



HYDROLOGICAL MONITORING PROTOCOL: Station Inspection

A. Purpose

The purpose of this protocol is to lay down clearly what are the operation and maintenance procedures for the Sediment Monitoring Stations. It should be followed as closely as possible so that any malfunctioning of the equipment will be minimized, irregularities about structures, stick gauges, housing, etc. can be rectified in the shortest time possible.

Engineers who are taking charge of the stations should be familiarized with this manual and put into practice these procedures to ensure good and reliable data being collected and analyses.

B. Data Type and Equipment

Typically the following types of data are collected using the respective equipment or tools:

1. Manual Rainfall -Manual Rainfall Gauge
2. Manual Water-level -Stick Gauge
3. Float Discharge - Float and Stop Watch
4. Sediment Concentration - Samplers, Bottles, Filters, Sieves, Beakers
5. Continuous Water-level and Discharge -Water-Level Sensor, Recorder Weir or Controlled Section
6. Continuous Rainfall - Rainfall Sensor, Recorder
7. Wind - Anemometer, Recorder
8. Temperature - Temperature Sensor, Recorder

C. Field Trips

SCHEDULE

Plan your visit schedule to the station according to the season:

- during monsoon: two weeks interval
- after monsoon : monthly interval

The reason for the time schedule difference for monsoon period is because that the water-level recorder is set to faster speed and the chart last only for two weeks. The rainfall recorder is also set to run at 20mm per hour during the monsoon period, and set back to 10mm per hour after the monsoon.

SPECIAL OPERATIONAL REQUIREMENTS BEFORE MONSOON STARTS

As a reminder, two things are necessary to be executed before the monsoon starts, i.e.

- set rainfall recorder chart to run at 20 mm/hour
- set water-level recorder chart to run at maximum of 2 weeks

D. Items to be taken

Items that are necessary to be carried during each field trip differs, depending on the nature of the trip. But in general, the following may be used as a check-list:

1. Laptop computer, with battery fully charged
2. Diskettes for file storage
3. Potentiometer for checking voltage of batteries
4. Water-level and rainfall charts to replace used charts
5. Ink cartridges for recorders
6. Inspection Form I
7. Standard tools: screw drivers, plier, keys, measuring tape, compass, label tape, etc.
8. Spares parts
8. Other special items:
 e.g. Form M if they are nearly used up
 New and fully charged batteries if there might be batteries due for replacement.

This list is by no mean complete, you may design your own check list tailored to your stations.

E. Station Inspection and Checklist

Carry out inspection of the station at each field trip. This includes all equipment, tools, structures and the manual records of the observers.

In order to assist the station inspection routine and make a record of each item inspected, a station checklist included in the "Station Inspection and Evaluation Form" or Form I is to be used on each field visit to a station. Since it contains summary information regarding status of the station, it is very important in preparing subsequent field trips properly. Section F describes in detail the manner in which the first part of the Form I is to be filled during the visit.

F. Guide to Use Form I for Station Inspection

The following is a guide to the use of the Form I to be filled during a station inspection:

HEADERS

Fill in all the details regarding:

Station Name, State, Date, Observer's Name, Silt Analyst's Name.

The 'Station Inspection Check List' is meant for checking instruments and tools of the station. Here a tick on either one

of the columns is expected. The condition refers to the state before any maintenance work has been carried during the particular trip. The meaning of G, M and B are:

G = Good, stands for very good condition

M = Medium, stands for a fair condition

B = Bad, stands for poor condition.

Consider your response very carefully. Any response with B means some kind of action is required in the next trip.

If any kind of work has been carried out during the present trip, it has to be documented in the next column under "Work Executed in this trip/ Remark". Tick "Y" if commonly executed works are done.

If any particular equipment is found to be "Bad" in the present trip and certain special items need to be brought along and installed in the next trip, then write these down under the column "Follow Up Work Required in Next Trip".

Put a dash line '————' across those questions asked which are not applicable to a particular station.

