

Training module # SWDP - 21

*How to make data entry for  
water level data*

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# ***1. Module context***

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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

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<b>Title</b>	:	How to make data entry for water level data
<b>Target group</b>	:	Data Processing Centre Assistant, Assistant Hydrologists, Hydrologists, Data Processing Centre Managers
<b>Duration</b>	:	One session of 60 minutes
<b>Objectives</b>	:	After the training the participants will be able to: <ul style="list-style-type: none"><li>• make entries for water level data</li></ul>
<b>Key concepts</b>	:	<ul style="list-style-type: none"><li>• daily water level</li><li>• multiple water levels a day</li><li>• hourly water levels</li><li>• digital data from data loggers</li></ul>
<b>Training methods</b>	:	Lecture, exercises, software
<b>Training tools required</b>	:	OHS, computers
<b>Handouts</b>	:	As provided in this module
<b>Further reading and references</b>	:	

## 3. Session plan

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No	Activities	Time	Tools
1	<b>General</b> <ul style="list-style-type: none"><li>OHS 1 – Aspects of water level data entry</li></ul>	5 min	OHS 1
2	<b>Entry of water level at multiple times a day</b> <ul style="list-style-type: none"><li>OHS 2 – Form for multiple observations a day</li><li>OHS 3 – Plot of water levels for a month</li><li>OHS 4 – Plot of water levels for a year</li></ul>	5 min	OHS2 OHS3 OHS4
3	<b>Entry of hourly water levels</b> <ul style="list-style-type: none"><li>OHS 5 – Form for entry of hourly water level data</li><li>OHS 6 – Plot of hourly water levels for a month</li></ul>	5 min	OHS 5 OHS 6
4	<b>Exercise</b> <ul style="list-style-type: none"><li>Exploring options on water level data entry</li></ul>	45 min	OHS 7

## ***4. Overhead/flipchart master***

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# ***5. Handout***

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



## ***6. Additional handout***

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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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## **Contents**

<b>1.</b>	<b>General</b>	<b>1</b>
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# **How to make data entry for water level data**

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## **1. General**

- **The receipt of water level data at Sub-divisional offices from gauging stations is first recorded on a standard form with the date of the receipt (Module 5).**
- **Field tabulations and chart records are then scrutinised for obvious errors before entry to computer.**
- **Primary module of dedicated hydrological data processing system (SWDES) is available to facilitate data entry.** Data entry is simplified by screen format which matches typical formats from observational records, such that observed values can be entered against pre-formatted date and time.
- **Data are then entered to computer using the keyboard for observed tabulated data on data sheets from staff gauges and data extracted from autographic charts, or directly loaded from data logger files for digital data.** From the staff gauges the observations are generally made once in a day in lean season and at multiple times a day during flood times. For a flashy river staff gauges may even be read at hourly intervals during flood season. However, standard timings are generally followed for the observations during the day by different agencies. An autographic type of water level recorder on the other hand gives a continuous record of water level in time. Levels are extracted manually from these autographic records and the data are normally reported at hourly time interval. Digital data from a digital water level recorder can either be at equal intervals of time (usually at quarter, half hour or hourly intervals) or can be reported for only those instances when there is a change in water level which is more than a pre-set amount. This latter option will only rarely be used. The entry of all such water level data series can be accomplished using various forms as described below:
- **SWDES provides data entry checking, ensuring correct entry of station name and parameter name and rejection of alpha characters in a numeric field. Provision is also made for graphical inspection of time series graphs.**

## **2. Scrutiny of manuscripts, analogue and digital water level records**

Before keying in of data to the computer, staff gauge water level tabulations must be checked for correct entry of station name, year month and date, and any ambiguity in handwriting in the tabulated numbers.

Similarly a rapid comparison is made between levels registered on the autographic chart and tabulated staff gauge readings. In particular, levels of peaks and troughs in the hydrograph should be compared and unclear hand-written values checked. Where uncertainty remains, reference should be made back to the observer or field supervisor for clarification.

