Listening to the River

Final Evaluation Report

Dawn Robles
Heather Mitchell
Elizabeth Horsch
Mark St. John

with the assistance of:

Laura Stokes

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Inverness Research

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Summative Evaluation Report

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You are standing on a rock outcropping and there is a river in front of you, or there is a bog in front of you. You could walk by and not look again and say, 'that was really beautiful' But if you walked out in it for about an hour, and looked really close at all kinds of different things, you would find out there are one million worlds there, not just one. The Listening to the River project communicated that perfectly to young people.

~Replication site partner

About This Report

Listening to the River (LTTR) is a watershed science education project funded by the National Science Foundation. Its aims are to deliver education experiences in the local area, Traverse City, Michigan, and also to develop a model that could be replicated in other locations. Inverness Research was contracted by the *Listening to the River* project to conduct both formative and summative evaluations. Our work began in 2005 when the project received a planning grant, and continued through the life of the project. Primarily through interviews and product reviews, along with some direct program observations,[1] we produced several memoranda which we shared with the core project team to provide formative feedback. In this summative report we examine core features of the project's model and its potential for replicability. Our purposes are to provide the funder, NSF, with lessons learned from their investment and also to provide others who are interested in watershed-based science education with our independent perspective on the LTTR model.

[1] See appendix for a detailed list of evaluation activities.

I. The *Listening to the River* Project: Overview and Purpose

Listening to the River grew out of conversations between four organizations in Traverse City, Michigan—the Land Information Access Association (LIAA), the Great Lakes Children's Museum (GLCM), Interlochen Public Radio (IPR) and the Water Studies Institute at Northwestern Michigan College (WSI). These four groups held in common the desire to improve the understanding and stewardship of watersheds in the Grand Traverse area. After doing some research both locally and through education research agencies, the group found that youth have at best a limited understanding of watershed concepts. While many local organizations were providing opportunities for youth to learn more about watersheds, these organizations were for the most part working independently. Driven by this need, the four organizations formed a partnership, the Coalition for Watershed Education (CWE), and began to lay the groundwork for the *Listening to the River* program.

The partners applied for a planning grant from the National Science Foundation (NSF). The purpose of this grant was to clarify the vision and goals of the LTTR project, to build new partnerships between the various local and regional programs involved in informal science education, and to assess the viability of specific ideas for the form and content of LTTR. As part of this planning grant, in February 2005 the CWE held a day-long summit. At the summit, representatives from local organizations worked together to deepen their understanding of informal science education and to make connections among their various programs. The summit also allowed the CWE to determine the interests and needs of these organizations and to test ideas for the project.

After the summit, the CWE submitted a full proposal to the NSF for the development of the *Listening to the River* program. The goals[2] of the project were as follows:

> Goal One: To build an innovative and sustainable program of informal watershed science learning opportunities for teenagers, children, and adults by tapping the expertise and capacity already present in a dynamic coalition of local and regional organizations; and
>
> Goal Two: To document and describe the Coalition's flexible structure and strategies for informal watershed science education so they can be adapted for use by other regional coalitions in communities and watersheds throughout the Great Lakes Region and beyond.

In support of these two goals, the Coalition agreed to focus on the following four major tasks:

- Develop Watershed Discovery Excursions—field experiences for youth—which would result in the production of video and/or radio pieces about the watershed, and a web-based multi-media map of local watersheds
- Create two watershed museum exhibits (one permanent and one traveling)
- Produce a project website and a Community Guidebook for sharing both the products and the processes of the project

[2] NSF ISE proposal #0540187

- Develop and strengthen the Coalition for Watershed Education

Each of the key partners played a significant and unique role in the development and implementation of the project, and they each supported the project according to their particular areas of expertise. The roles and responsibilities of each key partner are described below.

Land Information Access Association is a non-profit service organization whose purpose is to "provide technical, scientific, educational, and informational services to individual citizens, local interest groups, local governments, and other nonprofit corporations for land use planning, resource management, emergency management planning, and environmental protection."[3] Over the course of the project, the LIAA staff held the primary responsibility for the oversight and management of the project. LIAA also provided the technology and technological expertise for the project—from supporting youth in capturing and editing their video and audio pieces, to creating and maintaining the project website. The LIAA technology lab was the physical home of the project. The project data were stored at this site, most indoor activities took place here and the youth worked at this lab to edit their fieldwork.

