Basic Research with Practical Applications include basic studies on soil clay dispersion such as the photo on the left. We found for a wide range of soils that Mg promotes dispersion over Ca. Since dispersion promotes runoff and erosion the practical implication is that liming fields with dolomitic lime will increase the potential for water erosion.

Drainage Condition: Erosion by an interrill-type surface scour. Sediment regime is detachment limiting due to high soil strength or low soil erodibility. Seepage Condition: Severe rilling occurs. Sediment regime is transport limiting due to low soil strength or high erodibility.

The Water Erosion Prediction Project (WEPP)

WEPP Windows Hillslope Interface: second beta version, March, 1999. Purpose is to replace the current DOS interfaces which are text-based and were not designed for field users. Hillslope Windows interface depicts a slope profile with cursor-sensitive icons that allow selection, copying, cutting, pasting, deleting, and editing of soil, management, climate, slope information. A watershed interface under development. WEPP Windows interfaces provide basis for WEPP in common MoSES interface.

Technology Transfer

The Water Erosion Prediction Project (WEPP)

The Water Erosion Prediction Project model represents a new erosion prediction technology based on fundamentals of stochastic weather generation, infiltration theory, hydrology, soil physics, plant science, hydraulics, and erosion mechanics. The hillslope or landscape profile application of the model provides major advantages over existing erosion prediction technology. The most notable advantages include capabilities for estimating spatial and temporal distributions of soil loss (net soil loss for an entire hillslope or for each point on a slope profile can be estimated on a daily, monthly, or average annual basis), and since the model is process-based it can be extrapolated to a broad range of conditions that may not be practical or economical to field test. In watershed applications, sediment yield from entire fields can be estimated.

A CD-ROM was released July, 1995 with WEPP and a DOS interface for general public use. A WWW site [http://topsoil.nserl.purdue.edu/weppmain/wepp.html] also was established for information, technical support, and free downloads of developed software. A new Windows based interface is being developed which will be incorporated into a Multi-scale Soil Erosion System (MoSES) that will include WEPP, WEPS, RUSLE2 and RWEQ models.

Precision Agriculture research is being conducted to control erosion while improving yields through better water management. The left half of the field below was treated with 1 ton of by-product gypsum surface applied in a no-tillage system while the right side was untreated.

Sustainable production is threatened by water erosion. Although crops may look uniform to the eye, redistribution of water on the landscape can greatly affect the variability of grain production and therefore, profitability.

Estimation of sheet and rill erosion, deposition, and sediment delivery from hillslopes.

Evaluation of the effects of different crops, rotations, and tillage systems in conservation planning.

The WEPP model has been linked with the Arc-view 3.0 GIS, and procedures for automatic delineation of watershed boundaries, hillslopes, and channels are being developed.

Estimation of erosion and deposition in channels such as ephemeral gullies and grassed waterways in small watersheds.

USLE Database

The NSERL serves as a repository for the Universal Soil Loss (USLE) Equation Data which is available on the internet along with other NSERL developed software and data.

Basic and Applied Research

The NSERL’s basic research program is to understand the basic processes that cause soils to erode and to be able to develop economical methods to control erosion in the field that will be accepted in agriculture and industry. The basic causes of soil surface sealing and runoff generation and an understanding of how low electrolyte content of rainwater causes clay dispersion has led to field scale studies to control erosion through the use of by-product gypsum and organic polymers such as polyacrylamide. The field scale studies grew from our basic laboratory studies on infiltration, aggregate stability, dispersion/foucussation and surface sealing. Studies in the laboratory have also shown the importance of drainage on controlling erosion and field studies are being planned. Research includes, biological, chemical and physical aspects.

Basic research with practical applications include basic studies on soil clay dispersion such as the photo on the left. We found for a wide range of soils that Mg promotes dispersion over Ca. Since dispersion promotes runoff and erosion the practical implication is that liming fields with dolomitic lime will increase the potential for water erosion.

Corn Yields, 1T/A Gypsum (1997)
**Cutting Edge**

The NSERL has been a leader in development of specialized equipment for erosion process research. These include many types of rainfall simulators for field and laboratory use and laser scanners for quantifying surface roughness and its changes due to erosive forces. Equipment developed at the NSERL is being used in many research projects all over the world.

- Field and laboratory rainfall simulators
- Laser scanner for micro-topography measurements.
- Infiltrometers used to collect data on infiltration, runoff, and traction.

**History**

The National Soil Erosion Research Laboratory (NSERL) was opened on the Purdue University Campus in 1982. The NSERL was constructed as a result of funding provided by Congress with the support of Purdue University and sponsorship of the legislation by former Senator Birch Bayh. The laboratory was established at Purdue University because of the long history of water erosion research here. Over the years, many famous names in soil and water conservation have graced this location. The location was the birthplace of the Universal Soil Loss Equation (USLE), the Revised Universal Soil Loss Equation (RUSLE), and the Water Erosion Prediction Project (WEPP). These models have been, are, or are envisioned to be the methods of erosion prediction that are used by the USDA to administer billions of dollars in farm program dollars and also by many people far too numerous to mention in conserving our nation’s and the world’s natural resources. The laboratory’s budget is small in comparison to many ARS locations in the USA and the world, yet we are extremely productive because of linkages with other interested industries, organizations, government agencies, NGOs, and most of all, American Agriculture. Our basic research program, which is the foundation of the NSERL, attracts financial support from a wide variety of areas. These include: private farms, other government agencies, agricultural industries, the electric power industry, other countries, the United Nations and a multitude of other interested parties. Our laboratory, although small in size, is one of the most recognized soil and water research laboratories in the world. We have been recognized as such, by being selected to host the 10th International Soil Conservation Organization Conference in May 1999. This is the first time this meeting will be held in the continental USA. Our staff works very hard and is very proud of our accomplishments. We are open to any suggestions to improve our outreach and cooperative research endeavors. Please understand that we are small in number and do have limited resources and personnel.