

Training module # SWDP - 20

How to report on climatic data

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1. Module context

While designing a training course, the relationship between this module and the others, would be maintained by keeping them close together in the syllabus and place them in a logical sequence. The actual selection of the topics and the depth of training would, of course, depend on the training needs of the participants, i.e. their knowledge level and skills performance upon the start of the course.

2. Module profile

Title	:	How to report on climatic data
Target group	:	Hydrologists, Data Processing Centre Managers
Duration	:	One session of 60 minutes
Objectives	:	After the training the participants will be able to: <ul style="list-style-type: none">• prepare yearly reports on climatic data
Key concepts	:	<ul style="list-style-type: none">• observational network• basic statistics• graphical representation• data validation and quality aspects
Training methods	:	Lecture, computer
Training tools required	:	Board, OHS, Software
Handouts	:	As provided in this module
Further reading and references	:	

3. Session plan

No	Activities	Time	Tools
1	General <ul style="list-style-type: none"> • Overhead - highlighted text and bullet points (Point 1) • Overhead - highlighted text and bullet points (Points 2-4) 	10 min	
2	Yearly reports Overhead - highlighted text and numbered points <ul style="list-style-type: none"> • Introduction • The observational network • Basic evaporation statistics Overhead - highlighted text and bullet points <ul style="list-style-type: none"> • Graphical and mapped comparisons with average patterns • Data validation and quality • Bibliography 	10 min	OHS x
3	Periodic reports - long term statistics <ul style="list-style-type: none"> • Overhead - highlighted text and bullet points 	5 min	

4. Overhead/flipchart master

5. Handout

Add copy of Main text in chapter 8, for all participants.

6. Additional handout

These handouts are distributed during delivery and contain test questions, answers to questions, special worksheets, optional information, and other matters you would not like to be seen in the regular handouts.

It is a good practice to pre-punch these additional handouts, so the participants can easily insert them in the main handout folder.

7. Main text

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How to report on climatic data

1. General

- **Published reports are the primary visible output of the Hydrological Information System. They have several purposes**
 - ❖ **to provide information for use in planning, design, operation and evaluation.** Evaporation and evapotranspiration data are used for irrigation scheme design, operation and evaluation, for agricultural operations and in flood forecasting models.
 - ❖ **to advertise the work of the HIS and its capability and to create interest and awareness amongst potential users.**
 - ❖ **to provide tangible evidence to policy makers of a return on substantial public investment.**
 - ❖ **to provide feedback to data producers and acknowledge the contribution of observers and co-operating agencies.** The HIS is an integrated system in which evaporation (and other) data are transferred by stages from the field, to local and regional offices for data entry, processing and validation. The annual report shows how observations at individual stations are integrated in the network. It provides an encouragement to observers and data processors to ensure that the raw and processed data are reliable.
 - ❖ **to provide a clear incentive to keep archives up to date and a focus for an annual hydrometric audit**
- **The HIS provides opportunities for storage, retrieval and reporting on magnetic media and there is now no necessity to publish daily records for all contributing stations.** Reports are primarily designed to cover a fixed time interval, most commonly the water year. In contrast users most commonly require data as full time series from the beginning to the end of the record. there is thus a degree of incompatibility between user requirements and reporting formats. It is not possible to provide complete records in report form, though these can conveniently be provided on magnetic media from the HIS. **The main function of the report therefore with respect to functional use is to inform users of the availability of data in digital and other formats.**
- **Annual reports are produced with respect to evaporation over the hydrological year from 1 June to 31 May. They will generally be combined with annual rainfall reports and may be combined with streamflow.**
- A broad range of climatic variables is measured at observation station but, for hydrological purposes, the variables are not themselves of direct interest but are used in computing evapotranspiration by theoretical and empirical methods - especially the Penman method. **Whilst computed evapotranspiration will be reported, the statistics of climatic variables used in the computation are not required for reporting. Direct measurements of pan evaporation will be included in the report.**

2. Yearly reports

The annual report provides a summary of evaporation for the report year in terms of distribution in time and space. It also makes comparisons with long term statistics. Details of the observational network and data availability are included. **The following are typical contents of the annual report:**

- Introduction
- The Observational Network
 - ❖ maps
 - ❖ listings
- Basic evaporation statistics
- Annual summaries in graphical form
- Data validation and quality
- Bibliography

2.1 Introduction

The report introduction, which may change little from year to year, will describe the administrative organisation of the climate and evaporation network and the steps involved in the collection, data entry, processing, validation, analysis and storage of data. Standard climatic observational practice for variables required by computation of Penman evapotranspiration will be summarised.

