1. Products Developed

1.1. KRIF- Software for Koyna Reservoir Inflow Forecasting

Worldwide; in Reservoir Operation studies, it is found that the reservoir inflow prediction due to a given rainfall in the catchment area plays a major role in implementing the reservoir operating rule curves. However, there is no reported evidence of models used in the field, especially in Indian Scenario. A real time Koyna Reservoir (Maharashtra, India) inflow prediction software which can predict multi-time-step-a-head inflow for a given rainfall in the catchment on hourly basis has been developed. The appropriately selected soft computing technique-based reservoir inflow prediction model is working efficiently because of introduction of novelty in; selecting appropriate type of model, length of data required to develop a hydrologic prediction model, appropriate modifications to predict the peak inflows, data pre-processing to handle longer length of continuous zero values in the time series and more over consideration of time of concentration for a large Koyna reservoir. The best model (ANN and GP) is used for developing a graphical user interface (GUI) software to implement it in real life. The GUI is developed using Visual Basic as front end and MS Access as back end for data storage. After vigorous testing and verification at lab, the software was presented to the Koyna dam authorities. The software has been accepted by the Koyna Dam authorities to use it in real life. Number of demo and hands on experience training programs were given to field engineers at the Dam site. After gaining the confidence on the software, it is being used at the dam site for the past three years to predict the real time reservoir inflow.



1.2. ACAS-AGNI: Software for water resources allocation in Agniar River Basin

Under the World Bank Aided Water Resource Research Fund, a research project on "Water Management Studies in Agniar river Basin" has been sponsored by Institute for Water Studies, PWD, Government of Tamil Nadu. The main objective of the study is to develop a systematic water balance study in the basin after estimating the total water potential and total water demand. It is also aimed to delineate potential zones for artificial recharge for improving the ground water availability, which will reduce the severity of the drought. As a part of the project, two software namely, AGNI and ACAS has been developed. ACAS is user-friendly and interactive software for Agniar river basin management, if the available surface and ground water are known in advance. AGNI is another program developed for resource estimation and inter-sectoral allocation. AGNI requires a pre requisite of computer skill to run the water balance, whereas ACAS does not require any computer skill to run the inter-sectoral water allocation model. We hope that the WRO personnel working in the field of water resources can make use of this software for other basins also.

► ACAS AGNIAR CANAL AQUIFER SIMULATION Based on Standard Operating Policy		
ACAS		
Submitted to: Instititute for Water Studies, Water Resources Organization, Public Works Department, Tharamani, Chennai - 600 113.	Project Coordinators: Dr.K.A.Kuppusamy, Prof.S.Krishnamoorthi, Dr.V.Jothiprakash	Project Developed at: Department of Civil Engineering, Regional Engineering College, Tiruchirappalli - 620 015.
<u>E</u> nter	About ACAS Exit	

1.3. ResSim: Simulation of Kodayar river basin Reservoir operation

ResSim is a user-friendly, interactive software for **Res**ervoir **Sim**ulation. It is developed using Microsoft Visual Basic 6.0 as front-end and Microsoft Access 2000 as back-end. The icons used for the rich Graphical User Interface of the software are created in Microsoft® Developer Studio and the Hyper Text Markup Language (HTML) compiled, context sensitive help is created using Microsoft HTML Help Workshop.

ResSim is developed for simulating any reservoir's operation. This software is designed to store the details of reservoirs, the canals taking off from the reservoirs, crops cultivated in the canal command and other data like inflow, evaporation loss etc. required for the reservoir operation. The stored details can be retrieved and can be modified at any time. This software gives the working table and water balance simulation result as the output. A detailed report will be created at the end of each simulation run. The user can save and print the report for further analysis.



1.4. ReInPAI: Reservoir Inflow Prediction Using Artificial Intelligence

In real life, for day to day operation as well as for a long term planning of a reservoir operation, accurate prediction of reservoir inflow is crucial parameter, which is unknown until it is realised. To address this need, a cutting-edge web application called ReInPAI (Reservoir Inflow Prediction using Artificial Intelligence) has been developed to predicit reservoir inflow using AI techniques.

The software uses multiple AI tools such as Artificial Neural Networks (ANN), Long Short-Term Memory (LSTM), Random Forest, and Support Vector Machines (SVM). A key feature of ReInPAI is its use of Bayesian optimization for hyperparameter selection, ensuring optimal model performance. The web application allows users to upload historical inflow data, select the desired prediction model, and specify the number of future days for which predictions are required. The Graphical User Interface (GUI) for ReInPAI has been developed using Python with the Django framework.

The Django framework provides a secure and efficient backend for data processing and model execution, while enabling a smooth and intuitive user experience on the frontend. The web-based nature of ReInPAI allows for easy access and potential implementation across various reservoir systems, not limited to a specific geographic location.

This could lead to improved decision-making in dam operations, flood control, and water resource management. This flexibility enables users to tailor made user-friendly interactive software for reservoir inflow prediction makes it a versatile tool for dam managers and hydrologists..