1. GENERAL"

Housing :

Check the condition of the station housing.

Is the housing waterproof and dustproof?

Whether the floor is dirty or not?

The interior is generally tidy?

Surrounding:

The surrounding condition of the housing and weir and control section, whether there has been any slope failure that may affect the safety of the housing and the weir or the channel flow condition.

Silting of Weir:

If there is a weir, check the level of silt behind the weir.

Clearance:

This refers to the nearest obstacle to affect the catch of the rainfall gauge. If there are new buildings, vegetation, etc around the vicinity of the station that is suspected to be an obstacle to the station.

The ideal situation is to have the angle from the top of the gauge to the top of the encircling objects to range from 30 degrees to no more than 45 degrees (WMO Standard).

For rough estimation in achieving the 30 degree standard, if a tree is of height H, then its distance from the top of the gauge should not be less than 2xH.

Observer Readings

Check the manual records of the onserver :

Legible ?

Can you reasonably distinguish his writing. ?

Follow Notation ?

- Is the stick gauge reading to the nearest cm. ?
- Is rainfall reading is to the nearest 0.1 mm ?
- Is bottle number given ?
- Is the float time measured in seconds ?

Correct Date / Time ?

- Is the date of the last reading correct and the time measured to the nearest minute?

Attendance satisfactory ?

- In general does the observer not skip any data and does he measure at about half hourly intervals if there is a flood ?

2. MANUAL RAIN GAUGE

Collecting Can:

- Is the collecting can leaking?

3. AUTOMATIC RAIN GAUGE

Collector:

- Is the sharp edge of the collector damaged ?

Tipping Bucket:

- Is the tipping bucket functioning properly?
- To check, this the casing has to be opened up.

Pen/Drum:

- Trace line clear and smooth?
- Ink stock sufficient?
- Ink Flow regular?
- Pen cleaning necessary?

Housing:

- Can it be opened smoothly, i.e. without disturbing the recording device of the recorder inside?
- Cleaned ?
- Whether the sieves and tipping bucket of the collector have been cleaned in this trip ? Try to clean these parts during all trips.

Clock Checked ?

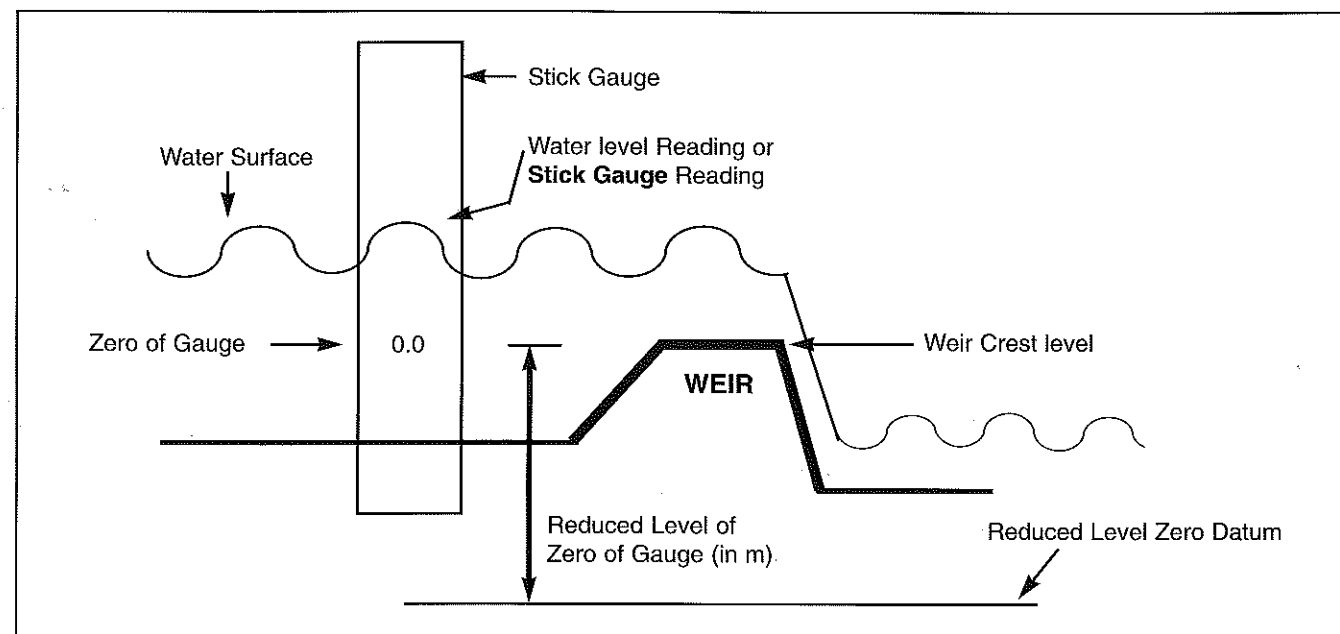
- Check the clock if it is functioning well ?

