



San Marcos Observing System Outreach and Education Final Report

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Education and Outreach Project Summary

This summary details the Education and Outreach component of the San Marcos Observing System (SMOS) project. Work began in August 2010 – August 2011. During this year (2011) many objectives of the SMOS project were completed and, more importantly, possible options for growth and development were explored. What follows is a summary of all of Education and Outreach accomplishments as well as the outcomes of the research and development phase.

Education-Based Revenue Generation Research

In order to help provide future funding for the SMOS project an initial objective to research the feasibility of creating a substitute teacher certification program for science, technology, engineering, and mathematics (STEM), using SMOS research results as a platform. The Education and Outreach (E&O) researchers determined that the geographic range of this initial inquiry should not be limited to the San Marcos River, but should include all of the Edwards Aquifer Region so that major school markets could also be captured.

The initial research found that nearly 534,000 students, 36,400 teachers, and 11,000 substitute teachers reside in the 15 counties located within the Edwards Aquifer Region. It was determined that an opportunity exists to involve these stakeholders in active learning regarding the use and protection of this vital resource.

The current methods of teaching science appear to have room for improvement as 24% of the students located within the Edwards Aquifer Region received failing marks on the Science TAKS Test, across all grade levels. Furthermore Science ranks between the worst two topics, when it comes to performance, among all of the school districts located in the region. Environmentally integrated curriculum offers schools an opportunity to improve TAKS scores and science learning by incorporating the environment into other subjects. Water is becoming the prime example of sustainability in the region as the population continues to grow; water resources are being increasingly stretched. The environmental movement is particularly strong in the Central Texas area and the idea of environmentally integrated curriculum looks to further capitalize on this trend.

Two target areas in the Edwards Aquifer Region were identified. The first was San Antonio, as the largest consumers of Edwards Aquifer water. San Antonio alone counts for 75% of the student population (or 300,000) in the region. These individuals will be heavily affected by the quality and availability of water, particularly the Edwards Aquifer, as the population in this area continues to grow. It is important to educate them on the importance of water conservation, which is a topic that will become even more prevalent during their lifetimes. The ability to properly educate teachers and students through interactive learning allows the River Systems Institute a unique opportunity involving the proprietary data created by SMOS (Appendix A: SMOS Science Results in Environmentally Integrated Curriculum).

Travis County and the Austin area represent another target due to the large population and relative density in population when compared to the western areas of the Edwards' Aquifer. There is also a trend towards westward expansion of Austin, moving more people into the Hill Country directly affecting the Edwards' Aquifer.

Appropriate curriculum development was also researched which could be distributed to classrooms and training seminars in the following areas: watershed delineation, ecosystem identification, surface runoff, and nonpoint source pollution (Appendix B: Aquarena Outdoors Curriculum).

The E&O team explored the feasibility of two options for revenue generation:

Certified Teachers and Substitute Teacher Workshops: These workshops would provide a significant emphasis on utilizing science in multiple disciplines and would integrate concepts such as: sustainability, environmental issues, and the impending water crisis.

Substitute Teacher Database: This database would provide districts with a list of teachers and substitutes that have been trained by RSI. This program could bolster the importance of attending the workshops so they could provide substitutes with an opportunity to differentiate them through extra training.

While both options were met with great interest, further research demonstrated that many organizations in Central Texas already provide substitute teacher training free of charge. The E&O team determined that these programs have great merit, but should be pursued in a future phase of SMOS or through other funding sources.

Future Revenue Opportunities

The Education and Outreach Team were tasked to consider alternative methods to generate revenue using the results of the SMOS research. Additional revenue would prolong the SMOS project beyond the current funding stream and would also allow the project to expand into other arenas. Below is a summary of potential feasible revenue opportunities.

Aquarena Outdoors

While the Army Corps of Engineers is working on the restoration of the peninsula at Aquarena Center, the staff will no longer be able to safely conduct tours on Spring Lake. A proposed alternative that would connect with SMOS and potentially generate revenue includes taking students up into the preserve and conducting a unique educational experience unparalleled to what we or any surrounding educational centers offer. This new tour would teach students about watersheds using some of the latest technology as well as combining it with traditional field methods. Aquarena Center staff would transport the students in a solar powered electric buggy up to the hillside preserve and then they would walk and conduct the activities on foot. Once the students are finished we would drive them back down the hillside in the solar powered electric buggy to a base camp or new visitor center.

The purpose of this tour would be to have students become a better informed individual about their watershed and how their decisions can impact their life. Students would learn the following information:

1. What is a watershed and why is it important?
2. What watershed are we located in at Aquarena center? What watershed do you live in?
3. How do we impact watersheds? What is the Quantity vs. Quality?
4. What organisms use our watershed at (Aquarena Center) and what impact human encroachment is making on the watershed?

During this field trip student will also learn or improve their skills using with the following tools:

1. Global Positioning System (GPS) unites, compasses
2. Binoculars, field guides both books, and online field guides from the Audubon Society on an IPAD or personal computer and field journals.
3. Digital Camera's and Digital Wildlife Camera's and card readers.
4. Water Testing kits or probes
5. Animal track pads and scents to attach the animals to that location.

Professional Development Courses

The research and technology used associated with SMOS is highly specialized. Many of these unique set of skills could potentially be developed into courses and be a new source of revenue. This would closely associate the mission of SMOS with that of the University. An example of a successful course that has already been developed and carried out is the *Instream Flow Habitat Modeling Course- Physical Habitat Modeling (PHABSIM)* instructed by Dr. Thomas Hardy, SMOS PI. The weeklong course cost each participant \$1000 and included instruction on the theory and application of physical habitat based instream flow modeling. The course also included the theory and application of Habitat Suitability Criteria (HSC) development, guild approaches for aquatic communities, spatial niche analysis techniques, habitat time series, effective habitat analyses and related time series based project flow scenario comparisons. Other courses that specialize in the technical skills required to conduct the in-depth research that SMOS has already completed could be valued by other members of the academic community and could secure a strong revenue source for SMOS in the future.

Kayak Tours of the San Marcos River with ORC

The Outdoor Recreation Center (ORC) located within Sewell Park rents kayaks and conducts outdoor programs to help facilitate the Recreation Departments goals. Another possible partnership could be formed between RSI and the ORC which could be mutually beneficial. Although the ORC rents kayaks and canoes out regularly, they do not provide guided tours with the caliber of SMOS researchers. Developing a relationship where SMOS researchers participate in guided tours, including the use of the glass-bottom kayaks, might be another source of revenue for the project.

Website Development

During the first six months of the project, the Education and Outreach team spent most of their time developing a comprehensive SMOS website that described the project (www.smos-rsi.org). The purpose of the website was to provide online visitors the opportunity to explore the San Marcos River through research findings in a format that is comprehensible to a broad audience.

The website was designed to give the user a natural feel with a logical interface. The website was developed using the website platform Square Space (www.squarespace.com). This allowed the RSI web developer to introduce new web content



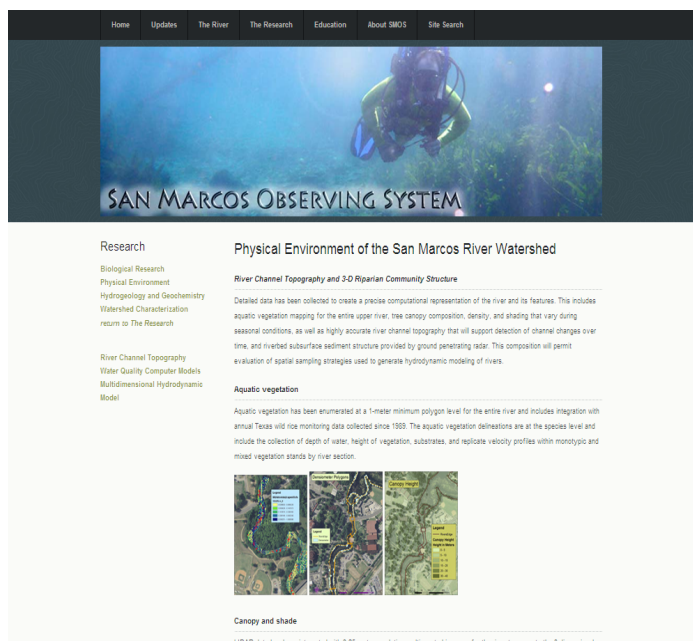
quickly. A large number of original maps were created and photographs were taken and many of them were put to use on the website (Appendix C: Maps). These photographs give the user a better understanding of the purpose of the project. Several photos have also been intentionally left off so that they can be changed out by SMOS staff in the future.

A page was created for: Home, Updates, The River, The Research, Education, and About SMOS.

Home Page: Provides a succinct description of the upper San Marcos River and the purpose of the SMOS project. It includes scrolling photographs of the researchers, research area, and areas of interest in the basin.

Updates Page: Provides summaries of outreach activities and updates to the website. This area could be used to highlight significant findings resulting from the research.

The River Page: Provides a brief geographic summary of the San Marcos River and links to a watershed map. It also includes a description and links to more pages, including:



- Archeology of the San Marcos
- Waters of the San Marcos
- Animal Life
- Plant Life
- Human Life

The Research Page: Provides a summary of all of the major components of the research, which is at the heart of the SMOS project. The summary is provided in a way that can be easily understood by a broad audience. It also includes a description and links to more pages that contain detailed information, maps and photographs, including:

- Biological Research
- Physical Environment
- Hydrogeology/Geochemistry
- Watershed Characterization of the Blanco River

Education Page: This purpose of this page was to provide a forum for any educational materials developed during the first phase of the project. Presently it includes links to a glossary developed by the E&O team, Learn About Water page, Learn about the San Marcos page, and Research Papers published by researchers.

