Luke Reusser
Critical Writing Seminar
For 3/6/02

Gellis, Allen C., Pavich, Milan J., Bierman, Paul, Ellwein, Amy, Aby, Scott and Clapp, Eric, 2002, **Modern Sediment Yield Compared to Geologic Rates of Sediment Generation in a Semi-arid Basin, New Mexico-Quantifying the human impact.** For submission to

Allen's paper attempts to determine the impact of human activities upon sediment yield in a semi-arid basin by contrasting background rates of sediment production (on a geologic time scale) with modern rates of sediment yield. Modern, short-term sediment yields for various geomorphic surfaces (mesa, steep colluvial slope, gently sloping hillslope, and alluvial valley floor) within the Rio Puerco, New Mexico, were measured using sediment traps and straw dams. It was found that average modern sediment yields in alluvial valley floors are up to an order of magnitude greater than background (geologic) rates of sediment production determined using 10Be cosmogenic nuclide concentrations. Gellis argues that this increase is the result of the installation of a gas pipeline and grazing practices within the valley floor which decrease vegetation cover and rates of infiltration. An alternate cause for the increase could be natural cut and fill cycles associated with longer-term climatic fluctuations. It is therefore difficult to determine whether the increased sediment yield in recent years reflects natural cycles, impacts of human practices or a combination of both.

Although I find the subject matter and management implications of this paper interesting and important to the assessment of human impact on natural systems, I feel that there are several issues that need to be worked out. After reading the paper several times, I am not sure what exactly you have concluded and/or what exactly can be concluded from the data presented in light of the limitations and alternative explanations for increased sediment yield in the short term. On a more technical note, figures 1 & 4 are not readable. I don't know if resolution was simply lost during bouts of email. Some of the figure captions could be more descriptive and informative (e.g. Figure 2; what exactly should we take away from it?) There are some minor formatting things that I will address below. It may be beneficial to readers not intimately involved with sediment work to have a quick section describing the differences and connections between erosion rates, rates of sediment productions, and sediment yield and what they can tell us about a drainage basin.

At this point, I am not sure this paper is ready for publication. I don't agree with your conclusion that 'results from this study provide a methodology…to determine short term sediment yields, comparable to geologic rates of sediment production…in order to assess human influences on erosion of the landscape.' I had trouble following the 'sediment measurement and grazing section.' What exactly did you want us to get from the comparison to mountainous Idaho (Kirchner et al., 2001)? The conclusions of your paper are based on the increased sediment yield over the short-term when compared to background rates, yet in this section you state that the 'similarities of geologic and short

term rates in the Arroyo Chavez may suggest several hypothesis…' I think I have weeded out what you are trying to say, but it is rather confusing and I am not sure what the relevance or benefit of this comparison is. My knowledge of the intricacies of sediment yields in semi-arid regions is limited, but from the data presented, I am not convinced that you can determine the cause of the increased sediment yield. As you have stated in your paper, it could be the result of an aggradational cycle caused by climate fluctuations or by grazing practices or a combination of both. I don't know how you could quantify how much is caused by grazing if any at all. How representative of sediment yield is sediment capture behind hay bails?

Specific Comments are keyed to numbers in the manuscript:

1) add of 'sediment yield' or whatever you are trying to say.
2) add 'in order to quantify human impact,' or something. That is the overall goal of the study.
3) I am not sure exactly what effect this gasline has on the sediment yield. Maybe a few words of explanation.
4) Can't read figure
5) Maybe briefly explain what readers should see in this figure.
6) 'Random Locations?' How did you achieve this? How are they representative of vegetation cove at that particular location?
7) Should this go in the discussion?
8) Add a brief explanation of how lithology can affect erodibility and sediment yield.
9) What does a slightly drier climate suggest about sediment yield in semi-arid regions?
10) What do these comparisons tell us?
11) Related to #3. What affect could trenching during installation of the gas pipeline have on sediment yield in the short-term?