Improper entry to the 31st day of a month with 30 days is unfortunately a common observer error. Such fabrications by the observer suggest that other values have also been incorrectly entered. Such entries should be reported to the Divisional office to facilitate correction following secondary validation. They should also be reported to the field supervisor to ensure that such mistakes are not repeated.

Digital records downloaded from the data loggers are also checked for valid station/instrument identification, dates and timings etc.

### 3. Entry of water levels at multiple times a day

The layout of the form for water level observations at multiple times a day is as shown in Fig. 3.1.

Dt.	Water Level Observations			Remarks
	08:00	13:00	18:00	
1	4.650	6.250	6.650	
2	6.900	6.300	5.800	
3	5.700	5.450	5.180	
4	4.520	4.150	3.800	
5	3.950	2.750	2.650	
6	2.790	2.700	2.450	
7	2.250	2.270	2.150	
8	2.150	2.240	2.100	
9	2.470	2.420	2.200	
10	2.210	2.080	1.950	
11	2.030	2.000	1.900	
12	1.800	1.950	1.870	
13	1.560	1.530	1.530	
14	1.420	1.750	1.800	
15	1.620	1.830	1.780	
16	1.390	1.360	1.290	
17	1.250	1.240	1.230	
Avg	2.560	2.580	2.520	
Max	6.900	6.300	6.650	
Min	1.140	1.240	1.220	

Minimum	L.Warning	U.Warning	Maximum
0.00	6.00	12.00	

Max.RoR	Max.RoF	Units
2.00	2.00	m

Avg	Max	Min	Remarks in case of mismatch
2.560	0.000	0.000	
2.580	0.000	0.000	
2.520	0.000	0.000	

Fig. 3.1 Form for entry of water level data at multiple times a day.

The station and series to which data are to be entered are selected from a list and the displayed entry form shows the station code, station name, Sub-division, location River/Basin and the reduced level (R.L.) of the gauge zero. Using the mouse or arrow keys, the data processor may scroll through the data to the required date and time.

Facility is available to enter data limits to provide a numerical basis for checking spurious entries or extreme observations. There are six data limits displayed on the screen:

- minimum level
- lower warning level
- upper warning level
- maximum value
- maximum rate of rise
- maximum rate of fall

Once entered these data limits are rarely altered.

The data for a complete month are entered in the tabular form. The rows represent the days in the month and number of column(s) are for each observation in the day. The

first column gives the day of the month and is automatically filled up according to the month and year. The data corresponding to each observation in the day is entered by the user. The cursor automatically moves first from observation to observation within a day and then the control moves to the next day. If a remark is to be entered for any day it can be entered by moving to that remark slot using the arrow keys or mouse. At the bottom of the form, for each observation time in the day, the average, maximum and minimum values, as available in the manuscript must be entered and the corresponding computed values from the tabulated entries are automatically filled.

