River Connections: Sharing Science through Film

Summary: Your final project will give you the opportunity to learn a process-based approach to river research, by developing research questions about river form and function. You will also learn to present your research results in the form of a video. As film becomes increasing popular, scientists are learning methods of engaging the general public through this medium rather than writing an article. Learning to present results as a video will improve your communication skills and help you to be able to convey what you are doing as scientists to the general public.

Goals:

1) The term project is an opportunity for you to design a small-scale, process-based research project of your own choosing. Research needs to be directed at a well-defined problem or hypothesis.
2) Learn how to collect and analyze fluvial geomorphology data in local rivers.
3) Develop a testable hypothesis and appropriate field methods by writing a short (2 - 3 page) research proposal.
4) Learn how to create a film using Apple's Final Cut Pro X
5) Develop video presentation skills by presenting your research and results in a **6 minute** video
6) Improve communication and collaboration skills by learning how to engage the general public with your science through film.

Task: You are being asked to develop a research question about rivers in Maine.

1) You will first **develop a testable hypothesis**. You will need to get approval of your hypothesis by ***March 1st***. The hypothesis should be a very short and simple statement that you can test using the observations you collect. The hypothesis should be followed by a brief rationale explaining the reasoning underlying the hypothesis.
2) You will need to **write a 2 to 3 page proposal** by ***March 8th***. The proposal should include the following:
    a. A brief introduction (including a literature review) - A minimum of 3 cited references is required. All references must be from books or peer-reviewed works (e.g., journal articles).
    b. Hypothesis and justification
    c. Methods
    d. Expected results
    e. References
3) **Collect data** during lab and over the weekend field trip**.**
4) **Analyze your data –** You will be able to spend three lab periods working on data analysis and developing your 6-minute final video.

5) **A storyboard is due for your video by April 25th.** The storyboard includes a description of what you will portray in each segment of the video and your narration.
6) **Final Video** – You will develop a 6-minute video, which you will show in class (***May 7th***). Your video will need to contain an introduction, presentation of methods, results, discussion, and conclusion. An IT associate will come to class on April 18th to train you on how to use the video software. She will also come to lab to help with troubleshooting as you work through developing your videos.

Developing a testable hypothesis:

A hypothesis is a limited statement regarding cause and effect in specific situations; it also refers to our state of knowledge before experimental work has been performed and perhaps even before new phenomena have been predicted. You must pose your hypothesis as a testable statement. For example, you cannot state "The purpose of this study is to evaluate how grain size differs along a streams longitudinal profile." You can state "I hypothesize that there will be a smaller average bed grain size from the headwaters to the mouth of a river system." Then go on to explain why, and explain the criteria that you will use to evaluate the grain size. Stating a testable hypothesis forces you to think through a problem more carefully and thoroughly, and to develop a conceptual model. ***A hypothesis cannot be proved. It can be disproved, or it can be supported.***

Notes about final video:

Your final video needs to follow a similar format as a scientific research paper.

- **Introduction:** The introduction of the video should set up the basis for the hypothesis that is being tested. Why do you think that average bed grain size will change as you go downstream, for example?
    - Include a location map and description of your site or sites.
- **Methods:** Describe the methods you used in the field and video of you collecting data.
- **Results –** *Presentation of Data - Figures and Tables:*
    - Include figures and tables that support your thesis and help the audience understand the topic. Consider what video you can use from the field that will help your audience understand your results.
    - Develop objective comparisons of quantitative data. Anything you want to examine can be quantified, and quantification facilitates comparison using graphs or statistics. The significance of differences in mean values for two different sample populations can be assessed with a t-test, for example, and the significance of the R^2 values can be statistically tested.
    - When making graphs, think about the data you are plotting and what each point represents. For example, do not connect individual data points with a line if you made measurements at discrete spatial or temporal intervals and do not know the conditions between those intervals (a line implies continuous change between measurements).

- **Discussion:** The discussion section of the video should explain why you are interpreting your results to either support or reject your hypothesis.
- **Conclusion:** The conclusion should re-emphasize the main findings of your research.
- **References:** References cited in the video should be used to provide a context for your work.
    - Any information in the video that is not either common knowledge (e.g. the Earth is round), or a product of your own research, should have a citation.

Worth:

30% of your final course grade: proposal 20 points, storyboard 20 points, final video 60 points

Example hypotheses from projects last year:

- In a bedrock channel, velocity increases at a faster rate than width or depth in the downstream direction.
- Dam removal will cause a base level change that will result in channel incision and migration of a headcut.
- Width to depth ratios will be significantly larger downstream of a dam removal site, because of increased sedimentation.
- Average sediment size and standard deviation are decreased downstream of a dam removal site because of bed fining from increased sedimentation.