4. STICK GAUGE

Position:

- Are the stick gauges positioned at about 3 times the value of maximum water head above the crest of the weir?
- Is the installed position subjected to turbulence?

WEIR AND STICK GAUGE DEFINITIONS



Range

Fill in the range of the stick gauge according to the separate attachment.

Check for:

- Whether they are cleaned and all figures are legible?
- Does the stick gauge faces a direction convenient enough for the observer to read?
- Can the whole range of the stick gauge be read at all possible stages?
- Is the stick gauge vertical and not affected by erosion?
- Check particularly the lower part of each stick gauge, is it not embedded in sediment or vegetation?
- The condition of the stick gauge can only be considered as "Good" if all the answers to the above are "yes".

Level Checked?

This check by precision survey leveling has to be made periodically, at least once a year even if the stick gauges appear to be standing. If you detect any soil movement or an inclining stick gauge, then the level has to be checked at once.

Cleaned ?

Whether the sieves and tipping bucket of the collector was cleaned during this trip ? Try to clean these parts during all trips.

5. WATER-LEVEL RECORDER

Functioning?

Is the stage indicated by the recorder pen coincident with the stick gauge?

Is the time indication of the recorder correct?

Is the pen arm of the recorder obstructed especially at the border edge of the chart?

Pen Writing?

Are tracing lines on the chart clear and smooth?

Is the ink stock sufficient?

Is the ink flow regular?

Is pen cleaning necessary?

Floater Working?

Are the correct types of weight and counterweight used?

Is the float and weight assembly hanging freely at the extreme water levels.

Is the stilling well in a good condition? Free from siltation inside the well?

Are the intake pipes in a good condition? Free from siltation?

Range Checked?

Check whether the pen marks exactly between the upper and the lower border lines on the chart, i.e. the full range of the chart is reachable.

Is the chart zero set on the correct side?

In case of malfunctioning, try to make minor adjustments if you can. Replace the recorder if there is a major fault.

Clock checked?

Check the clock to see whether it is functioning properly.

6. BENCH-MARK

All station should have at least two bench-marks established some distance away from the monitoring station. This is to prevent any complete lost of datum used in water level measurement should there be a major catastrophe such as a flood which completely destroys the station and stick gauge.

If there is any bench-mark installed, write down the number and check the condition of the bench-mark.

Is the bench-mark located at a safe site on stable ground.

Can the bench-mark be found easily?

Any building, soil or vegetation is covering the bench-mark?

Level checked?

All bench-mark have to be checked once a year and to tie up with the stick gauges. Say "Y" if this is executed during this trip.

7. BATTERY

Functioning?:

Whether there is any indication of burn or failure?

Wiring Connections:

Check the connections for any loose ends.

Battery Fluid Level:

Check if the level of fluid in the battery is within the optimum range.

Battery Voltage:

Use the potentiometer to measure the voltage across the terminal and note it down.

Installation Date:

Note the date of the newly installed battery and this is also noted on the battery. It is important to label the 1st date of usage as the life span of the battery can be traced. Decision on when the next change of battery is required can be made better, especially when it is considered together with the voltage reading.