About SMOS Page: This provides another more in-depth description of the SMOS project and links to pages, including:

- River Systems Institute
- Staff and Stakeholders
- Special Consideration
- Immediate and Long-Term Objectives
- Press Releases

Website Content Development for a General Audience

The E&O team created all the content about the SMOS project through research and interviews with researchers and their staff. What follows is a summary of the content that can be used for many Education and Outreach activities or programs (Appendix D: SMOS Fundamentals)

Interviews with Stakeholders and SMOS Researchers

In order to translate the highly technical research that SMOS project leaders conducted and establish how RSI wanted to depict SMOS to the general public, the E&O team conducted a series of interviews with SMOS researchers, members of the community, and RSI staff. These following key individuals were interviewed:

- Dr. Timothy Bonner- serving as the primary biologist researcher on the SMOS team, Dr. Bonner's interview provided insight into how his fish assemblage program will help provide baseline data for the overall health of the San Marcos River.
- Jennifer Buratti- a curriculum and outreach specialist with the Texas Stream Team, Ms. Buratti provided a wealth of knowledge and worked closely with the team to develop the Education and Outreach Plan.
- Ron Coley- as Director of the Aquarena Center, Mr. Coley has a perspective about Education and Outreach that very few can even imagine. His interview along with his educational developer Sonja Mlenar was very instructive and gave the team a better understanding of the resources that RSI already has in terms of outreach and education.
- Todd Derkaz- of the San Marcos Greenbelt Alliance provided a perspective on this community group that works for the development of green spaces within San Marcos as well as the protection of important recharge features within the watershed.
- Dr. Thomas Hardy- serving as the Project Director for SMOS, Dr. Hardy was able to provide the team with the long and short term goals of the program as well as applying the results of the project to the watershed protection plan.
- Ben Hutchison- a graduate assistant for Dr. Benjamin Schwartz, Mr. Hutchison is also a key player in groundwater research. His interview and the pictures taken allowed the team to develop strong content for the SMOS website which describes their project.
- Dr. Jim Kimmel- Founder of the Center for Nature Heritage and Tourism, Dr. Kimmel has provided wonderful insight into the nature of interpretation and how it can be applied to the outreach components of SMOS.

- Dr. Weston Nowlin- as one of the lead researcher on the Geochemistry component of the SMOS project, which has very important implications for the future management practices used to protect the Upper San Marcos River. Dr. Nowlin helped the E&O team gain an appreciation for these implications. Dr. Nowlin also provided insight into how having a better understanding of what is happening underground will lead to creating better management strategies to protect the Upper San Marcos River.
- Joshua Oyer- as the Volunteer Coordinator for Texas Stream Team, Mr. Oyer's interview provided information on the current monitoring system that is used on the Upper San Marcos River.
- Jason Pinchback – as the Program Manager of Texas Stream Team, Mr. Pinchback's work on the San Marcos River Watershed Protection Plan is critical to the overall usefulness of the SMOS project. His interview gave the team the ability to see the SMOS project as a part of the big picture and also allowed members of the team to participate actively in WPP meetings.
- Dr. Francis Rose- as a biology professor with Texas State University, Dr. Rose's primary focus is research on turtles. His work with turtles in Spring Lake goes back over fifteen years and provides a strong indication of the river's health.
- Dr. Ben Schwartz- as one of the lead researchers on the Geochemistry component, Dr. Schwartz provided access to his lab and answered multiple questions that allowed for large parts of web content to be drafted easily.
- Kristina Tower- a graduate student in Geography and worked directly with Dr. Hardy. Ms. Tower's work with Geographic Information Systems has been important to the ongoing research on the physical environment using technology. Her interview provided insight into the mechanisms that drive the SMOS research forward and she also allowed the team to utilize several animations which were later turned into videos and placed on the website.
- Dianne Wassenich- as Director of the San Marcos River Foundation, Ms. Wassenich's activism within in the community on water issues is unparalleled. Her interview provided the team with a baseline for determining the current political climate of water protection issues in the community.

Media Development

During the early phases of the SMOS project, researchers expressed an interest to create ways of conveying to the general public what SMOS was doing and why the project was important. In order to address this need, the E&O team created several short videos that could be view on the SMOS website. The SMOS researchers were very willing, and even excited, at the opportunity to describe in their own words and show their research activities in such a unique way. These videos were uploaded to a special YouTube channel built specifically for SMOS <<http://www.youtube.com/user/SMOSRSI>> and available through the SMOS website. These videos shared the research that SMOS has conducted with an ever growing internet based citizenry:

- Why We Care
 - Why We Care is a video that was filmed during the Earth Day celebration at Aquarena Center. This video is a compilation of many interviews with participants at the event during which they described why they care so much about the San Marcos River.
- Water Hyacinth
 - This video is an interview with biologist Casey Williams and describes the physical aspects and issues associated with Water Hyacinth in Spring Lake.

- What is a Wetland?
 - In this video biologist Casey Williams describes just how important wetlands are for the overall health of the ecosystem.
- SMOS UAV
 - This video depicts SMOS researchers launching an Unmanned Aerial Vehicle and gives the viewer an inside perspective on this innovative technology.
- SMOS Riparian shade Model
 - This video was developed through a GIS analyst at the River Systems Institute. This animation shows the riparian shade model that was developed during the physical characterization phase of the SMOS project
- SMOS Wild Rice Model
 - The SMOS Wild Rice Model is a large part of the finished SMOS project and this video shows the growth of these plants and their habitat over a ten year period.

As soon as the videos went live, the YouTube channel began receiving subscribers. Although the team did not promote the video project to the public, many have taken interest through general searches. The video approach appears to be the most suitable method for reaching students. Today's students are much more likely to watch several three minute video about SMOS than read a pamphlet, scientific journal, or attend a lecture.

The E&O team recommends that during the next phase of SMOS, more informational videos be developed with the actual researchers describing and showing their own research. This allows students of all ages to access information that typically is not available in a format that is understandable to a broad audience.

Community Outreach Activities

In order to reach out to the community and explain the importance of the SMOS project, the Education and Outreach team designed and developed three outreach activities in the community. The purpose of these outreach activities was to build a hands-on relationship with the community and create an environment where the community would feel invested in the project. The three outreach activities were geared towards different audiences in an effort to not only inform these groups on the SMOS project, but to also receive feedback on what approaches are most effective when working with different demographics.

The first event was the San Marcos River Foundation (SMRF) River Clean Up held on March 5, 2011. SMRF is a nonprofit organization that was formed by San Marcos citizens to protect the river. This event was targeted at both members of the San Marcos community and Texas State University students. The purpose of this event was to pick up trash along the Sessom Creek tributary that leads directly into the Upper San Marcos River. SMOS staff also assisted the leadership of the San Marcos River Foundation with planning the event. Our staff generated routes, gathered support, and relayed communication to key members of the student cleanup crew. E&O team members informally interviewed SMRF staff and its members on their impression of the SMOS project and participation in the event. The overwhelming response received was that SMOS and RSI helped make the event a success. Students in particular voiced that they enjoyed being part of the process. The event was posted on the updates section of the SMOS website: www.smos-rsi.org/updates.

The second event was targeted specifically at Texas State University students. This event also featured a trash clean up on Sessom Creek and was hosted by Bobcat Build, a Texas State University student service organization. The event was attended by 40 students and one faculty advisor. This event was geared toward students because of their intensive recreational use of the river resource (e.g. Sewell Park on the banks of the Upper San Marcos below Spring Lake is one of the most popular student gathering places) and their ability to become potential partners through student organizations or internships. Prior to the cleanup, the E&O team gave a presentation on the importance of the river's health and how SMOS and RSI alongside our volunteers were going to keep the San Marcos River clean. The E&O team informally surveyed the student's response who applauded these efforts.

The third outreach event for SMOS was an Earth Day Celebration booth at Aquarena Center on April 30, 2011. The event's target audience was the general San Marcos public and visitors to Aquarena Center. We shared a wealth of passive information on RSI's mission, discussed the purpose of SMOS, and provided an opportunity to film people on their impressions, attitudes, and significance of the San Marcos River to them and their community. These interviews were later compiled into a special documentary titled, "Why We Care" which was uploaded on to our YouTube channel after the event.

True community stewardship and involvement in river protection are built upon knowledge, personal responsibility, and observation. The knowledge base is what the SMOS researchers are providing through their in-depth characterization of the river. While outreach and education are key to the success in building the community's sense of responsibility and in providing access to events that allow for observation.

These community outreach activities will aid in the success of future SMOS programs. These activities will bring long term involvement from those who participate and build an environment of inclusion.

Logos

Several logo prototypes were developed to brand the SMOS project. Although none of these logos were ultimately used in a comprehensive manner, it is recommended that during the next phase of SMOS a brand and a catch phrase be generated that describes the project. During the outreach activities, people were often confused about SMOS as a stand-alone project and how it fit in with the River Systems Institute. In addition, during many of the interviews with SMOS researchers, it was difficult for them to describe the project in a succinct manner. A logo and a common definition or understanding of the project will assist in the future. (Appendix E: Logos)

Press Releases

During the busier phases of the Education and Outreach activities of the project, two press releases were sent to both the University Star and the San Marcos Daily Record. These press releases provided summary information about the outreach events and their effectiveness. Although these stories were not published, it is a valuable method to inform the public about future outreach events. (Appendix F: Press Releases)

SMOS Strategic Plan for Education and Outreach in the Future

Introduction

The SMOS Strategic Plan for Education and Outreach provides a blueprint for the development of outreach and educational programs in the future. These programs have the ability to extend the already far-reach impacts that the SMOS project has on the professional and academic communities to include a broader, general audience. Throughout the plan various methods are introduced and are delineated based on the need for funding and the resources required for their implementation.

These programs include:

- Education - Intended to provide Texas students with standards-based curricular materials, based on the Texas Education Agency's (TEA) Texas Essential Knowledge and Skills (TEKS) that connect student to the San Marcos River.
- Outreach - Designed to provide visitors (in person and online) with an interpretative based connection to the natural resource observed in the San Marcos River.

The combination of these two primary programs will bolster the impact that the SMOS project has in the future.