Great Lakes Children's Museum is located in Greilickville, MI. The museum's mission is "to surround children and the adults in their lives with a hands-on, interactive, and informal educational environment that will invite curiosity, allow exploration, encourage participation, and celebrate the child-like wonder in all of us."[4] The museum staff lent their expertise to the design and development of the *Waterscape* exhibits. One of the staff members played a significant role in gathering content for the permanent exhibit and in the installation, testing and remediation of the permanent exhibit, which is housed at GLCM. The GLCM education director also provided support and watershed science expertise during excursions.

Interlochen Public Radio (IPR) is a listener-supported broadcast service of Interlochen Center for the Arts.[5] The news director from IPR provided guidance to the project on the nature and production of radio pieces. He also supported students in all stages of developing their radio pieces, from selecting a topic to editing the final piece. He directed the Radio Academy, and was in the field with youth participants throughout the life of the project.

Northwestern Michigan College's Great Lakes Water Studies Institute has a threefold mission: 1) To provide learning opportunities about freshwater that foster stewardship of the Great Lakes and its watersheds; 2) To build, support, and encourage partnerships that achieve shared missions for freshwater–including nonprofit organizations, businesses, K-12 schools, and school districts, higher education, research institutions, foundations and others; and 3) To bring people and organizations together to learn about and address freshwater issues and needs.[6] WSI has provided to the project their expertise in watershed stewardship, connected LTTR to other groups and individuals working on or interested in watershed education, and provided facilities for gatherings such as the planning summit and the exhibit charrette. WSI also provided support and

[3] http://www.liaa.org/mission.asp Retrieved 4/22/10
[4] http://www.glcm.org/goals.shtml Retrieved 4/22/10
[5] http://ipr.interlochen.org/content/about-ipr Retrieved 4/22/10
[6] http://www.nmc.edu/resources/water-studies/ Retrieved 4/22/10

watershed science content for the excursions, both through a staff member and through connections to watershed scientists in the community.

II. The *Listening to the River* Model

In this section of our report, we outline the core components of the project, and describe, for each, the component and its related activities, the rationale for including the component, and a discussion of the extent to which and ways in which the component and its activities—as realized—contributed to the goals of the project. We then discuss what we learned about the role of partnerships in the project model.

The Core Components

The core components of the LTTR project include:[7] 1) Watershed Discovery Excursions or Workshops, 2) Soundscapes and the Radio Academy, 3) LTTR museum exhibits, and 4) the LTTR website.

- Watershed Discovery Excursions or Workshops

The discovery excursions and workshops are the heart of the *Listening to the River* project. It is intended that—through direct experience of the watershed—youth will come to gain a sense of place, and that from that they will gain a desire for stewardship of the local natural world. In the excursions youth field teams join adult volunteers and science/technology experts to explore and document various aspects of their local watershed using state-of-the-art mapping and multimedia technology. Participants experience the watershed firsthand, and learn about it through their own eyes as well as through the perspectives of the adult volunteers and content experts who join them. All of this leads young participants to learn both the content and process of science in a highly contextualized fashion.

Rationale for the Watershed Discovery Excursions

The *Listening to the River* staff felt strongly from the beginning that the core activity of this project should be the youth participants spending time in the watershed, and having their own insights, questions and explorations arise out of firsthand experience. In order to set the program up in this way, they first had participants spend unstructured "deep listening" time outdoors and then record their thoughts and questions. The staff then worked to build on the natural interests of the youth, setting up connections with places, people and resources so that participants could pursue topics of interest. Staff also trained youth to use technical equipment to document and share their experiences and images. Project staff assumed that these experiences would lead youth to have a greater appreciation for the watershed, and that they would share their new knowledge and enthusiasm with others.

The field excursions were designed to be the basis of *Listening to the River*, in that all other components built on and extended from the excursions. The excursions have the potential to serve the goals of the project because: they provide firsthand experience of the watershed, and they incorporate the use of state-of-the-art recording and GPS technology. They also are the source of data for sharing information about and experiences of the watershed with others in

[7] Descriptions of the components are from the LTTR website: http://www.listeningtotheriver.org/overview.asp

various venues, including the radio programming, the museum exhibit, the website and the Guidebook.

Activities

The LTTR project experimented with several approaches to these excursions. In several cases they connected to, and built on, already-established programs being conducted in the watershed. In other cases, they ran excursions or workshops independent of other organizations. A description of the various approaches follows:

- Watershed Student Congress: Initially, LTTR connected with the Watershed Student Congress. This program is run by a range of local conservation and nature education organizations and agencies and it holds annual workshops for youth about water use and related issues. In 2006 and 2007 the LTTR staff joined forces with the Congress, and provided training and equipment for the youth to record sights and sounds of the watershed. The video and audio pieces that the students produced were then posted on the LTTR website.

