Rainfall Monitoring[1]

A. *Before You Start*

Importance

Rainfall measurements are important meteorological data. Rainfall rate and quantity interact with many other factors to influence erosion, vegetative cover, groundwater recharge, stream water chemistry and runoff of nonpoint source pollution into streams.

Rainfall observation from various sites is especially significant in the Philippines because of its mountainous terrains and islands. Datasets from global models and limited number of ground stations do not capture the fine-scale rainfall patterns necessary to describe local climate.

Rainfall observation and recording is a good opportunity for students to apply learned scientific methods and to realize how historically recorded data can help in understanding and predicting events such as floods and droughts.

Method

A standard rain gauge is mounted in a proper location and rainfall data are collected at least once on a daily basis. Data are then entered into a computerized spreadsheet for inclusion in other forms of data archiving and analysis.

Equipment and Supplies

- Rain Gauge with 0.1 inch or 2 mm increments (or finer)
- Post
- Clipboard
- Data Sheets
- Pencil or Ballpen
- Computer

Constraints

Placement and reading of rain gauge are critical to accurate measurement of rainfall. Data log must be kept up-to-date. A reading must be taken every day. For drought monitoring, it is important to record observations even if there is no rainfall on a given day.

[1] *"The Clean Water Team Guidance Compendium for Watershed Monitoring and Assessment State Water Resources Control Board",* http://www.swrcb.ca.gov/nps/docs/cwtguidance/5111sop.doc. Revisions were made to suit the project requirements.

Quality Assurance

Two or more rain gauges may be placed on the site or within short distances. The comparison data sets can yield quality assurance information.

Data Value

Rainfall observations performed uniformly and continuously over a period of time are valuable inputs in developing climate models and predicting events such as floods and droughts. They capture the fine-scale rainfall patterns necessary to be able to develop a local climate model and verify remotely sensed data.

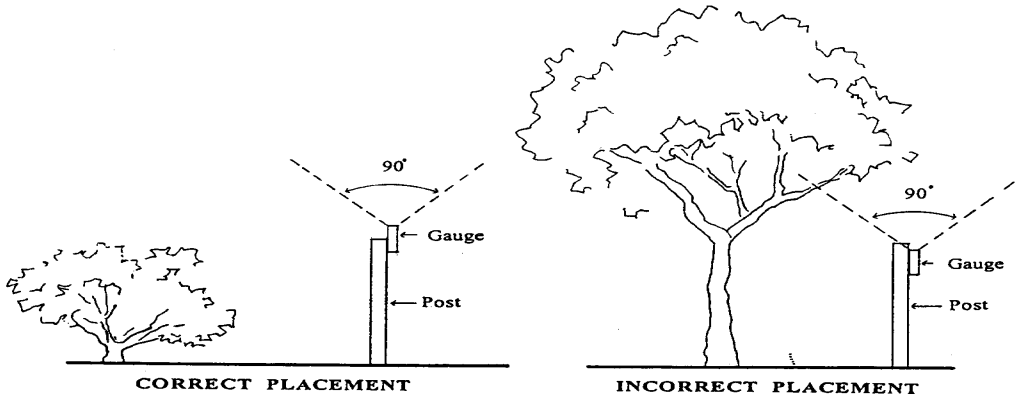
Rainfall data may also significantly contribute to the understanding of the relationships between local rainfall and the stream flow, hydrogeology and geomorphology of watersheds.

B. *Monitoring Instructions*

Rain gauge monitoring requires little equipment and a small amount of time: the greatest need is dedication to the activity over the course of a year.

Setting up the Rain Gauge

Place the rain gauge in an appropriate location where the gauge can be easily checked. The gauge must be positioned in an area which is clear of obstruction within an imaginary 90 degree cone, as illustrated below. Secure the gauge to a post or other object that will not bend in high winds. Make sure the gauge is "true" (not tilted in any direction) and has at least 4 feet of clearance from the ground to avoid any splash water.