The Purpose of the SMOS Education and Outreach Plan

The purpose of this plan is to provide guidance for the development and implementation of the education component of the San Marcos Observing System. SMOS Education and Outreach is intended to provide Texas students with standards-based curricular materials, based on the Texas Education Agency's (TEA) Texas Essential Knowledge and Skills (TEKS) and provide visitor (in person and online) with an interpretative based connection to the natural resource explained and observed in the San Marcos River.

SMOS Education Curriculum will be designed as a scope and sequence for teaching specific grade levels. The curriculum will have clearly defined learning objectives that are aligned to Texas' academic content standards and aim at helping students achieve mastery of those standards at targeted grade level.

SMOS Outreach Materials – interpretive programs and multi-media communications will be designed for the general public. The curriculum will have clearly defined learning objectives that are aligned to Texas' academic content standards and aim at helping students achieve mastery of those standards at targeted grade level.

This E&O plan is designed to achieve accomplish several objectives of the RSI mission and the Long- term goals of the SMOS project. For RSI the primary element is cultivating public awareness and education about water resource issues. For SMOS the primary element is to facilitate communication between the various stakeholders within the community in order to foster a sense of working together to protect the San Marcos River.

The key phases in developing a comprehensive Education and Outreach Plan (including Interpretation) are as follows:

- Phase I: Guidance Plan
- Phase II: Development of Education and Outreach Materials (based on funding)
- Phase III: Implementation of Education and Outreach Materials (based on funding)

The E&O Team present here an initial Phase I: Guidance Plan.

Goals of SMOS Education and Outreach

The goals are:

1. To provide students instructional continuum that helps them master Texas' academic content standards,
2. To provide the public with Interpretative based experiences when visiting the San Marcos River and
3. To provide multi-media resources on-line of the research of SMOS.

Development of SMOS Education and Outreach Materials

The major steps in the process of developing Phase I were:

1. Interviewing experts at Texas State University to guide the development of the goals of SMOS education and outreach and provide options on paths for Phase II and III. Participants in the interview process include:
 - a. Dr. Richard Boehm (Geography)
 - b. Jennifer Mandel Buratti (Texas Stream Team)
 - c. Ronald Coley (Aquarena Center)
 - d. Dr. Richard Earl (Geography)
 - e. Dr. Jim Kimmel (Geography)
 - f. Dr. Julie Westerlund (Biology)
2. Development of guidance sheets (Appendix G: Task Sheets).

Materials Design Strategies and Instructional Considerations

The purpose of the SMOS Curriculum is to teach students to master both the Texas' academic TEKS standards and TEA's Scope and Sequence of Decision-making, Goal-setting, Planning, Problem- Solving and Interpersonal Skills. In order to achieve this goal, the design of the curriculum must take into account several instructional considerations, including:

- alignment to academic content standards;
- strategies for teaching in the field;

- development of specific skills identified in the TEKS standards and Scope and Sequence Guidance;
- opportunities to help teachers meet the science instruction requirement(s) while not imposing extreme financial cost to school budget; and
- appropriateness to the students' level of academic development.

The curriculum will follow a mixture of these six materials design elements:

1. Conduct needs assessment (What grade level(s) will be served? What gaps/TEKS can SMOS fill? What do students need to learn?)
2. Identify competencies addressed by SMOS (What can users of this curriculum expect?)
3. Write goals and objectives (Provide clarity about the educational program to learners, teachers and other involved individuals)
4. Determine teaching methods (In classroom or field?)
5. Determine assessment methods (How will the students be pre and posted tested to determine effectiveness of curriculum)
6. Determine SMOS involvement (How involved will SMOS staff be with schools?)

Community Involvement

The River Systems Institute has identified target groups who represent a cross-section of the community. Reaching out to these groups of people will be the first step toward community involvement in SMOS and other San Marcos River watershed activities.

Community Groups

SMOS and RSI should work with select citizen groups in the city of San Marcos. These citizen groups have missions and goals that align closely with SMOS and RSI.

During Phase I, the two main organizations that the E&O team worked with were the San Marcos River Foundation (SMRF) and the San Marcos Greenbelt Alliance (SMGA). Both organizations provide services and educational opportunities to members of the community who care about the natural resources in San Marcos.

Community Events

By making RSI and SMOS the center of research and discussion with regards to the San Marcos River over time, an environment of inclusion and collaboration will develop. The best way to reach out to our community groups is to actively participate in appropriate community events. These events will give SMOS the opportunity to meet with those who lead their respective groups and show them that we don't mind getting a little dirty to protect the San Marcos River.

Earth Day at Aquarena Center

Earth Day at Aquarena is the single largest Earth Day event in San Marcos. This annual event brings hundreds of citizens from all over the community. SMOS can make the most of this opportunity by

providing an educational booth with some sort of activity which participants can become involved with. This will be a great event for releasing our RSI newsletter, information on SMOS and promotional materials.

SMRF River Clean Up

The San Marcos River Foundation hosts an annual River Clean Up that is well attended by members of the community and students from Texas State University. The best way for SMOS to participate in this event is to sponsor a team of cleaners either from the university or a community group like the River Rangers.

Upper San Marcos River Watershed Protection Plan

The SMOS project is collaborating with a citizen group involved in the development of an Upper San Marcos Watershed Protection Plan, led by the River Systems Institute. "A Watershed Protection Plan (WPP) is a coordinated framework for implementing prioritized and integrated water quality protection and restoration strategies driven by environmental objectives." (Texas State Soil and Water Conservation Board 2011)

SMOS is providing the baseline data to develop a watershed characterization. The characterization will be a tremendous benefit to the watershed protection process by establishing a "snapshot" of the natural resources that currently exist and need to be protected. The aerial imagery captured by SMOS researchers will also identify areas of critical erosion and impact. Once the baseline has been established SMOS researchers will take it one step further. By creating a computer generated model SMOS will be able to input a range of variables such as land use or potential development projects in specific areas of the watershed then the SMOS model will generate a range of outcomes that compare the particular variable with Flow Conditions and Population Growth. This model will give policy makers a strong understanding of how their decisions will affect the future of the Upper San Marcos River.

Partnering with Texas State University

Texas State University has experienced a +20.1 % change in fall enrollment from 2005 to 2010 (Enrollment Management & Marketing Division of Academic Affairs, 2010).

With an ever increasing student population, SMOS can take advantage of a unique outreach opportunity through existing campus groups and events. By participating with these groups the SMOS message of conservation and preservation can be heard by a much larger audience. In turn this audience may work the River Systems Institute to help conduct research, plan for the future and volunteer to protect the San Marcos River. In order to gain access to these groups and activities it will be important for the SMOS staff members to have a firm understanding of how CASO (Campus Activities and Student Organizations) is structured. The main avenues for SMOS student outreach would be student organizations, Bobcat Build events, PAWS Preview and Cat Camp (Appendix G: Task Sheets).

Calendar of Important Opportunities for SMOS Outreach

Phase II and III should consider developing ongoing outreach activities to bring attention to the SMOS project:

Season	Event
Fall	Orientation Paws Preview University Seminar Tours
Spring	Bobcat Build SMRF River Clean Up SMRF Spring Plunge Aquarena Earth Day
Summer	Professional Workshops Cats Camp

Website and Social Media Development

The purpose of the SMOS Multi-media resource(s) is to provide online visitors the opportunity to explore the San Marcos River through research findings. In order to achieve this goal, the design of the Multi-media materials will follow Alessi & Trollip's four elements in development and methods:

1. Presentation of information
2. Guidance about how to proceed
3. Practice for fluency and retention
4. Assessment to determine need for remediation and next steps (Alessi & Trollip 2001).

Considerations in the development of multi-media materials will take funding, volunteer/staff capacity, expertise, campus/web host capability, time, and longevity of the product (how often will it need design work or updating).

a. Website

The SMOS website (www.smos-rsi.org) is the primary tool that the public will use to gain access to the information that SMOS will produce. The website's content will be available to the public through past project links on the RSI webpage and will be updated only if necessary and funding is available. The content of the website is designed to provide an insight into the SMOS project and should be easy to read and understand.

b. Imagery

Images (photography) have long been used to teach and convey messages to audiences. Therefore, photographs and other images produced by the SMOS project will be one of the online resources provided in order to increase public interest, understand and involvement.

c. YouTube

The SMOS/RSI YouTube channel <<http://www.youtube.com/user/SMOSRSI>> makes use of a remarkably powerful tool. Videos provide an easy way for members of the San Marcos community to access the information provided by the River Systems Institute. All projects including SMOS at RSI should make use of this opportunity and make videos that show our researchers in the field, the purpose of our research, and how our organization cares about the community and the people who live here. This is the easiest and most affordable to reach the largest audience and should be considered a top priority for the Institute.

d. Facebook

Facebook provides an interesting way for RSI to reach a new generation of people, specifically the student demographic. By updating the site regularly and having it maintained by a staff member who is well versed with the tools associated with Facebook will be the organizations best chance to make use of social media <<http://www.facebook.com/#!/pages/Caring-for-the-San-Marcos-River/109462379136685>>.

Plan for Incorporating or Connecting with Existing Educational Materials

SMOS staff will seek funding for Phase II and III and will then solicit the involvement of university, state, and national experts in development of curriculum, interpretive and multi-media materials. Those who respond to the initial Phase I plan were supportive of the SMOS project and opportunity to develop components of Phase II and III.

Based on future funding, SMOS project managers are also considering usage of established curriculum from Rivers Curriculum Project, Project Wet, Project Wild and Project Wild Aquatic.