- Boardman to the Bay: In mid-June 2006, the LTTR staff conducted their first independent pilot excursion. They recruited ten youth from the community, and explored the watershed from the Boardman Lake and the Traverse City Wastewater Treatment Plant to the mouth of the River. Again, images and sounds that were collected by the youth were posted on the project's website. In this session, staff learned about recruiting youth, organizing their activities, getting youth trained and working with the technology, and defining important watershed content.

- Fall 2006 After-school Session: This was LTTR's first independent extended Watershed Discovery activity. A group of 11 youth met weekly after school for eight weeks. The group explored the watershed, collected sound recordings and still and video images, and edited these materials in the lab at LIAA. They produced three videos, one each about water pollution, invasive species, and the bottom of the bay. These videos are posted on the project website.

- Spring Break 2007 and 2008 Workshops: Another activity the LTTR tried was an intensive, 3-day workshop during the youth participants' spring break from school. Twelve high school participants in the 2007 session produced two radio pieces for Interlochen Public Radio (about salamanders and chickadees), short video clips, and two photo collections, one accompanied by music. Nine middle school youth who participated in the 2008 session created three audio pieces (about lichen, water flow in Beitner Creek, and about the way cedar trees grow) and took many photographs.

- Youth Corps 2007: Eight to ten youth from YC in partnership with LTTR worked on developing a trail and a boardwalk trail system in a local cedar swamp. The LTTR staff provided information about the natural history of the area, and equipment and training for documenting their experiences. This particular activity engaged the

participants in the human-environmental interface issues as they observed the displacement of a homeless camp along the river

- Upward Bound 2007: The LTTR project partnered with Northwestern Michigan College's 6-week residential Upward Bound program. Upward Bound youth who chose to participate in the LTTR activity collected photos, video and audio for use in the project's museum exhibit at Great Lakes Children's Museum and they produced pieces for broadcast on Interlochen Public Radio. The participants shared their final products with the larger Upward Bound group at the end of the session.

- Sound Walk and Geocaching Event: These one-day excursions focused on particular technologies. In the Sound Walk, children and adults visited Grand Traverse Bay area natural areas with a naturalist and radio producer and collected sounds. In the Geocaching event, LTTR partnered with the Grass River Natural Area to provide a class where families learn about GPS and geocaching.

Findings and discussion

The staff experimented with a range of variables in an attempt to develop a model that was successful and sustainable:

-connections with community partners and the roles of adults
-length and level of immersion in watershed experience
-age of participants
-foci of science and environmental education content
-format and use of technology

Connections with community partners and the roles of adults: Calling themselves the "Coalition for Watershed Education," the four core organizations of LTTR approached and tried to partner with a broad range of institutions and individuals. Sometimes it meant that there were simply one or two volunteers that served as content experts (e.g., on Family Geocaching Days); in other instances LTTR worked in full partnership with a community organization, including working with that organization's youth and building on their projects (e.g., Youth Corp, Upward Bound). In the latter model the LTTR team worked with established groups and added value to their activities and mission.

Finding and then organizing the right combination of people to conduct field excursions was a great challenge in this project. The four core organizations had to invent almost every aspect of the work: i.e., they had to design the experience and the curriculum, to find the people to carry out the excursions and to produce the products, and they had to manage all that work as well as plan for the dissemination of the project. It appears that the core group probably underestimated the complexity of the development work and how much effort it would take to make their vision become real. It took the group much of the early part of the project to sort out their own roles, as well as the roles of those they brought in from other community partnerships.

In the end the project drew on many individuals, both from within the four core organizations and from the community. They included people with the following areas of expertise:

- project management;
- technology application (in the use of web design, GPS, video and still cameras, and audio recording equipment);
- radio and video production;
- museum exhibit development;
- natural history and science knowledge;
- volunteer recruitment and management; and
- youth education.

Some of the adults involved were also "hybrids:" i.e., people who had some mix of the skills listed above.

It is clear that bringing on partners contributes greatly to the potential of the project, by allowing it to share participants, to gain additional expertise, to relieve some of the burden of running the project on the part of core staff, and to gain buy-in towards future sustainability of the project.

Length and level of immersion in watershed experience: Among the various activity models used to implement the field excursion component, it appears that the three-day "spring break" model came the closest to meeting the project's potential and reaching its goals. Staff reported to us that they felt that three full days was the minimum amount of time needed for participants to have a relatively in-depth experience of the watershed, to learn how to use the technology, and to create some kind of product from their experience. Conducting the workshops during the spring break made it easier to recruit youth who are often busy with competing interests during school semesters.