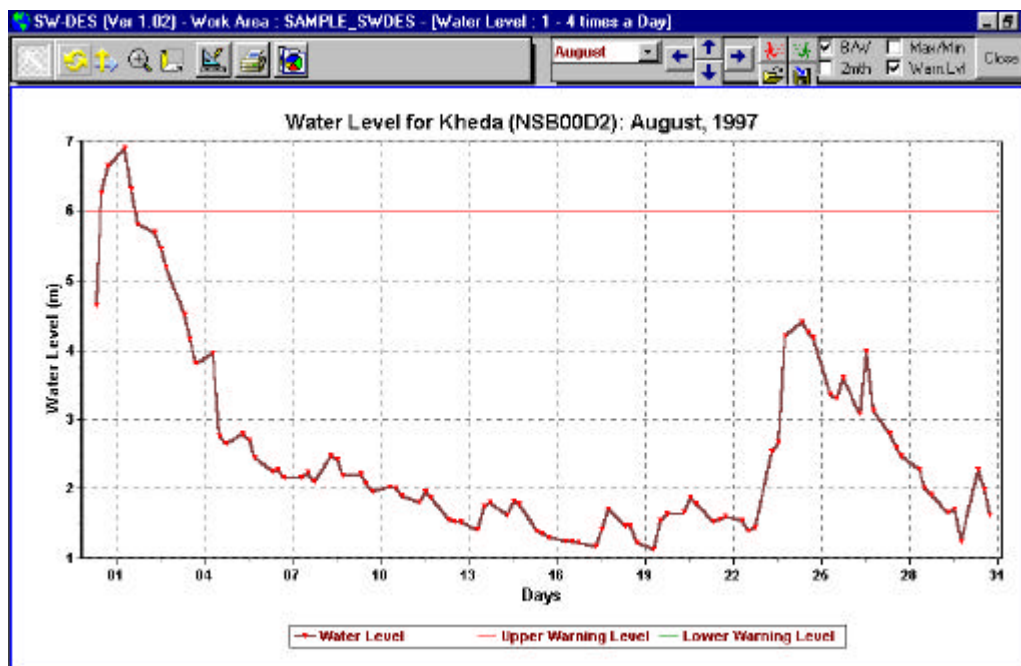
The data processor can draw a graph of the data entered and data limits previously specified may be shown on the graph. There are two options:

- (a) to plot the data of the whole month for which the entries are being made (Fig. 3.2)
- (b) to plot the data of the entire year for which the data are being entered (Fig. 3.3).

Two types of data entry check are performed for water level data at multiple times a day.

- (a) The entered daily data are compared against minimum value, lower warning level, upper warning level, maximum value, maximum rate of rise and/or minimum rate of rise.
- (b) A check is carried out to see if there is a proper match between the entered and computed values for the monthly average, maximum and minimum values for each observation in the day. The user is suitably prompted where there is a mismatch so that the entries can be re-checked. Where a mismatch remains (for example due to observer error or unclear readings), a slot is available to make comments to aid subsequent validation.

Scrutinising and checking the water level data month by month in this manner will leave little scope of any data being wrongly entered.



**Fig. 3.2 Plot of multiple times a day water level data for a month.**

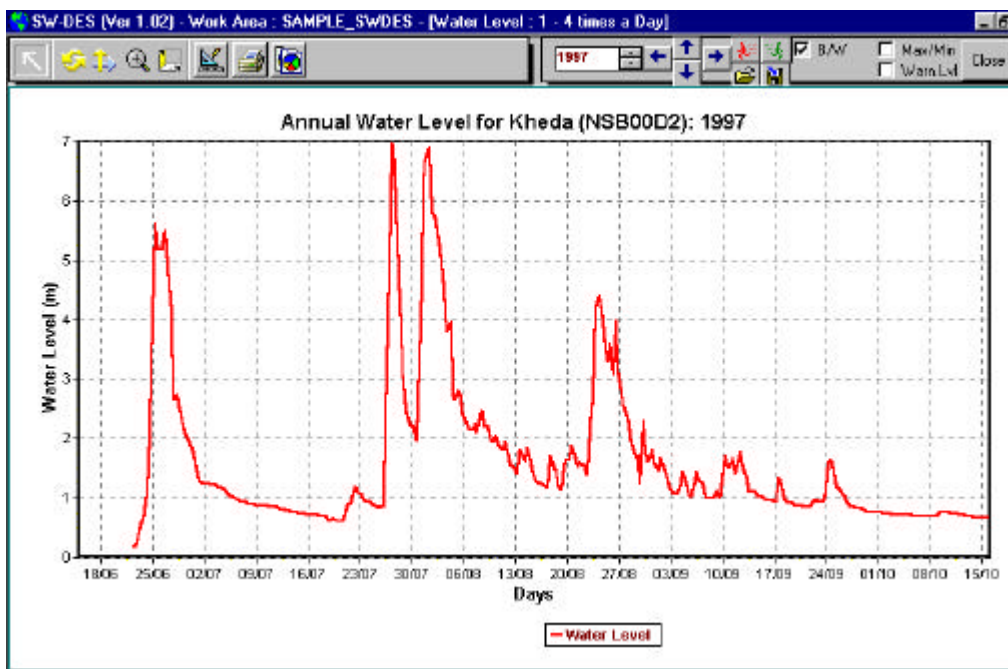


Fig. 3.3 Plot of multiple times a day water level data for a year.