Interpretation Plan

The purpose of future SMOS Interpretation Program(s) is to provide each visitor the opportunity to personally connect with the San Marcos River. Each individual may connect to the place in a different way...some may not connect immediately, but everyone should have an opportunity to explore how that special place is meaningful to them (National Park Service 2011). In order to achieve this goal, the design of the Interpretive Program will follow Freeman Tilden's (1977) six principles of interpretive communication:

1. Any interpretation that does not somehow relate what is being displayed or described to something within the personality or experience of the visitor will be sterile.
2. Information, as such, is not Interpretation. Interpretation is revelation based on information. But they are entirely different things. However, all interpretation includes information.
3. Interpretation is an art, which combines many arts, whether the materials presented are scientific, historical, or architectural. Any art is to some degree teachable.
4. The chief aim of Interpretation is not instruction, but provocation.

5. Interpretation should aim to present a whole rather than a part, and must address itself to the whole person rather than any phase.
6. Interpretation addressed to children should not be a dilution of the presentation to adults, but should follow a fundamentally different approach. To be at its best it will require a separate program.

Considerations in interpretive planning will take funding, volunteer/staff capacity, incorporation of existing resources/agencies, time, special events, and seasonality into consideration.

Under Phase II of the SMOS Education and Outreach Plan, two options exist for Interpretation:

1. Creation of an Interpretive Plan and Program(s) that can be applied at Aquarena Center
2. Partnership with existing entities/agencies whose programs would add components of SMOS research into their already existing services.

The path taken for Phase II would be based on funding. With additional funding, SMOS would be able to develop a new and unique plan and programs for Spring Lake and the San Marcos River. If no funding is available, SMOS would partner with an already existing entity/agency to incorporate its research findings.

Option 1: SMOS Interpretive Plan and Program(s)

In order to develop a comprehensive SMOS Interpretive Plan and Program(s), SMOS would contract an Interpretive Developer to create the necessary materials that best fit the budget and purpose of SMOS.

Further, the SMOS project could partner with students and the professor for the Interpretation course offered at Texas State University. The Interpretive Plan and Programs may be an appropriate class project.

The plan may include the following components for long-range interpretive planning:

- Legislation and Purpose
- Significance Statement: What is the significance of Spring Lake and the San Marcos River
- Mission, Goals, and Vision Statement of SMOS
- River Systems Institute and Aquarena Visitor Services Strategy
- Visitor Accessibility
- Spring Lake and the San Marcos River Interpretive Themes *
- Desired Visitor Experience
- Issues and Challenges Affecting Interpretation
- Visitor Profiles and Targeted Audiences
- Existing Conditions
- Action Plan over the Next 2-5 Years
- Research and Collection Needs
- Staffing and Training Needs
- Implementation Plan

**Themes Notes: Interpretive themes that are the most broadly relevant-and the most powerful-connect a tangible resource to a universal concept. The interpretive theme statement, and therefore the main*

idea or ideas of an interpretive product, should always contain a universal concept (intangible-love, anger, etc) (National Park Service, 2011).

Tangibles – Intangibles and Theme Example:

- *Artesian springs (tangible) – Creation (intangible)*
- *The successful establishment of a human settlement around Aquarena Springs was and will be the continued flow of good quality and quantity water.*

Cost Estimation of Interpretive Plan Table

Developer	Time Required	Results	Cost estimate *
Contractor	3 months, part-time	1-3 year plan and 2 programs	\$6,300
Contractor	6 months, part-time	4 year plan and 3 programs	\$12,500.00

*based on \$26.00 per hour fee

Spring Lake Interpretive Signage

As the Spring Lake (Aquarena) property undergoes a re-development and restoration project, there may be opportunity in the budget to purchase interpretive, outdoor signs for areas along Spring Lake and wetland waterbody branch. In order to provide the best possible interpretive experience SMOS will only consult the Green Pages a list of appropriate sign contractors which is developed by the National Association for Interpretation to create the interpretive signs around Spring Lake.

<http://www.interpnet.com/resources_interp/greenpages/signage.shtml>. (Appendix H: Sign Contractors)

Option 2: Partnership:

Kayaks Tours

Glass bottom kayak tours are only offered on Spring Lake by Aquarena staff. Instead of trying to develop our own program perhaps we can take this opportunity to work with the program specialist at Aquarena Center during the training of their staff. Providing Aquarena tour staff with resources from SMOS and RSI can provide the staff and audiences with a deeper connection to the work and research occurring at Spring Lake and on the San Marcos River.

Interpretive Hikes

Interpretive hikes of the Municipal Nature Area located directly above Spring Lake are an option to partner with the San Marcos Greenbelt Alliance. The San Marcos Greenbelt Alliance has work around the city to identify and create hike and bike trails where visitors can physically relax and re-connect with the natural resources found in San Marcos. SMOS project could use its research and finding to support a new, volunteer led, interpretive hike program that could be administered by the

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Appendices

APPENDIX A: SMOS Science Results in Environmentally Integrated Curriculum

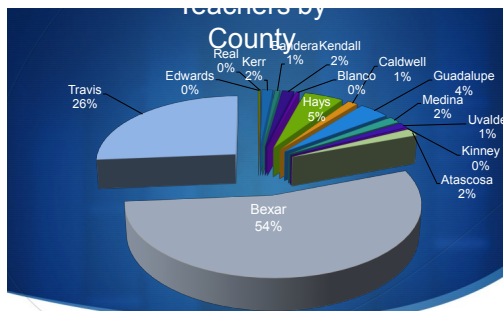
SMOS Science Results in Environmentally Integrated Curriculum



Target Market



- Primary stakeholders:
 - Edwards Aquifer Area
 - 534,000 students
 - 36,400 total teachers
 - Estimated 11,000 Substitute teachers



Primary Target Markets



Bexar County

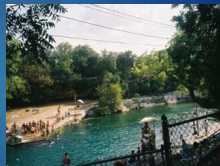
- Student Population: 300,000
- Largest consumers of the Edwards Aquifer
- 76% Science Pass Rate in Bexar County



Primary Target Markets

Travis County

- Student Population: 135,017
- Largest population outside of San Antonio
- 76% Pass rate



TAKS Passing Rates

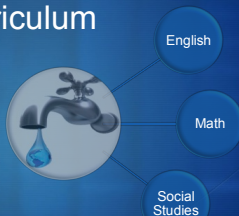


- Ranks lowest in 44 ISD's
- Ranks 2nd lowest in the remaining 17 ISD's
- Nearly 1 out of 4 of students do not pass
- Poor science performance is a national trend



Environmentally Integrated Curriculum

- Incorporation of Science into other disciplines
- Water as a limited, valuable resource
- Sustainability is a growing topic, particularly in this area



Relevant TEKS

- | | |
|--|--|
| <p>5th grade</p> <ul style="list-style-type: none"> Introduction to Scientific Method Analysis of information in order to reach a conclusion | <p>Science:</p> <p>8th grade</p> <ul style="list-style-type: none"> Similar to 5th grade, higher complexity Emphasis on earth systems, including water |
| <p>High School</p> <ul style="list-style-type: none"> Biology and Environmental Systems Increased use of technology and scenario based learning | |



Extension to Substitute Teachers

Workshop

- ◆ Advanced Training
- ◆ Resume Building
- ◆ Emphasis on Incorporating Science
- ◆ Offered at Texas State University

Districts

- ◆ Offer On-Site Workshop
- ◆ Outsource substitute training



Competition

Certified Teachers Workshop

- ◆ All similar workshops in this area target certified teachers
- ◆ These workshops are held throughout the summer
- ◆ Prices range from free to \$200 with the majority of them being free

Substitute Teachers Workshop

- ◆ Most school districts offer substitutes a brief training program
- ◆ The majority of these training programs are geared towards procedures and rules to adhere to rather than teaching



Opportunities

Substitute Teachers Workshop

- ◆ Offer a substitute teachers workshop on the Texas State Campus
- ◆ Capitalize on the surplus of substitute teachers
- ◆ Provides substitutes with an opportunity to differentiate themselves through extra training

Substitute Teachers Database

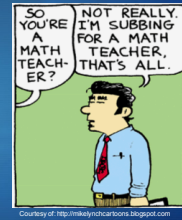
- ◆ Currently no system is in place to help districts find substitutes and vice versa
- ◆ Substitutes whom attend the workshop are listed in a database that school districts can access their information



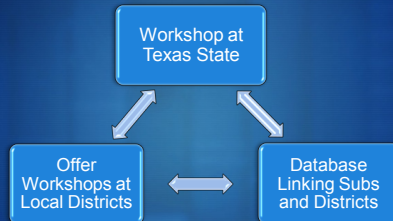
Opportunities

On-Site Workshops

- ◆ Offer our services directly to districts and their substitute teachers on their campuses
- ◆ Increase the academic influence that substitutes have on learning, through training



Recommendation



APPENDIX B: Aquarena Outdoors Curriculum

Subject: Watersheds

Grade level: High School

Purpose: The purpose of this tour is to have students become a better informed individual about their watershed and how their decisions can impact their life. Students will learn the following information:

1. What is a watershed and why is it important?
2. What watershed are we located in at Aquarena center? What watershed do you live in?
5. How do we impact watersheds? What is the Quantity vs. Quality?
6. What organisms use our watershed at (Aquarena Center) and what impact human encroachment is making on the watershed?

During this field trip student will also learn or improve their skills using with the following tools:

6. Global Positioning System (GPS) unites, compasses
7. Binoculars, field guides both books, and online field guides from the Audubon Society on an IPAD and field journals.
8. Digital Camera's and Digital Wildlife Camera's and card readers.
9. Water Testing kits or probes
10. Animal track pads and scents to attach the animals to that location.

Standards:

Chapter 112. Texas Essential Knowledge and Skills for Science Subchapter C. High School

§112.32. Aquatic Science, Beginning with School Year 2010-2011 (One Credit).

(4) Science concepts. Students know that aquatic environments are the product of Earth systems interactions. The student is expected to:

(A) Identify key features and characteristics of atmospheric, geological, hydrological, and biological systems as they relate to aquatic environments;

(C) Collect and evaluate global environmental data using technology such as maps, visualizations, satellite data, Global Positioning System (GPS), Geographic Information System (GIS), weather balloons, buoys, etc.