In the models that were shorter, participants did get out into the watershed, and were able to capture some data such as photographs and sounds. Also, single- or half-day sessions created the opportunity to introduce youth and their families to the project overall. However, in the shorter sessions there wasn't enough time for participants to explore any one component (such as video or radio production) in great depth, nor to contribute significantly to products that would inform the public—which was a major goal of *Listening to the River*.

Age of participants: The project experimented with targeting both older (high school) and younger (middle school) audiences. Each group offered unique opportunities and challenges. Older youths were hard to recruit. They tend to have very busy schedules with other extracurricular competing interests. However, the high school youth that ended up participating in the program reported positive learning experiences. Younger participants needed more guidance, but they were old enough to be able to work with the technology and benefit from the outdoor experiences of the project. They also had fewer schedule conflicts.

This model appears to work for the full range of potential participants, from late-middle through high school aged, in terms of the learning opportunities it provides. The best experiences will likely be provided at those sites who can secure people with the level of expertise and skill in

science education to work with these age ranges, and for those sites who have already-established connections with older youth, so that they can bring them into the program.

Foci of science and environmental education content: A goal of the LTTR project was to teach participants key concepts about watersheds: what they are, and why they are important to study. Project core staff created extensive lists and matrices as a way to ensure that the core concepts were built into excursion activities. In viewing footage of some of the excursions, and also examining the videos that youth produced, we see that participants were, indeed, exposed to basic concepts and terminology about the watershed. The focus of the content was widespread and varied, most often emphasizing human influence on the watershed (e.g., the impact of pollution and invasive species). In our interviews with project partners, some felt satisfied with the content that was being introduced. Others felt that more structure and orientation was needed in order for youth to have good encounters with watershed phenomena and to learn basic science that they can apply to their projects and share with the community. The challenge was how to structure science learning in this informal context so that youth could create high-quality products with engaging science content.

In this project, there was a challenging and multi-dimensional goal of conducting both science education more generally, and watershed education specifically. *Listening to the River* is an interdisciplinary project by nature—that is, watersheds are complex systems that could be studied with all or some of the lenses of hydrology, biology, chemistry, physics, ecology, and geology. A project that focuses on these particular areas of science would reflect an emphasis on the watershed as a context for science education. Watersheds also are homes for people who depend on them and impact them. A project that focuses on human relationship and impact would reflect watersheds as a context for environmental education. The two areas of focus are obviously related, and each is needed for the understanding of the other. Watersheds are a context that offer the possibility to learn something about both science as well as human impact on the natural environment.

The experiential learning activities were set up such that youth had access to some of both the science and the environmental protection issues, and they had the freedom to focus on what intrigued them individually. The participants' products on the LTTR "Mediascape" demonstrate participants' strong interest in natural history—for example, lots of bird photos and song recordings, videos and other media capturing frog sounds and images, capturing experiences with plants, and so on. There are also youth projects that reflect their observations of human impacts on the watershed—for example, videos about invasive species and the impacts of pollution. This is a great advantage of an interdisciplinary project that has experiential learning built in: there was a lot of exposure to a range of topics, with the ability for youth to gravitate to what they were interested in.

Format and use of technology: A foundational design feature of the LTTR project is providing youth participants access to sophisticated, "state of the art" audio and visual recording equipment. A related design feature is providing youth with the opportunity to share their recordings with the public via the project's website and Interlochen Public Radio broadcasts. Depending on the length of a given excursion or workshop, and the level of staffing available, the project experimented with a range of ways to include technology in the field-work. On

shorter hikes participants simply took photographs of the watershed. On more in-depth excursions, the youth took along video cameras as well as sophisticated audio recording equipment. In most cases, participants were asked to record, by using a GPS, the location of the place that was being documented in order to inform the web-based watershed map.

A member of a local organization who partnered with the LTTR project told us:

> *[LTTR staff] did a great job of providing the opportunity for the students to be in the lab setting with the computers and taking the raw data and forming it into something, and then there was the actual hands-on field experience where they were out searching for the stuff and in fact, one of our students changed his major to film production because of it…because he just loved working with the equipment and he loved recording things.*

The use of media and technology in this project was a significant "hook" to attract youth to participate. Some youth reported that they were using equipment they had never used before or were using it in new ways. The audio equipment in particular seemed to enhance their experience of the watershed; they could hear sounds that were very far away, and closer sounds in much greater detail than normal. The time commitment involved on the part of staff to organize the youth's work with technology, as well as the cost, are significant factors. However, the technology component appears to be worth the investment as it greatly enhanced the youth experience of the watershed, allowed the youth to share what they learned on the project website and on radio, and perhaps made the project able to get participants to sign up in the first place. In addition to providing motivation for participants, it seems that it is worth taking the trouble and expense of using this equipment because it authenticates the experience; that is, it provides real experience in how scientists and documentarians do their work.