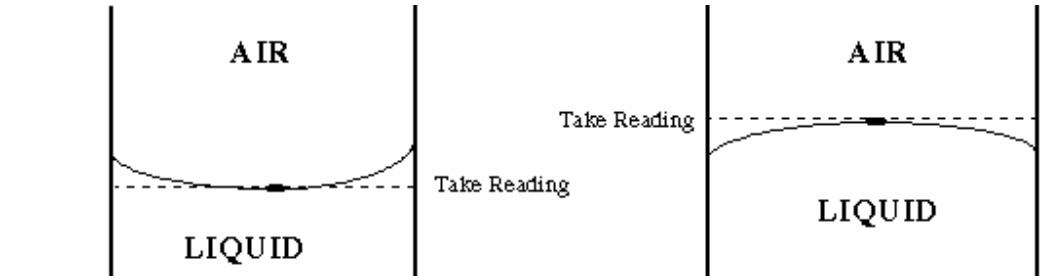
The gauge should remain in the same position for the entire year. A sample rain gauge data sheet for recording daily rainfall totals can be found on the last page of this protocol.

Procedure

The teacher must designate a “rain gauger” who will be responsible for monitoring the rainfall data. An alternate rain gauger must also be assigned in case the designated rain gauger is not available. The duration of the assignment for monitoring the rain gauge will depend on the teacher. However, it is important that there is an assigned rain gauger and an alternate rain gauger at all times to ensure that no precipitation data is missed.

The teacher and the rain gauger will choose a specific time of day to monitor the gauge. The gauge must be monitored every day in the previous 24 hours. Mornings are best, as captured precipitation will quickly evaporate when the weather clears. It is important to indicate in the record if there is no rainfall during the 24-hour period. The monitoring procedure is as follows:

1. At the specified time of day, read the amount of captured precipitation. The water in the gauge is likely to appear rounded at the surface when observed at eye level. This is caused by water tension and is called a *meniscus*. The gauge is read at the center point of the meniscus.



2. Record the reading, including units (inches), before removing the gauge from its base. After recording the value, double check your reading, then empty the gauge and reset it.

3. Additional readings may be taken during the day, but DO NOT EMPTY the gauge after these midday readings unless the rain gauge is predicted to spill-over. Note that entries #2 and #3 in the sample rain gauge journal are midday readings. No “24 hour” notation was made, and the values in the “Reading(s)” column are cumulative, not added, since the gauge was not emptied during this period.

4. Additional readings may also be taken during the day if there is a possibility that the rain gauge will spill-over due to heavy rains. Record the time and the reading in the journal as illustrated below. In this case, EMPTY the rain gauge each time of the readings and ADD all the readings for the 24-hour duration. Note that entries #8 and #9 are midday readings and no “24-hour” notation was made. The values in entries #8, #9 and #10 in the “Readings” column are added and the total is indicated on the “24-hour” notation of entry #10.

5. Use the Remarks column to record observations such as no rainfall, trace of precipitation which did not register on the gauge, heavy rain, driving rain conditions which might affect the operation of the gauge, or other phenomena of interest.

6. Indicate the name of the persons recording and verifying the rainfall data.

Sample Rain Gauge Journal

Entry No.	Date (mm-dd-yy)	Time	Reading (inches)	24 Hour Total Rainfall (inches)	Remarks	Recorded by	Verified by
1	1-01-07	8:00 am	0.35 in	0.35 in	Light, steady rain all night		
2	1-01-07	12:30 pm	0.25 in		Still raining steadily – no wind		
3	1-01-07	5:00 pm	0.50 in		Clear at dawn		
4	1-02-07	8:00 am	0.56 in	0.56 in	Rain tapering off		
5	1-03-07	8:00 am	0	0	No rainfall		
6	1-04-07	8:00 am	0	0	No rainfall		
7	1-05-07	8:00 am	1.50 in	1.50 in	Heavy rain		
8	1-05-07	12:00 pm	0.50 in		Heavy rain/ **Emptied the rain gauge**		
9	1-05-07	5:00 pm	1.00 in		Heavy rain/ **Emptied the rain gauge**		
10	1-06-07	8:30 am	0.50 in	2.00 in	Light, steady rain all night		

Rain Gauge Journal

Entry No.	Date (mm-dd-yy)	Time(s) (am/pm)	Reading(s) (inches/ mm)	24 Hour Total Rainfall (inches/ mm)	Remarks	Recorded by	Verified by