(5) Science concepts. The student conducts long-term studies on local aquatic environments. Local natural environments are to be preferred over artificial or virtual environments. The student is expected to:

(A) Evaluate data over a period of time from an established aquatic environment documenting seasonal changes and the behavior of organisms;

(B) Collect baseline quantitative data, including pH, salinity, temperature, mineral content, nitrogen compounds, and turbidity from an aquatic environment;

(D) Identify the interdependence of organisms in an aquatic environment such as in a pond, river, lake, ocean, or aquifer and the biosphere.

(7) Science concepts. The student knows the origin and use of water in a watershed. The student is expected to:

(A) Identify sources and determine the amounts of water in a watershed, including rainfall, groundwater, and surface water;

(B) Identify factors that contribute to how water flows through a watershed; and

(C) Identify water quantity and quality in a local watershed.

§112.37. Environmental Systems, Beginning with School Year 2010-2011 (One Credit).

(2) Scientific processes. The student uses scientific methods during laboratory and field investigations. The student is expected to:

(F) collect data individually or collaboratively, make measurements with precision and accuracy, record values using appropriate units, and calculate statistically relevant quantities to describe data, including mean, median, and range;

(G) demonstrate the use of course apparatuses, equipment, techniques, and procedures, including meter sticks, rulers, pipettes, graduated cylinders, triple beam balances, timing devices, pH meters or probes, thermometers, calculators, computers, Internet access, turbidity testing devices, hand magnifiers, work and disposable gloves, compasses, first aid kits, binoculars, field guides, water quality test kits or probes, soil test kits or probes, 100-foot appraiser's tapes, tarps, shovels, trowels, screens, buckets, and rock and mineral samples;

(H) use a wide variety of additional course apparatuses, equipment, techniques, materials, and procedures as appropriate such as air quality testing devices, cameras, flow meters, Global Positioning System (GPS) units, Geographic Information System (GIS) software, computer models, densitometers, clinometers, and field journals;

(5) Science concepts. The student knows the interrelationships among the resources within the local environmental system. The student is expected to:

(B) Identify source, use, quality, management, and conservation of water;

(E) Analyze and evaluate the economic significance and interdependence of resources within the environmental system; and

(F) Evaluate the impact of waste management methods such as reduction, reuse, recycling, and composting on resource availability.

(9) Science concepts. The student knows the impact of human activities on the environment. The student is expected to:

(A) Identify causes of air, soil, and water pollution, including point and nonpoint sources;

(B) Investigate the types of air, soil, and water pollution such as chlorofluorocarbons, carbon dioxide, pH, pesticide runoff, thermal variations, metallic ions, heavy metals, and nuclear waste;

(C) Examine the concentrations of air, soil, and water pollutants using appropriate units;

(E) Evaluate the effect of human activities, including habitat restoration projects, species preservation efforts, nature conservancy groups, hunting, fishing, ecotourism, all-terrain vehicles, and small personal watercraft, on the environment;

National Science Education Standards:

Earth and Space Science-Content standards D:

Structure of the Earth's system

Life Science- Content Standard C:

Structure and function in living systems

Populations and ecosystems

Science in Personal and Social Perspectives- Content Standards

Population, resources and environments

The American Association for the Advancement of Science (AAAS) founded Project 2061

By the end of the 8th grade, students should know that

- *Fresh water, limited in supply, is essential for some organisms and industrial processes. Water in rivers, lakes, and underground can be depleted or polluted, making it unavailable or unsuitable for*
- *Some material resources are very rare and some exist in great quantities. The ability to obtain and process resources depends on where they are located and the form they are in. As resources are depleted, they may become more difficult to obtain. 4B/M10ab**
- *Recycling materials and the development of substitutes for those materials can reduce the rate of depletion of resources but may also be costly. Some materials are not easily recycled. 4B/M10c**
- *The wasteful or unnecessary use of natural resources can limit their availability for other purposes. Restoring depleted soil, forests, or fishing grounds can be difficult and costly. 4B/M11a**
- *The benefits of Earth's resources—such as fresh water, air, soil, and trees—can be reduced by deliberately or inadvertently polluting them. The atmosphere, the oceans, and the land have a limited capacity to absorb and recycle waste materials. In addition, some materials take a long time to degrade. Therefore, cleaning up polluted air, water, or soil can be difficult and costly.*

Introduction 15 minutes:

Once the school has arrived and checked in they will meet at our base camp. The students and teachers will listen to an overview of what they will be doing that day. The overview will included a 3D model of our watershed or an image from Google Earth. Teachers will also learn what is expected of each student such as not to wonder away from their group not to leave any trash behind or to pick up and take home anything they do not have permission for. Once the students understand about what is expected of them they will be divided into groups. We will have four group of no more then 8-10 people.

Each group will then be taught how to use or review the following supplies- 20minutes;

- GPS unit, and compasses
- IPADs will have electronic field guides downloaded from the Audubon Society,
- Digital Camera's and card readers to download images from the Digital Game Camera's
- Water testing Kits or probes
- Binoculars,
- And how to write down observations in their field notebooks

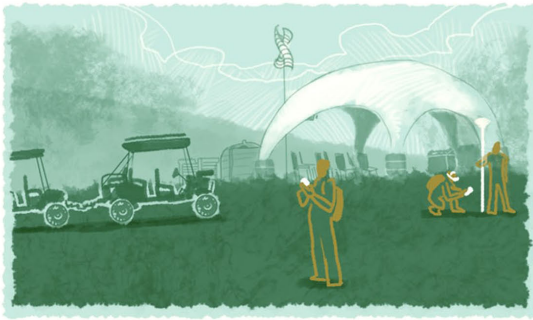
Once each group has been taught the GPS unit they will receive a different location to find with the GPS unit and the compasses. The groups will then ride up the hillside and meet their guides. The guides will be there to help each group find their game cameras.

When the game cameras have been located the students will then view the images from the night before. The students will use the digital copies and hard copies of field guide to identify the images. Students will also view the track pads in front of the cameras and take pictures of the impressions. Students will also record what scent was placed in front of the game cameras to attract the animals. The students will record their finding in field notebooks. While the students are identifying the images they will also identify the plants that a growing around the site, as well as any animals or insects in that area, students will also take pictures of what they are seeing. The students will also make observations of the locations such as: is it near water? is it located in a clearing? can street noise be heard? is there any trash? etc. The group of students will theorize how their observation can affect our watershed.

After the student have finished with the game cameras they will pick an area of water to test either the pond, water out of spring lake, or the wetlands. The students will get the GSP location for their site. The students will also take down observation of this site just like they did for the game cameras. The students will look and see what type of organisms are living in the water way and record what they observe. The students will then test the water with a water testing kit or with probes. They will test the water temperature, ph, dissolved oxygen, and nitrogen compounds.

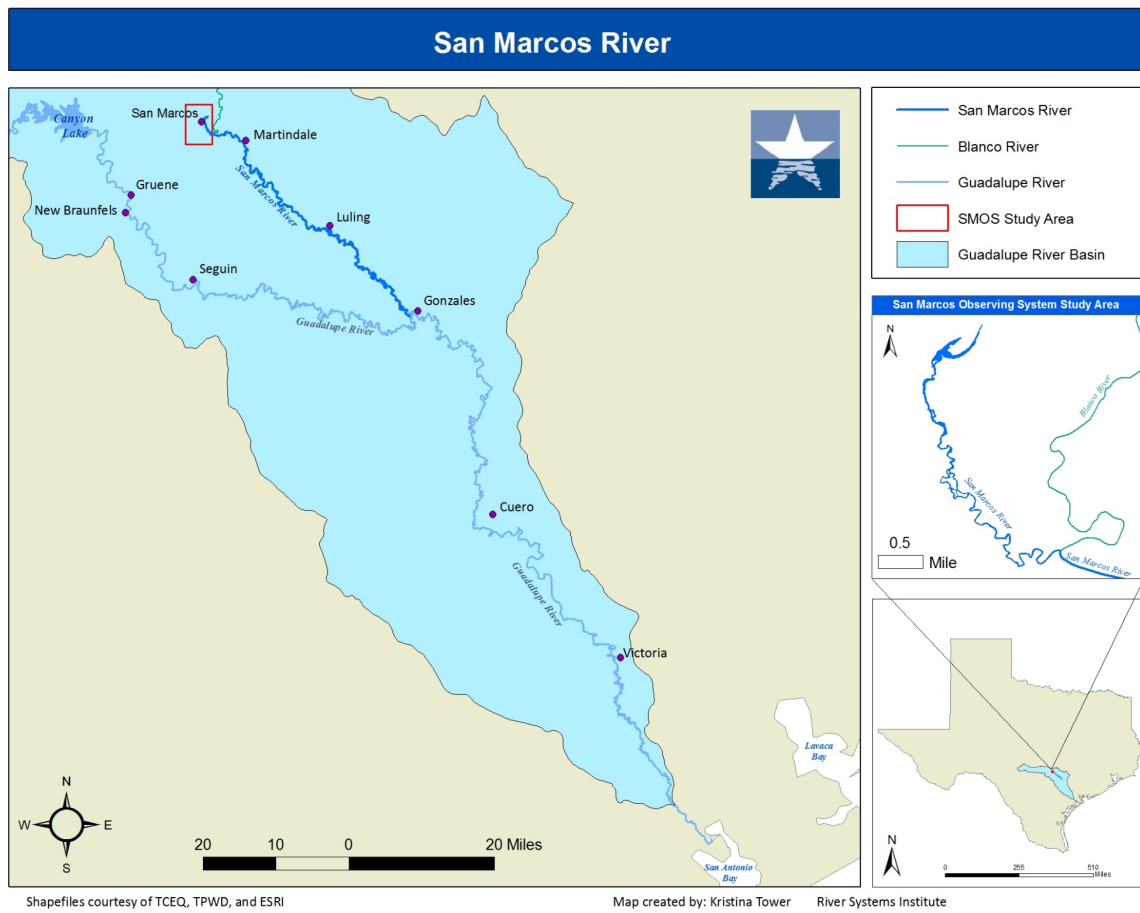
The groups will then come back down to the base camp and input their data and compare what each group has found. Once the data is imputed the students will see where they were located in our watershed and identify the interdependence of the organisms in our watershed.

