

Student Application Cover Sheet for CLA Technology Fund Grants

Project title: Using Remote Sensing to identify stream impairments

Duration of Project: From: 1/16/07
Month / Day / Year

To: 5/10/07 (completion date)
Month / Day / Year

Funds Requested: (max. \$3000): \$350

Description of Project:

(In this space or on one separate sheet, provide a descriptive plan of the work you propose to undertake.)

See proposal

Project Goal:

(Provide an explanation of what the final product/goal is for the project and how/when it will be demonstrated.)

See proposal

The proposal you submit with this application must include an itemized budget:

(In the space provided or on a separate sheet, provide an itemized budget for your proposed project.)

See proposal

Yes ☐ No ☒

Have you previously received a CLA Tech. Fund Grant? If yes, give date, project title, amount.

Past award recipients must have completed a final report and evaluation for all previous projects before they will be considered for another award.

Yes ☐ No ☒

Have you investigated the availability of other funds? If yes, please provide details:

Yes ☐ No ☒

Does this project involve the use of human subjects? If yes, you must receive approval from the Committee on the Use of Human Subjects in Research using their *Request for Approval* form. For more information about this topic go to the *Research Subjects' Protection Programs* webpage <http://www.research.umn.edu/subjects/index.cfm>

Date Applied: _____ Date Approved: _____

Please contact Peter Angelos at (218) 726-7350 or pangelos@d.umn.edu if you have any questions.

Project participants must comply with all University policies, including those addressing responsible conduct of research and intellectual property.

Introduction:

The vast world of technology continues to advance at a rapid pace. As certain technologies advance, it is important to explore the many different uses one particular technology can encompass. Remote sensing is one example of a technology which is has advanced significantly in a short time period. The implementation of satellite images has allowed the uses of remote sensing to become diverse and numerous. Therefore research must be done with current remote sensing technology to fully understand its capabilities.

Project Goal:

Many watershed managers use GIS and remotely sensed imagery to quickly identify areas of concern. However it is not known what resolution (scale) imagery is ideal in detecting stream impairments or what impairments can successfully be detected. Currently the Natural Resources Research Institute is working on restoring the Lester River watershed. The Lester River is a great candidate for restoration due to its historically high turbidity. The impact of high turbidity is especially important because Lester River is a designated trout stream.

The completion of my senior project will determine whether the use of remotely sensed images can be used to identify stream impairments on the Lester River. If this method of identifying stream impairments proves to be accurate, it will be a useful tool for NRRI in restoring the Lester River watershed.

This project will also allow me to gain field experience which will help when applying to field technician jobs with environmental agencies. Also the project will give me the opportunity to do volunteer work with NRRI which I believe will also be helpful with future plans to work in the natural resources field. Last, completion of this project could potentially aid in improving the health of the Lester River.

Time Table:

I will begin conduction research as soon as possible. The first portion of this research will involve a literature review which will be turned in to my advisor, Stacey Stark, on the fourth week of spring semester, 2007. This will give me to opportunity to see what other individuals have accomplished with the use of remotely sensed images. After the completion of the literature review I will begin the first portion of the field work. The field work should take roughly two days to gather enough data on random sections of the Lester River. After the data is gathered, I will then compare it to the QuickBird image. After I have analyzed the data gathered in the field, I will then chose impairments that I see on the photo and once again go into the field to verify them. Finally, as a requirement of my senior project, I will construct a presentation and write a paper, which represent my conclusions as to whether remotely sensed images can be used to identify Lester River impairments.

Budget:

In order to complete this project with the highest amount of accuracy a QuickBird image must be purchased. I researched possible prices and have found one company, Digital Globe, who has a university discount. Digital globe has an image of the Lester River water shed at the following price:

$\$450 - \$100 \text{ (university discount)} = \350

Description:

Fortunately I am a future graduate, in May 2007, in the field of physical geography. This fact has enabled me to do research for the completion of my required a senior project. After consulting with NRRI and Stacey Stark, who will be my senior project faculty advisor, I have decided to research the use of remotely sensed images and their ability to identify stream impairments in the Lester River watershed.

This project will encompass both field and lab work. The field work component will involve walking along the Lester River at random locations while using a GPS to record any stream impairments. This following brief list includes some of the impairments that will be included in the research project:

- any non-point source activity that consolidates flow OR reduces retention time and water infiltration.
- direct discharge into the stream (sewer pipe, stormwater outlet, etc.)
- sloughing or exposed bank structure
- lack of canopy cover or riparian buffer
- eroded trails and direct stream crossings
- failing culvert (pools form above culvert)
- exposed instream habitat like open gravel bars
- ratio between conifer vs. deciduous riparian type

This list is not meant to be exclusive, meaning if I see something that is not on this list but appears to be impairment to the health of Lester River it will be included.

The lab component will involve analyzing two different types of remotely sensed images to identify the impairments which were located in the field. Also the images will be used to identify new impairments which will then be field checked. One of the images I will use has been processed by a satellite named QuickBird which is currently orbiting the earth. QuickBird produces high quality images with a resolution of 61 cm. Also the QuickBird image is taken during the spring (leaf-off) conditions which are preferred to reduce shadows and increase visibility of the river and its floodplain. DNR color infrared is the other image used to find stream impairments. These images have a resolution of 1m and are taken in the fall (leaf on).