sup> February, 2014, along with demand draft in favour of National Institute of Hydrology, payable at Roorkee.

## Venue

The venue of the course shall be National Institute of Hydrology, Roorkee - 247 667. Roorkee is a medium size town of Uttarakhand State and it is well connected by road & rail from Delhi, Dehradun, and Saharanpur. NIH is situated at about 1 km from Bus stand and 3 km from Railway Station. The weather generally remains cool in Roorkee during February and average temperature varies from 6 to 15° C.

## National Institute of Hydrology (NIH)

NIH is a premier research institute of India in the field of hydrology. It is an autonomous society under the Ministry of Water Resources, Govt. of India. NIH has five scientific divisions: Surface Water Hydrology, Ground Water Hydrology, Water Resources Systems, Environmental Hydrology, and Hydrological Investigations. The institute has four Regional Centres at Jammu, Sagar, Kakinada, and Belgaum and has two Centres for Flood Management Studies at Patna and Guwahati. The Institute has organised a number of training courses on a wide range of topics dealing with various aspects of hydrology. NIH has five well-equipped laboratories: Water Quality, Remote Sensing & GIS, Soil & Groundwater, Hydrological Investigations, and Isotope Hydrology. For more details please visit NIH web site [www.nih.ernet.in](http://www.nih.ernet.in).

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## Training Course

On

## Application of NIH\_ReSyP Software

(March 03 - 07, 2014)



**National Institute of Hydrology**  
**Jal Vigyan Bhawan**  
**Roorkee-247667**  
**Uttarakhand**

## Registration Form

### Training Course

On

### Application of NIH\_ReSyP Software

(March 03 - 07, 2014)

Name : .....  
Designation : .....  
Organization : .....  
Address : .....  
Tel. No. : .....  
Fax : .....  
Email : .....  
Qualifications : .....  
Field of Specialisation : .....  
Experience : .....

(Signature of Candidate)

### SPONSORSHIP CERTIFICATE

Certified that Mr./Ms./Dr. ....  
has been officially deputed for the above mentioned  
training course to be conducted by NIH, Roorkee.

Signature of Sponsoring Authority  
with Office Seal and Date

(Photocopies of this form can be taken as per requirement)