Modification: This field trip could be modified for Middle School and Jr. High students by having the tour guides taking a more active role in the program. The tour guides would guide the students to the game cameras with the students input as well as guided them to a water testing location.

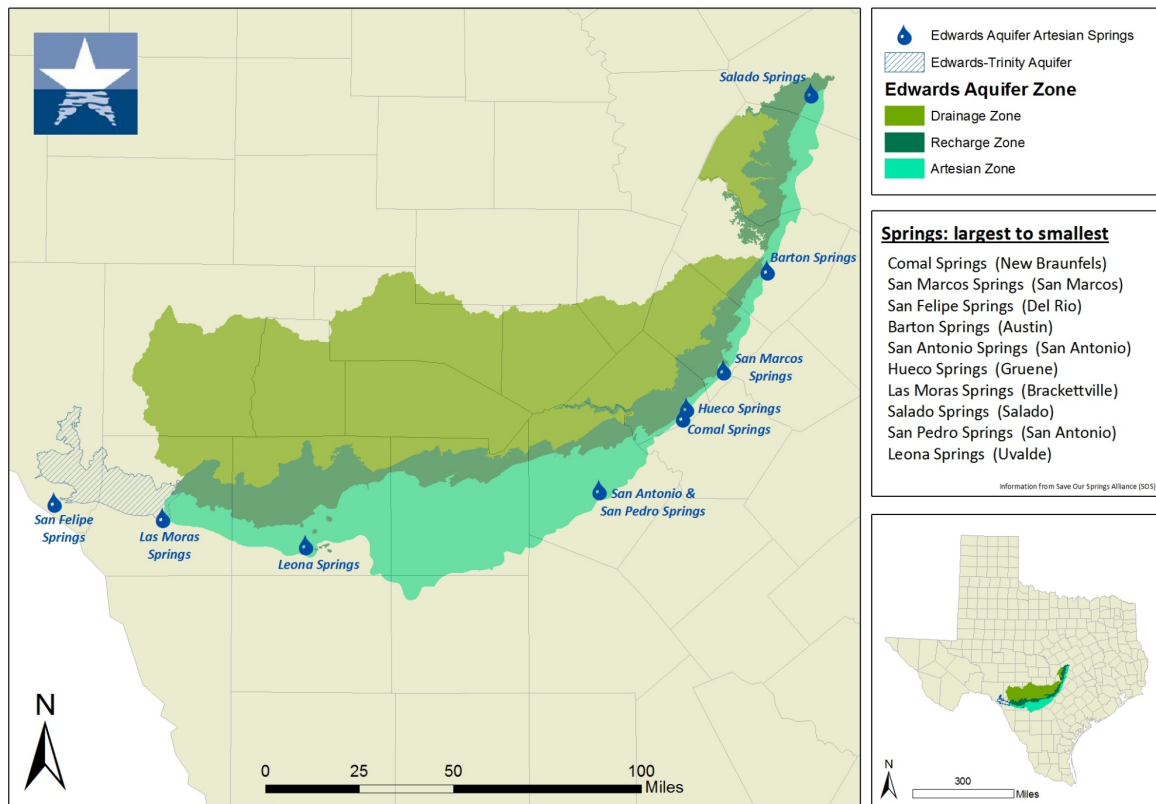


Topher Sipes © 2010 // tophersipes.com

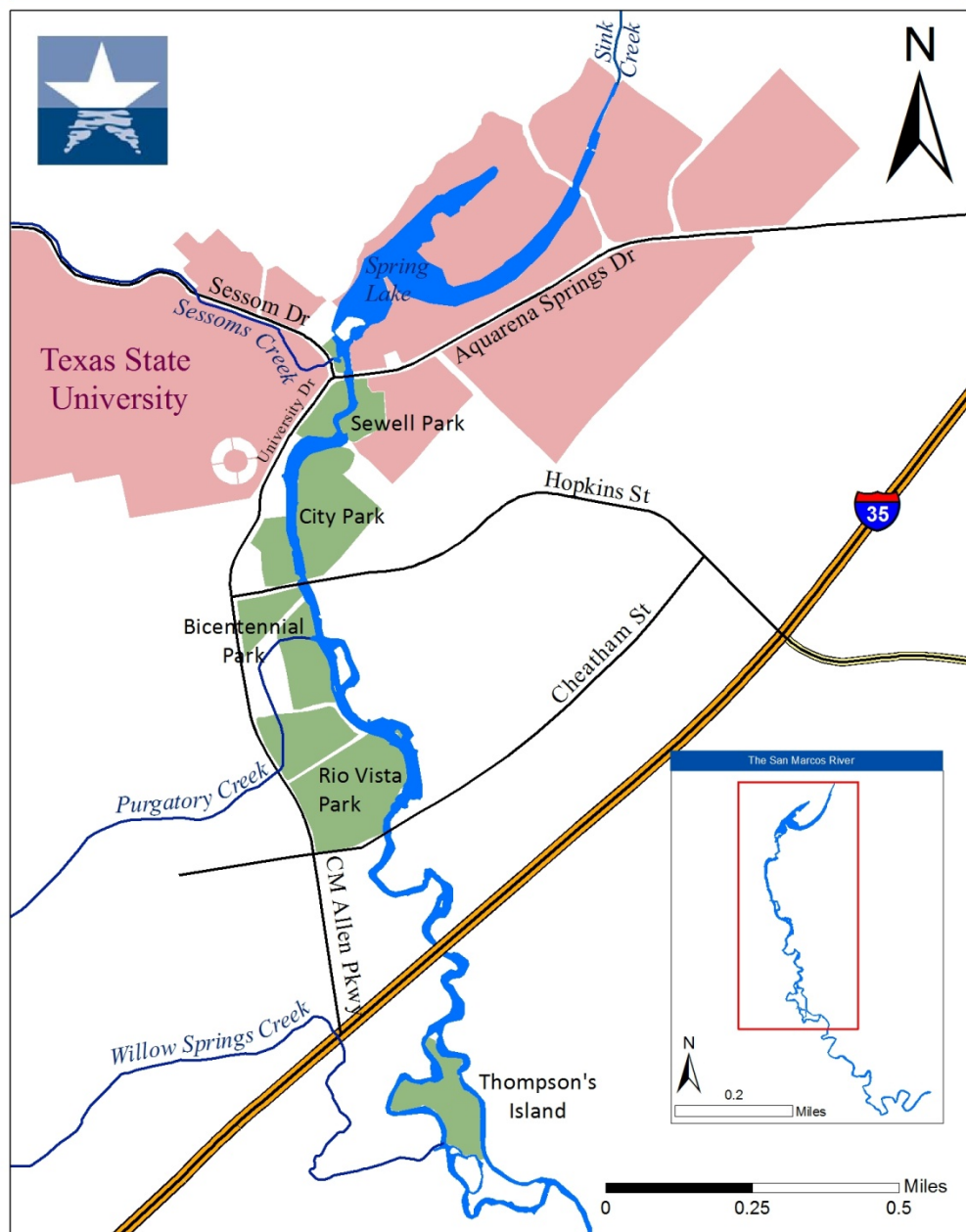
APPENDIX C: MAPS



Artesian Springs of the Edwards Aquifer



Upper San Marcos River



Map created by: Kristina Tower River Systems Institute

APPENDIX D: SMOS Fundamentals

Understanding SMOS Fundamentals

One of the greatest outflows from the Edwards Aquifer is the San Marcos Springs. More than 200 springs burst forth from three large fissures and many smaller openings. Early travelers and settlers described the large ones as fountains, gushing water several feet above the surface of the stream they created. Today, the Springs lie at the bottom of Spring Lake and can be viewed through the floor of glass-bottomed boats. The Springs and the short 3.8 mile San Marcos River below them have been designated as critical habitat for five endangered species, including the Fountain Darter, the Texas Blind Salamander, the San Marcos Salamander, the San Marcos Gambusia, and Texas Wild Rice. (Edwards Aquifer Authority 2011) Along with protection of the critical habitat the community of San Marcos which has a population of roughly 50,000 people has a large interest in the protection of this resource. The tourism industry provides a influx of money to the local economy. The river also enhances the quality of life experienced by those who live in this small community. As the river flows downstream its water is used by farmers and other permit holders. “The importance of protecting this river cannot be overstated (San Marcos River Foundation 2011).”

San Marcos Observing System, a component of Texas State University’s River Systems Institute, is taking an innovative approach looking at many dynamic variables to understand the river system as a whole. From groundwater to surface water, endangered species to common aquatic plants, storm events to variable water flow, SMOS is studying the interactions of the Upper San Marcos River through continuous monitoring of water quality quantity and the characterization of the river’s ecology.

SMOS provides this research to support sustainable management practices and policy decisions for Spring Lake and the Upper San Marcos River watershed. The watershed is delineated from the sources of surrounding tributaries that flow into the Upper San Marcos River downstream to the river’s confluence with the Blanco River. Knowledge gained by SMOS and River Systems Institute (RSI) supports efforts of the Edwards Aquifer Authority and the Hays-Trinity Groundwater Conservation District and other entities in the understanding and management of their water resources and the future sustainability of the San Marcos River Basin.

Immediate and Long-term Objectives SMOS

Immediate

- Determine nutrient and sediment inputs to Spring Lake and the upper San Marcos River as well as the fates of these materials once in the system
- Characterize quality, quantity, source area, and susceptibility of these waters to negative impacts and temporal and spatial variability resulting from changes in climate and land-use
- Research and compile existing relevant surface and ground water data in a functional Geographic Information System (GIS) which will facilitate data analysis and interpretation, and facilitate collaboration and communication with stakeholders
- Use new and existing data to characterize long and short-term effects of, and interactions between, surface water, ground water, and land use in surface and ground water basins, on the long-term health of Spring Lake and the Upper San Marcos River.