8. OTHER EQUIPMENT

This space is provided for writing down the status of some other equipment that may exist in the station.

9. DATA LOGGER

Functioning:

Using the manufacturer program to check and retrieve data files.

Refer to manual on the usage of the program if you are not sure.

Is the data logger storing data as it should?

Logger No.:

Note down the logger No. written on the logger. This is for identification purpose.

Diskette No.:

All diskette should be given a unique no. to avoid confusion.

Channel No.:

The channel of the logger where the data will be stored.

Time Interval:

The time interval of the logger data that was set for the series of data in each channel.

Date and Time On:

The date and time on which the series of data started.

Date and Time Off:

The date and time on which the series of data stopped or terminated.

File Name Given:

The name of the file that is given to the respective data series. The convention is to use the first six digits as the "Date and Time Off", the next two digits derived from the channel number and the file extension based on the first three letters of the station name, e.g. HAR for Haripura. Effectively it can be abbreviated as "DDMMYYCC.SSS" for easy remembrance. Be sure not to overwrite an already existing file!

Station Inspection and Evaluation Form I

STATION INSPECTION & EVALUATION FORM FORM HI0/92 Indo-German Bilateral Project Watershed Management		Station : <u>DONDKI</u> State : <u>M.P.</u> Date : <u>17.10.93</u> Observer : <u>R.L. Yadav.</u> Silt Analyst : <u>-</u>				
Station Inspection Check List G = Good M = Medium B = Bad	G	M	B	Work Executed in this trip /Remarks	Follow-up Work Required in Next Trip	
General <input type="checkbox"/> Housing <input type="checkbox"/> Surrounding <input type="checkbox"/> Silting of Weir <input type="checkbox"/> Clearance <input type="checkbox"/> Observer Reading	✓					
2. Manual Rain Gauge <input type="checkbox"/> Collecting Can						
3. Automatic Rain Gauge <input type="checkbox"/> Collector <input type="checkbox"/> Tipping Bucket <input type="checkbox"/> Pen/Drum <input type="checkbox"/> Housing	✓			Cleaned ? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N Clock Checked ? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N <i>graph changed</i>		
4. Stick Gauge <input type="checkbox"/> Position <input type="checkbox"/> Range				Level checked ? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N Cleaned ? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N		
5. Water-level Recorder <input type="checkbox"/> Functioning ? <input type="checkbox"/> Pen Writing <input type="checkbox"/> Floater Working	✓			Range checked ? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N Clock checked ? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N		
6. Bench-mark <input type="checkbox"/> No. _____ <input type="checkbox"/> No. _____				Level Checked ? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N		
7. Battery <input type="checkbox"/> Functioning ? <input type="checkbox"/> Wiring Connection ? <input type="checkbox"/> Battery Fluid Level ? <input type="checkbox"/> Battery Voltage : _____ <input type="checkbox"/> Installed Date: <u>16.07.93</u>	✓			<i>2 wires were cut down by rats which is repaired.</i>		
8. Other Equipment <input type="checkbox"/> wind speed sensor <input type="checkbox"/> Solar panned <input type="checkbox"/> data logger <input type="checkbox"/> Temp. sensor	✓			<i>Data could not retrieved due to misperformance of laptop Computer</i>		
9. Date Logger <input type="checkbox"/> Functioning ? <input type="checkbox"/> Logger No. <u>E01606</u> <input type="checkbox"/> Data Logger files Retrieved in this trip: <i>[Signature]</i>						
	Diskette No.	Channel No.	Time Interval	Date / Time On	Date / Time Off	File Name
Station Inspected By: <u>V.P. Chowbey</u> <i>station incharge, Sabal</i>	Date: <u>17.10.93</u>	Date of Next Trip: <u>10.11.93</u>				