The report will list those agencies contributing to the included data. It will describe how the work is linked with other agencies collecting or using evaporation data including the India Meteorology Department and operational departments in hydropower and irrigation. It will describe how additional data may be requested and under what terms and conditions they are supplied.

2.2 The observational network

The salient features of the observational network are summarised in map and tabular form.

The map of climate stations must also show major rivers and basin boundaries and distinguish each site by symbol between the combination of instruments in use at each station (e.g. automatic weather stations, stations with net radiometer, etc.). Mapped stations must be numbered so that they can be related to information contained in tabular listings.

Tabulations of current stations are listed by named basin and sub-basin. Also listed are latitude, longitude, altitude, responsible agency, the full period of observational record and the period of observation which is available in digital format. A similar listing of closed stations may be provided. All additions and closures of stations must be highlighted in the yearly report. Similarly station upgrading and the nature of the upgrading should be reported.

2.3 Basic evaporation statistics

This forms the core of the report. As noted above **the full reporting of daily data is no longer required and the principal output will be monthly statistics of evaporation for each station compared with the average for the period of record.** Stations will be ordered by basin and sub-basin - rather than in alphabetical order. Fig. 1 provides an example of such a listing. **A typical listing includes:**

- For the current year
 - ❖ monthly and annual pan evaporation
 - ❖ monthly and annual Penman evapotranspiration
- For the previous record
 - ❖ mean monthly and annual pan evapotranspiration
 - ❖ lowest monthly mean in period
 - ❖ highest monthly mean in period
 - ❖ various percentile values
 - ❖ mean monthly and annual Penman evapotranspiration
 - ❖ lowest monthly mean in period
 - ❖ highest monthly mean in period
 - ❖ various percentile values
- For the station
 - ❖ location details and station elevation

Values of evaporation, whether from pan measurements or derived from Penman calculations should be reported to no more than one decimal place (mm). More than one decimal place is beyond the accuracy of measurement and gives a spurious impression of accuracy.

2.4 Graphical and mapped comparisons with average patterns

Graphical displays often provide the best and most accessible means of illustrating the time series of evaporation during the water year and how this relates to the previous record. The following graphical plots will be presented for a selection of stations.

- Annual histogram plot of monthly evaporation compared with previous mean, maxima and minima
- Map showing annual or seasonal evaporation as a percentage of the long period average.

2.5 Data validation and quality

The limitations of the data should be made clear to users. The general limitations of pan evaporation as a measure of open water evaporation should be explained (primarily the difference in heat storage properties of a small metal container and an extensive natural open water surface). In addition, the number of values corrected or infilled as a total or a percentage may be noted for individual stations, by basin or by agency.

2.6 Bibliography

Data users may be interested to know of other sources of evaporation and related climatic and rainfall and streamflow data. The following should be included.

- Concurrent annual reports from the HIS of rainfall or streamflow data
- Previous annual reports incorporating climate and evaporation data (with dates) from the HIS.
- Previous annual reports incorporating climate and evaporation data(with dates) published by each agency and division within the state
- Special summary reports of climate and evaporation statistics produced by the HIS or other agencies.

A brief note on the administrative context of previous reports, methods of data compilation, and previous report formats would be helpful.

3. Periodic reports - long term statistics

Long term point and areal statistics are important for planning, management and design of water resources systems. They also play an important role in validation and analysis. These statistics must be updated regularly and an interval of 10 years is recommended. **The following will be typical contents of such reports.**

- Introduction
- Data availability - maps and tabulations
- Descriptive account of annual measured pan evaporation and computed evapotranspiration since the last report
- Thematic maps of mean monthly and seasonal evaporation
- Basic evaporation statistics - monthly and annual means, various percentiles, maxima and minima
 - ❖ for a standard climatic normal period where available
 - ❖ for the updated decade
 - ❖ for the available period of record
- Analysis of periodicity and trend in the evaporation data