#### 4. Entry of hourly water levels

Hourly water level data are obtained in tabulated form from the chart records of the autographic type recorders. The layout of the hourly water level form is as shown in Fig. 4.1:

SW-DES (Ver 1.02) - Work Area : SAMPLE\_SWDES - [Water Level - Hourly]

File Edit View Insert Format Records Tools Window Help

Add Recs Delete Recs Hourly Monthly Report Check Form Total Close

Station Name Pargaon		Sub-Division SDDPC, Shirur Sub-div		Local River / Basin Bhima		Latitude 18°33'00"		Longitude 74°22'30"		Year 1997								
Series Code		Minimum -2.00		L.Warning 2.00		U.Warning 8.00		Maximum 14.00		Max.PoR 2.00								
Station Code Pargaon		Para. ID HZA		T1 4		Div. 1		Zero RL 0.000		Month August								
										Units m								
Day	0930	1030	1130	1230	1330	1430	1530	1630	1730	1830	1930	2030	Day	2130	2230	2330	0030	0130
1	7.520	7.420	7.340	7.270	7.150	7.070	6.920	6.870	6.820	6.720	6.520	6.420	1	6.300	6.170	6.120	6.020	5.920
2	5.260	5.210	5.170	5.130	5.100	5.060	5.030	5.010	4.980	4.930	4.900	4.880	2	4.870	4.870	4.900	4.910	4.910
3	4.870	4.810	4.760	4.710	4.680	4.640	4.590	4.540	4.520	4.500	4.460	4.420	3	4.390	4.350	4.300	4.240	4.240
4	3.700	3.620	3.590	3.550	3.500	3.440	3.400	3.350	3.300	3.270	3.250	3.220	4	3.200	3.150	3.140	3.130	3.130
5	3.150	3.250	3.400	3.550	3.800	4.000	4.200	4.400	4.500	4.650	4.700	4.750	5	4.770	4.750	4.730	4.700	4.680
6	4.200	4.150	4.100	4.080	4.070	4.080	4.100	4.150	4.200	4.300	4.360	4.400	6	4.460	4.500	4.530	4.540	4.540
7	4.800	4.850	4.880	4.900	4.870	4.850	4.820	4.780	4.750	4.730	4.700	4.670	7	4.640	4.600	4.570	4.520	4.520
8	4.000	3.980	3.960	3.960	3.950	3.940	3.940	3.940	3.930	3.910	3.890	3.870	8	3.830	3.780	3.720	3.700	3.680
9	3.380	3.340	3.320	3.300	3.280	3.270	3.260	3.250	3.240	3.230	3.210	3.200	9	3.180	3.130	3.100	3.050	3.050
10	2.680	2.630	2.600	2.580	2.560	2.530	2.510	2.500	2.470	2.450	2.440	2.430	10	2.430	2.430	2.430	2.430	2.430
11	2.320	2.300	2.280	2.270	2.250	2.230	2.220	2.220	2.210	2.200	2.190	2.190	11	2.180	2.180	2.170	2.170	2.170
12	2.100	2.090	2.090	2.080	2.080	2.080	2.070	2.070	2.060	2.060	2.050	2.050	12	2.040	2.040	2.030	2.030	2.030
13	1.980	1.980	1.970	1.970	1.960	1.970	1.970	1.980	1.980	1.990	2.000	2.010	13	2.040	2.060	2.070	2.080	2.080
14	2.170	2.160	2.150	2.150	2.150	2.150	2.140	2.140	2.140	2.140	2.140	2.160	14	2.170	2.200	2.220	2.250	2.250
15	2.600	2.600	2.630	2.600	2.710	2.720	2.720	2.720	2.720	2.720	2.720	2.720	15	2.710	2.700	2.700	2.700	2.700

User Level : 1

Max. Hourly Water Level: As entered 13.75, As in form 0.000, Remarks in case of mismatch

Fig. 4.1 Form for entry of hourly water level data.