Abbreviations and Explanation of Indian terms

1 USD	-	42 Rs. (in August 1999)
1 DM	-	24 Rs. (in August 1999)
A.P.	-	Andhra Pradesh: A State of the Indian Union
AED	-	Agricultural Engineering Department (Tamil Nadu)
AI SLUS	-	All India Soil and Land Use Survey (New Delhi)
Akhlu	-	Name of birhore tribal farmer
Anganwadi	-	Central government sponsored scheme on pre-school children
Arjun	-	Name of a man
Ashram	-	A community living and working together on a campus
Bajra	-	Cereal
Banas	-	Name of a river in Rajasthan
Bigha	-	Measurement of land (8 bigha = 1 hectare)
Birhore	-	A tribal community in the Chotanagpur plateau in Bihar
BMZ	-	German Ministry for Economic Cooperation and Development
Brinjal	-	Egg plant
BSA	-	Banwasi Seva Ashram (NGO in Uttar Pradesh)
BSNSS	-	Baba Shrinath Siksha Sansthan (NGO in Uttar Pradesh)
Channa	-	Chickpea
Chotanagpur	-	Region in south - Bihar
cm	-	Centimeters
Crore	-	Equal to ten million
Dal	-	Pulses
Damodar	-	Name of a river
DDP	-	Desert Development Programme
DM	-	District Magistrate
DPAP	-	Drought Prone Areas Programme
Dunger-Dai	-	Para-vet
DVC	-	Damodar Valley Corporation (Bihar)
EPIINFO	-	Statistical software
FAO	-	Food and Agriculture Organization
FCRA	-	Foreign Contribution Regulation Act
FD	-	Forest Department
FPR	-	Flood Prone River
g/l	-	Grams per litre
Gandhi	-	Leader of independence movement
Ganga	-	Name of a river
Ghats	-	Mountain range
Ghunghat	-	Veil
Gobhi	-	Cauliflower
GoI	-	Government of India
Gomti	-	Name of a river
Gram	-	Village
GTZ	-	German Technical Cooperation
Gundli	-	Cereal

GWMS	-	Groundwater monitoring station
H.P.	-	Himachal Pradesh: A state of the Indian Union
ha	-	Hectare
Hardas Ka Was	-	Name of a village in RWS Burhanpura, Rajasthan
Heera Devi	-	Name of a woman
HRD	-	Human resources development
IARI	-	Indian Agricultural Research Institute
ICAR	-	Indian Council of Agricultural Research
IDEA	-	Integrated Development Through Environmental Awakening (NGO in A.P.)
IGBP	-	Indo-German Bilateral Project "Watershed Management"
IIT	-	Indian Institute of Technology
Indira Awas Yojana	-	Centrally sponsored programme for housing
Jowar	-	Cereal
JRY	-	Jawahar Rozgar Yogana
Kacha	-	Temporary
Karma	-	Village in Bihar
Kathas	-	Land measurement unit (45 kathas = 1 hectare)
Kharif	-	Summer crop
KIGS	-	Kumarappa Institute of Gram Swaraj (NGO in Rajasthan)
Kisan	-	Farmer
Kisan Mela	-	Farmers Fair
Kumarappa	-	Name of a freedom fighter
Kurti	-	Short top (dress for ladies)
KVIC	-	Khadi and Village Industries Commission
Lakh	-	Equal to one hundred thousand
Lehnga	-	Long pleated skirt (Dress for ladies)
m ³ /s	-	Cubic metre per second
Mahila Mandal	-	Women's council
Mahua	-	A local tree species
Mandopura	-	Name of a village in RWS Burhanpura, Rajasthan
Mandua	-	Cereal
Mayurhand	-	Name of a village in RWS Karkara, Bihar
mm	-	millimetre
MoA	-	Ministry of Agriculture
Mungiya Devi	-	Name of a woman
MYRADA	-	An Indian NGO based in Bangalore
NGO	-	Non-Governmental Organization
NIH	-	National Institute of Hydrology in Roorkee
NWDPRA	-	National Watershed Development Programme for Rainfed Areas
Pakka	-	Permanent structure
Para-vet	-	An individual provided with basic know-how and skill for veterinary care
PEP	-	Programme Evaluation Protocol
PI	-	Principal Investigator
PRA	-	Participatory Rapid Appraisal
PRADAN	-	An Indian NGO based in New Delhi, with offices in Hazaribagh, Bihar
PRI	-	Potential Runoff Index
Purulia	-	District in West Bengal
Rabi	-	Winter crop
Rajputs	-	Community in Rajasthan
Ram Niwas Yadav	-	A farmer in RWS Burhanpura