Long-term

- Design and initiate a long-term continuous monitoring program for surface and ground water resources affecting Spring Lake and the upper San Marcos River.
- Building on results from the monitoring programs, develop a comprehensive management plan for Spring Lake which includes continuous water monitoring, and adaptive optimization of the management plan by utilizing a continuously larger and more comprehensive dataset.
- Provide support to researchers and water authorities conducting studies on the Edwards Aquifer, Spring Lake or the San Marcos River.
- Facilitate communication between the various stakeholders within the community in order to foster a sense of working together to protect the San Marcos River.

SMOS Components

Fish Assemblage Project

This project is currently working on gathering fish assemblage data that will help to better understand the habitat and characteristics of the aquatic species that live in the San Marcos River. Methods include the use of SCUBA, nets, and several boats. The research team's primary focus is on the river below Spring Lake. The data set from this project will be used in creating the baseline necessary for the development of a watershed protection plan.

Geochemistry and Characterization

This project will obtain high-resolution data on nutrient and suspended sediment inputs to Spring Lake in order to determine the influence of various water sources on the water quality of Spring Lake and the Upper San Marcos River. Spring Lake and the Upper San Marcos River have experienced increased turbidity and algal blooms following substantial rainfall events and the associated increases in surface and groundwater flows. While there is an obvious and sometimes persistent deterioration of water quality during and after periods of high surface and groundwater inputs to the lake, the relative pollutant load contributions of these sources is unknown. Under this project, patterns in land-use in the Sink Creek watershed will be assessed as well as nutrient and sediment inputs to the lake from various spring openings in the lake and the Sink Creek watershed in order to identify potential management strategies.

Physical Characterization

This project focuses on several aspects of the river's physical processes. One of the primary goals is to develop an overall understanding of the river's physical nature as it stands today. This has been accomplished through the integration of LIDAR, high resolution multispectral imagery, detailed vegetation and substrate mapping and extensive three-dimensional mapping the river topography which provides the most detailed spatial representation of the San Marcos River in history. Using this data set the important elements of the San Marcos River such as the location of the endangered species habitat and physical aspects of the river channel this project hopes to create a model which will allow policy makers to input possible development ideas and report back the impacts that those development projects will have on the river's health. It should also be noted that this project is critical to the development process of a watershed protection plan.

APPENDIX E: Logos

LOGO 1



LOGO 2



LOGO 3



LOGO 4



LOGO 5



LOGO 6



PRESS RELEASE 1

Contact: Ryan Spencer
River Systems Institute
Phone (512) 245-4476
Fax 512 245 7371

601 University Drive
San Marcos, Texas 78666
Phone 512 245 4490
Fax 512 245 7371

**River Systems
Institute SMOS**

Press Release

River System Institute Sponsors Bobcat Build Site

The Bobcat Build Site sponsored by RSI hopes to provide students with a chance to help protect the San Marcos River.

Portland, OR, September 23, 2004: When writing a press release, say *who, what, where, when, why* and *how* in the first paragraph, if you can. Study your newspaper and notice how deftly most writers work that type of information into the first paragraph of each article. In addition, it is helpful if you remember the following:

- Know your contact's name, title, telephone, fax and department.
- Mail or fax your release 10 days in advance of the release date.

How to Customize This Press Release

To create your own customized version of this template:

1. Insert your company information in the company name, contact, address and release date frames, and change the header text on page 2, if the press release extends to another page, to reflect the contents of your story.
2. Choose File Save As. At the bottom of the menu, choose Document Template in the Save File as Type: box (the filename extensions should change from .doc to .dot).
3. To create a document, choose File New to re-open your template as a document.

For Release 9 a.m. EDT, September 23, 2004

Contact: Ryan Spencer
River Systems Institute
Phone (512) 245-4476
Fax 512 245 7371

601 University Drive
San Marcos, Texas 78666
Phone 512 245 4480
Fax 512 245 7371

**River Systems
Institute SMOS**

Press Release

River System Institute Sponsors Booth for Earth Day

The Earth Day Booth Featured at the Aquarena Center on April 30, 2011 Hopes to Spark Interest about Why People Care about the River.

San Marcos, Texas April 30, 2011

This year's booth will feature an opportunity for visitors to explain on camera why the San Marcos River is important to them. After the event the videos will be compiled and the short online video known as "Why We Care" will be produced.

River Systems Institute

The Institute is committed to helping protect and conserve water resources while promoting economic development and social well-being by:

- advancing scientific and technical knowledge through research on aquatic resources;
- identifying and analyzing socio-economic and political issues affecting water use;
- guiding the development of environmentally sustainable public water policy in Texas;
- cultivating public awareness and education about water resource issues.

For Release 9 a.m. EDT, April 30, 2011

APPENDIX G: Task Sheets

STUDENT ORGANIZATIONS

The Power of Student Organizations

Student organizations provide Texas State University students with the opportunity to learn to grow and serve their community. Many of these organizations are made up of over 100 students and combined log approximately 10,000 service hours annually. Working with these organizations will allow RSI to reach to very specific goals: Inspire students to go in to fields of research that fall within our mission and enhance the SMOS project by giving students a chance to serve as stewards of the river. Below is a summary of...It is imperative that RSI reach out to these organizations for future involvement in San Marcos River projects. Reaching out to these organizations also helps RSI serve the mission of Texas State University.

Getting the Contacts

Call 512 245 2111 and ask for the Campus Activities and Student Organizations (CASO) office

This office has a large contact list for all of the student orgs on campus and should be able to provide them to you quickly over email.

With which organizations should we work?

Organizations have different purposes. Working with those who already have a common purpose with our own will allow us to have a higher success rate and will be mutually beneficial. Some organizations to keep in mind are those which are housed within environmental departments such as agriculture and geography as well as graduate forums for the above departments. Some student organizations that fall within this category are:

- Environmental Conservation Organization (ECO)
- Student Planning Organization (SPO)
- Water Aid
- Environmental Service Committee
- Horticultural Club

Creating Opportunities

Invite the leader of a specific organization to meet with you in your office and show them around. By presenting showing all the resources that RSI can give to their membership and then allowing him or her to go back to the organization and take credit for creating the partnership will yield a far better result than other methods.

Develop events that showcase our good will

These events aren't just for RSI or for the students. These events will allow RSI to display how well we can work with students and push the mission of the university. Some events that could work are:

- River Clean Ups

- River Clean Ups give RSI and SMOS a chance to walk the walk. If we get out their early and the morning and stay late people will recognize that we aren't just researchers, we are people who care about the San Marcos River and more importantly that we are people who care about them. Many river clean ups are driven by the San Marcos River Foundation. Collaborating with this group is the easiest way to reach the maximum amount of people
- Internships
 - Internships supply two main things: The opportunity to get discount help and the opportunity to help educate the person who applies. Internships help strengthen our relationship to the University and the Student Body and allow us to help carry the University's mission of education.
- Service Projects
 - Service Projects works hand in hand with river clean ups except these can run by student organization with sponsorship coming from the Institute. If we purchase the supplies for a student organization to clean up the river multiple goals are achieved:
 - Give students a chance to invest in the San Marcos River
 - Allow RSI to support students at Texas State University
 - Help the community
- Orientation
 - Orientation provides a very underutilized and unequalled opportunity to effect widespread change as it regards to the San Marcos River. By providing passive marketing and potentially videos and lectures we have the ability to encourage proper behavior on the San Marcos River before it ever even begins. Why quite bad habits when we can avoid them all together.

Spreading the Word

In order to ensure that people see how well we work with students a month before the event a press release should be sent to the university star and the daily record. Also take as many pictures as you can and update all of the dynamic content on our YouTube, Facebook, and Website.

Water Aid

<<http://www.studentorgs.txstate.edu/wateraid/>>

"As the local Texas State chapter of Water Aid we are committed to supporting the global mission of Water Aid but most importantly taking action locally to protect and conserve our own precious water resources. We will accomplish this by volunteering our time and efforts to community activities such as river clean-ups and invasive species removal, as well as spreading awareness of the importance of protecting our water."(Water Aid 2011)

Water Aid a relatively new student organization on campus was started by Geography student Maia Alaina. This organization has many shared interests with the River Systems Institute and is perfect for recruiting students as volunteers. Water Aid members cover a broad range of majors and minors however there is a predominance of Geographers.

This group also utilizes the following online services, Google Groups and Facebook and can be reached at WaterAidTxState@gmail.com

Hortus Colere

<<http://ag.txstate.edu/resources/organizations.html>>

“The Horticulture Club was established to offer students an opportunity to enhance their knowledge and involvement in horticulture. Students gain interest in learning more about the agriculture industry and its development through the club's many activities, such as participating in an annual Agriculture Department poinsettia plant sale, organizing plant sales and taking trips to local gardens. Students are involved in the community and regularly volunteer at the San Marcos Nature Center, as well as with other community gardens. Members also attend various conventions and seminars where they can network with business owners and professionals in the industry, potentially leading to great career opportunities.” (Hortus Colere 2011)

This group of students will be most interested in assisting with volunteer projects that focus on plants. These students will seek to use RSI to further develop their knowledge of invasive species and their removal. The best opportunity to expand RSI's relationship would be to offer a series of volunteer events that involve plant removals.

Environmental Service Committee

<<http://www.txstate.edu/esc/>>

“The Environmental Service Committee (ESC) strives to make positive changes to the physical environment at Texas State University and in the greater San Marcos area. The ESC distributes funds collected from the Environmental Service Fee to start or continue environmental improvement projects.” (ESC 2011)

In the future RSI might be able to request funds from this committee to begin phases of projects or extend their reach and influence.

