Indicator 1. Soil Loss

Data to be collected extractively.

Data to be collected:
* Rainfall at several poins in the watershed
* Water level and water velocities at the outlet of the watershed.
* Sediment concentration at the outlet of the watershed.
* Cross section of the river where the water level is being measured.

The sediment load of the river, that is the volume of sediment carried out by the river during a given time period, is a proxy for the erosion rate in the watershed. To eliminate climatic changes, data must be collected continously during monsoon for several years (minimum 7-10 years). Furthermore, a control watershed outside of the project and has to be monitored in order to pinpoint the impact of the Programme activiities. Hence, a very expensive and long-term effort, which is only justifiable for projects with major financial input.

TEAM MEMBERS (NUMBER AND SKILLS)
1. A Hydrologist: will establish Silt Monitoring Stations (SMS), train and supervise local observers. The hydrologist will also be responsible for analysing and publishing data.
2. Three Silt Observers: Since the SMS are to be operated 24 hours a day during the monsoon, three silt observers must be hired locally. They will be trained by the hydrologist to perform their duties.

NECESSARY TOOLS AND SUPPORT
Data has to be collected during the monsoon at half hour intervals, twenty-four hours a day. Data should be collected from the watershed before the programme starts its activities and from nearby watershed where the programme will not be active.   In this manner, controlled, time-series data can be collected.

1. SMS consisting of a stilling well with housing
     for the instruments and a small building
     (2 rooms) for the silt laboratory.
2. Hydrological instruments:
*   5 Automatic Rain gauges
*   1 Water level sensor
*   1 Data logger
*   1 Current meter
*   1 Stop watch
*   1 Set of stick gauges
* 1 Turbidity sensor
* 1 Punjab bottle sampler
*   Hydrological Data Collection form sheets

3. Silt laboratory Equipment
*   Set of Sieves
*   Electronic Balance
* Drying oven
*   Record books.
4. Data processing Equipment
* 1 PC plus printer
* 1 Data Reading Unit
5. Miscellaneous Equipment
* 1 Dumpy level

TIME REQUIRED TO USE INDICATORS
A minimum of seven to ten years are required to accumulate a sufficient amount of data.

FREQUENTY OF USE
Daily

SEQUENCE OF USE
The Silt Monitoring Stations should be operational preferably one or two monsoons before the programme starts.

SAMPLING
Sampling is not an issue regarding the placement of the SMS. There need to be only one SMS in each watershed. It is located at the point in the watershed past which all drainage flows. As mentioned under the "Frequency" section above, silt samples are taken from in front of this SMS once every half hour, twenty-four hours per day.

In order to carry out all the necessary calculations for this indicator, total rainfall in the watershed must be calculated. This requires the placement of approximately five rain gauges. These should be evenly distributed throughout the watershed (preferably near the residences of teachers or educated farmers who are willing to take readings).

FINAL PRESENTATION AND ANALYSIS
The data collected from the SMS should be presented in a table like the following sample taken from an IGBP Report*

*Guy Honore and S.Kumar, "Analysis of Rainfall and Runoff Data of Project watersheds", IGBP Technical Publication, 76/97, 1997.

The key column on this table is Runoff-Rainfall-Ratio (Q/R). This figure represents the percentage of the watershed's total runoff that flows past the SMS. If this percentage is high, less rainfall has been absorbed by the ground and more has run into the local streams. The logic is that more runoff leads to more erosion and less ground water recharge. When enough data has been accumulated, a time-series analyses of the Runoff-Rainfall-Ratio can be undertaken. If erosion control treatments are successful, the Q/R ratio will decrease in value.

Data must also be collected for monthly sediment loads. Once again, when enough data has been accumulated, a time series analysis can be executed. Like the Q/R ratio, the values for this variable should decrease if treatments are successful.