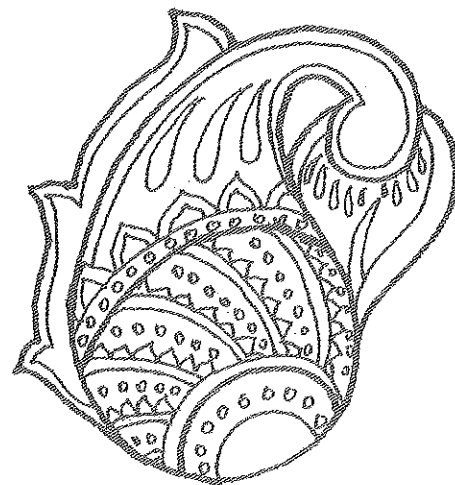
Rohini Devi	-	Name of a woman
Ruth Magalir Sangha	-	Self-Help Group in RWS Kattery, Tamil Nadu
RVP	-	River Valley Project
RWS	-	Representative Watershed
Sahibi	-	Name of a river in Rajasthan
Salamoor	-	Village in RWS Kattery, Tamil Nadu
Samiti	-	People's organisation
Sansthan	-	People's organisation
Santosh Kanwar	-	NGO worker in RWS Burhanpura
SC	-	Scheduled Castes
Seva	-	A word in Hindi for help
SGD	-	State Government Department
Sheesham	-	Tree species
SHG	-	Self Help Group
Shiksha	-	Education
Shivalik Hills	-	Foothills of the Himalayas
Smokeless Chula	-	A cooking stove that consumes lesser quantities of fire wood
SMS	-	Silt Monitoring Station
Sone	-	Name of a river in Uttar Pradesh
SPD	-	Society of People for Development (NGO in Uttar Pradesh)
SPSS	-	Statistical software
ST	-	Scheduled Tribes
Sultanpur	-	District in Uttar Pradesh
SUTRA	-	An Indian NGO, based in Himachal Pradesh
Swaraj	-	Freedom
SYI	-	Sediment Yield Index
to	-	Tonnes
U.P.	-	Uttar Pradesh: A state of the Indian Union
UNEP	-	United Nations Environment Programme
UNICEF	-	United Nations International Children Education Fund
VDC	-	Village Development Committee
WHOIS	-	World Health Organization Information Services
WMO	-	World Meteorological Organization
WPR	-	Watershed Project Report
Yamuna	-	Name of a river in Uttar Pradesh

Description of Photographs

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Page 10	-	Well managed watershed in Tamil Nadu
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Page 23	-	Check dam for erosion control in RWS Burhanpura, Rajasthan
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Page 41 (top)	-	Checkdam in RWS Burhanpura, Rajasthan
Page 41 (lower l.)	-	Rope making as an income generation activity, Nawazgarh, Uttar Pradesh

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Page 43 (top)	-	Village meeting in RWS Burhanpura, Rajasthan
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OUR LAND, OURSELVES chronicles the experiences of the Indo-German Bilateral Project "Watershed Management" on how to strengthen ongoing efforts in watershed management in India.

The first part of this book describes the opportunities and challenges encountered and the strategy followed by the project.

The second part renders in great detail the procedures, protocols and guidelines developed by the project.

our land, ourselves

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The German Technical Cooperation (GTZ) is implementing worldwide, on behalf of the German Ministry for Economic Cooperation and Development their technical cooperation projects.



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