Cat Camp

<<http://www.catcamp.txstate.edu/Welcome.html>>

“Cat Camp is an amazing two day experience for students wanting to learn about Texas State pride, spirit, and traditions. Cat Camp is led by current Bobcats who have a passion for everything Texas State. Cat Camp does not replace New Student Orientation nor PAWS Preview. These are mandatory. Cat Camp is optional.”(Cat Camp 2011)

Cat Camp might not share many common goals with RSI however their impact on the retention rates of their participants cannot be ignored. The future leaders of student organizations can be usually found in each year's cat's camp class. RSI would be best suited to work with this organizations by providing materials which they can incorporate such as a “how to float video” which would serve as a freshman instructional video about how to protect the Texas Wild Rice.

Paws Preview

[<http://www.pawspreview.txstate.edu/>](http://www.pawspreview.txstate.edu/)

“PAWS Preview is a transition program, designed to give new students at Texas State ‘just in time’ information that will help you be successful college students. After the completion of New Student Orientation, students will receive notification of the session they are assigned to attend. This is a required program for all entering freshmen with 0-29 credit hours.” (Paws Preview 2011)

This seminar is hosted every semester and gives new students a chance to become acclimated to the college experience. Working with this organization could benefit SMOS, through outreach we could prevent pollution and degradation of the San Marcos River before it even begins. The best way to reach out to this organization is to establish a mutual beneficial relationship where we provide the tools for their organization to conduct our outreach. The development of passive materials focused on protecting the San Marcos River was discussed and could be lucrative.

Environmental Conservation Organization

[<http://www.geo.txstate.edu/studentorgs/naep/index.html>](http://www.geo.txstate.edu/studentorgs/naep/index.html)

“We are a diverse gathering of students who share a common appreciation for the environment. Through our local actions we encourage progress and growth towards a global sustainable future.” (Environmental Conservation Organization 2011)

Sponsored by the Geography department at Texas State University ECO could be yet another friend found within this department. This organization is relatively large compared to the others in this list and can help SMOS reach their outreach goals in several ways. The most important of these is that many of the students that SMOS would like to have as interns would come from this association. The members of this group are interested in pursuing careers in the environmental field and could help create a lasting relationship between SMOS researchers and the graduate school at Texas State University. Another method that ECO would use to facilitate the completion of SMOS’s outreach goals is through volunteering. This group deeply cares about the protection of the San Marcos River and would assist in any volunteer opportunities that SMOS could offer.

Student Planning Organization

[<http://www.geo.txstate.edu/studentorgs/spo/>](http://www.geo.txstate.edu/studentorgs/spo/)

“It is the mission of the Student Planning Organization to promote responsible and sustainable growth for the future. We strive to enhance our education thru public service and research to create further advancements in urban planning while strengthening the bond between Texas State University and the San Marcos community. SPO fosters a creative and interdisciplinary environment providing an outlet for students of all majors outside of the classroom.” (Student Planning Organization 2011)

As one part of the Watershed Protection Plan SMOS situates itself in a unique position to assist this organization the fulfillment of its mission, in return the members of this organization could work with the WPP and SMOS to better understand the planning process and perhaps even assist the development of the protection plan.

Greek Life

“The Greek community at Texas State includes a variety of service, traditions, leadership, service and more! There are 33 organizations and more than 1,450 student members. We encourage all students considering Greek Life at Texas State to learn more about the numerous benefits of “Going Greek” by exploring this site, visiting the 4th floor of the LBJ Student Center, talking with one of the Greek student leaders, or contacting one of the Greek Affairs staff members.” (Greek Affairs 2011)

<<http://txstate.theginsystem.com/>>

SMOS and students share common interest, the San Marcos River. This common interest will give SMOS a powerful tool to work with as many volunteers as it could ever need. The Greek community at Texas State University is continually looking for ways to increase the number of service hours and amount of money donated. By utilizing the Greek affairs office SMOS can find the best method for working with each of the four separate Greek councils listed below.

Interfraternity Council (IFC)

<<http://www.txstateifc.theginsystem.com>>

National Panhellenic Council (NPC)

<<http://www.lbjsc.txstate.edu/caso/greek/nphc.html>>

Multi Cultural Greek Council (MGC)

<<http://www.lbjsc.txstate.edu/caso/mgc>>

Panhellenic Council

<<http://www.txstatepanhellenic.com>>

SMRF AND SMGA

Why do they matter?

San Marcos River Foundation is the largest community organization that focuses solely on the San Marcos River. Their members are devoted and give their time money and support to any project that SMRF deems important to the preservation of the San Marcos River.

San Marcos Greenbelt Alliance has developed a large network of green spaces and with the help of the city of San Marcos they will help generate recreation potential on the watershed. This organization will have a large impact on protecting properties that could be converted to green space. More information about this organization and its membership can be found at: <http://www.smgreenbelt.org/>

Collaborating with these organizations will develop an environment of inclusion and help citizens in the community buy in to our projects people and potential. Without the people in the community short of regulation our efforts will be fruitless.

Making Opportunities

The best way to work with these organizations is by supporting their activities. In the spring of 2012 if we help provide materials (cups, water, trash bags, food) at the annual river cleanup when it comes time to help support an RSI program SMRF and SMGA will be much more likely to stand up in support. Also allowing these organizations to use the conference room at the Texas Rivers Center for marginal or no cost will also create a good reputation with these groups.

Creating Opportunities

Another method for encouraging collaboration will be to host an annual thank you banquet where we thank members of the community for their hard work and determination to protect the San Marcos River. This banquet will also give members of the community an opportunity to meet the staff and participate in the donation program. However it should be taken into account that this could be a collaborative effort due to the cost of the event.

Spreading the Word

In order to ensure that people see that we have a program at least ten days before the event a press release should be sent to the university star and the daily record. Also take as many pictures as you can and update all of the dynamic content on our YouTube Facebook and Website.

INTERPRETATION

“To develop and promote programs and techniques for ensuring sustainable water resources for human needs, ecosystem health and economic development.” RSI Mission

“Facilitate communication between the various stakeholders within the community in order to foster a sense of working together to protect the San Marcos River.” SMOS long-term goals

Interpretation and Outreach allows RSI and SMOS to make significant impacts on the Upper San Marcos Watershed by facilitating behavioral change among the residents. Experiences in the out of doors that relate to the San Marcos River provide guests and students an opportunity to directly interact with the resource and potentially invest themselves in its protection. Interpretation activities such as: nature hikes, signage, lectures, and guided river tours all help promote the San Marcos Observing System and the River Systems Institute as a whole. However there are some very important factors to consider before starting a program.

Beginning Phase II

The development of interpretative materials can be the most difficult portion of the programs eventual success. It is important to: develop a programs topic, relate the programs topic to TEKS standards, identify the resources you have, develop a procedure based on your resources, and train interpreters (funded or volunteers to provide the program.)

Ask the Experts

Luckily, Aquarena Center, a program under RSI, has made an art form out of interpretation and continues to educate over 100,000 guests a year through several venues. As of this writing (2011), [Ron Coley](#) the director of the Aquarena Center and [Sonja Mlenar](#) the Educational Specialist are great resources for coming up with ideas and more importantly of what to avoid. Along with understanding the topics associated with Spring Lake Outreach Specialist [Jennifer Buratti](#) is an expert in identifying which TEKS standards can be achieved by developing the program.

Others in the community also have a great deal of knowledge about interpretation and can offer assistance. The Center for Nature Heritage and Tourism and Founder [Dr. Jim Kimmel](#) (Geography) are wonderful resources and currently work in many different areas within RSI.

Sustainability

Like all aspects of the environment SMOS programs must also be sustainable. Efforts that eventually lose their momentum and disappear are as useful as no efforts at all. Make sure that the program either pays for itself or makes use of volunteers to meet the programs goals.

CURRICULUM

Why should we develop Curriculum?

Curriculum is an important part of the SMOS program and its development will allow researchers at RSI to take the very important concepts that they have either formulated or clarified to be fitted into a curriculum that is suited for children. This process can be a very long and difficult one requiring many hours by experts. The best thing that RSI can do is bring the right people to the right place at the right time and then let them take care of the rest. In order for this to happen curriculum planning must occur and it is this planning process that this task sheet hopes to explain

What to talk about?

During the early discussions about curriculum development many ideas were passed around. One which struck a chord was the idea of using the large land preserve behind the building as a class room. Currently the use of the resources is negligible and it would allow RSI to develop curriculum that centers more on watersheds and Non-Point Source Pollution then solely on the uniqueness of Spring Lake and the San Marcos River.

The thought of a watershed survey has been detailed numerous times but in its most basic sense an interpreter would lead a group of students on a hike of the preserve and conduct a series of observations and calculations that would show the students how rain can affect the San Marcos River directly.

Time Line (Funding)

One of the most important parts of this project is developing a timeline. Utilizing resources at RSI developing a funding based timeline is essential. Everything that is needed to receive funding must be met by a certain deadline. Within RSI there are many experts that can help develop these proposals and although it will not be an easy process they will help in any way they can. Once the timeline is developed and a series of less general tasks has been created it should become clearer as to which path to take.

Bringing people to the table

Many faculty and staff at Texas State University and within River Systems Institute can be utilized for their expertise in curriculum development:

- Dr. Boehm Geography
- Jennifer Texas Stream Team
- Dr. Westerlund Biology
- Dr. Jim Kimmel Geography
- Dr. Richard Earl Geography

Having these people working together would be of great value should RSI decide to pursue this program further. Each of these people has their own expertise and many have collaborated before. It will be important to guarantee funding so that they can be paid for their participation in the development process

Resources and Examples

Texas Stream Team a program within RSI has drafted up an example watershed survey. However they have yet to utilize this program in the field. One of the easiest ways to generate this program might be to collaborate with TST and allow the Aquarena Center to utilize it in their programming on a requested basis.

Spreading the Word

In order to ensure that people see that we have a program at least one month before the event a press release should be sent to the university star and the daily record. Also take as many pictures as you can and update all of the dynamic content on our YouTube Facebook and Website.

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