The form again displays information on station code, station name, sub-division and local river/basin, reduced level of gauge zero and the six data limits: The year and month of the data displayed on the screen are also displayed for reference purpose.

Water level data are entered in a form of a matrix in which the columns are the hourly values for a day and the rows represents different days of the month. The entries for the dates and hours are filled automatically. All the hourly values are entered by navigating horizontally across the day. At the end of each day's entry the cursor moves to the column for entering the daily minimum, maximum and average as available in the manuscript. The corresponding statistics as per the entries made are computed and filled automatically. Remarks, if available in the manuscript, can be entered on a daily basis.

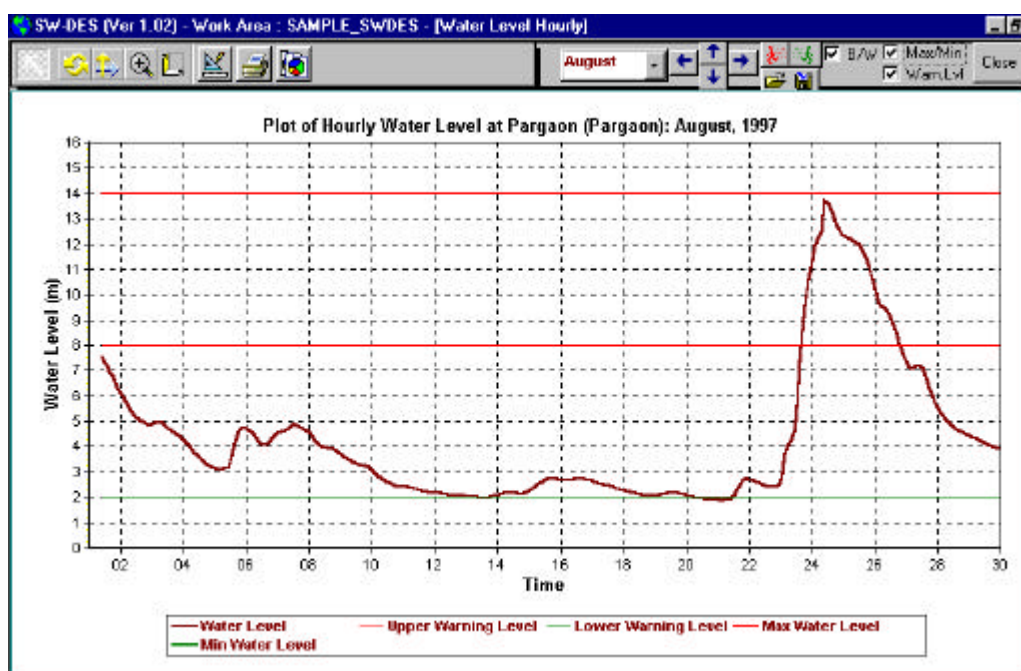
For graphical display of data there are two options:

- (a) to plot the data of any day from 0100 to 2400 hrs. and
- (b) to plot the data for the complete month (see Fig. 4.2)

The latter option is very useful in comparing the entered data with the autographic chart record. The user can navigate through different days in the month to see the corresponding plots without leaving the graph.

Two types of data entry checks are performed for hourly water level data.

- (a) The entered hourly data are compared against minimum value, lower warning level, upper warning level, maximum value, maximum rate of rise and/or minimum rate of rise.
- (b) A check is carried out to see if there is a proper match between the entered and computed values for daily minimum, maximum and average water levels for each day. The user is suitably prompted where there is a mismatch so that the entries can be re-checked.



**Fig. 4.2 Plot of hourly water level data for a month**