Summary: When experimenting with excursion models, staff needed to find the right recipe—i.e., the right combination and amounts of time, resources, expertise, and participants—to meet their goals and to provide high-quality outdoor and lab experiences for participants. It is not surprising that the longer "spring break" model, as well as the after-school session, required a great amount of time and organization. However, of all the approaches they took, this one seemed to be the most successful in terms of meeting project goals, and in terms of providing high-quality experiences resulting in high-quality products.

- Soundscapes radio segments and the Radio Academy

The Soundscapes and Radio Academy components of the project focused on youth participants collecting and producing audio segments that reflect the participants' experience of the watershed. Recorded sounds ranged from a single bird song to full-length interviews with people who had some kind of relationship with the watershed.[8] In the Watershed Discovery Excursions described above, participants worked with Interlochen Public Radio (IPR) and Radio Anyway staff to document their discoveries with technical sound recording equipment. Many of these short recordings, such as bird calls, the sounds of machinery, and the sounds of water, have

[8] At the time of the writing of this report, the products posted on the Mediascape that are marked with a sound icon range from very short (less that 60 second) recordings, to longer more finely produced/edited pieces–some of which were broadcast on IPR.

been posted on the project's website and are organized by the location at which they were recorded.

In the more in-depth Radio Academy (RA) component, six participants spent time learning about the local watershed with the goal of creating radio segments to be broadcast on IPR. Over a three-month period, the RA youth spent time exploring and collecting a wide range of natural sounds, sometimes conducting interviews, and producing their pieces. These radio segments were combined into a longer radio program about the watershed, with added narration by IPR staff.

The rationale for Soundscapes and the Radio Academy

The rationale for the investment in these audio components was that they would serve several purposes. First, they provided a vehicle for capturing and analyzing data from the watershed, and for gaining a deeper understanding of the sounds that can be heard there. Second, they provided an opportunity for youth to learn a technology with practical applications—i.e., audio recording equipment and related production software—that they conceivably could apply in the future via amateur or professional engagement in radio. Third, the components provided a way for these youth to learn to tell stories in a radio format and to reach a wider audience by airing their productions on public radio and in the museum exhibition.

The Soundscapes and Radio Academy components clearly have potential to serve the goals of LTTR. They are designed to tap into the expertise of one of the CWE's core partners: Interlochen Public Radio. Additionally, because the topic of watershed science is relevant to all who live in the Grand Traverse Bay watershed, the radio segments have the potential to educate and perhaps increase the level of appreciation of those living within its bounds.

Findings and discussion

The Soundscapes and Radio Academy components were a significant investment on the part of the project, in terms of time and resources. In the end, the project created three short (1- to 2-minute) pieces and one long (13-minute) segment that aired on IPR. There were also many very short (e.g., 5-second) sound clips posted on the project website. Below we discuss some of the benefits of this component as well as some of the issues that surfaced.

Benefits to youth: One of the ways that the Soundscapes and Radio Academy components helped the project reach its goals is that it provided a way for youth to produce radio, which they very much appreciated—they enjoyed learning how to tell a story, and felt satisfied that they were able to share their experiences with the public. As one Academy participant told us:

> *I am always doing the video side of things and to have time where you could focus mainly on audio and learn to create an effective story through listening and sound [was a good opportunity]… it is definitely a different view of something I have already been doing.*

Youth were allowed to investigate areas of interest to them, and because there were different topics explored, the segments could potentially be relevant to a public with diverse interests themselves.

The creation of radio pieces turned out to be a source of pride for some of the participants, as one project partner noted:

> *…all parents and students really got into it, and it became a pretty cool thing that some of our students were on NPR and talking… it aired a number of times.*

Connections with other LTTR components: We found that the Radio Academy youth did not appear to be integrated into the larger *Listening to the River* experience. For example, they had heard of, but did not know anything about, the museum exhibit. They expressed interest in exploring other mediums (e.g., video) and doing more projects related to the watershed, but two of the three that we interviewed reported that they had not heard of the three-day summer workshops that would have been available to them the following summer.

Trade-offs: While there are some direct benefits to youth and possibly to the community resulting from this component, the intensity of the radio production effort, and the small niche of youth interested in it, limited its effectiveness as a major component. The production of high-quality radio, suitable for broadcast, is a very time consuming process. The way these components were designed, and the timeframe in which they occurred, made meeting the potential a tall order.

The vision of youth producing radio is a powerful one, and there are many examples of high-quality youth radio programs. However, in this case the group was starting "from scratch" without a youth radio program already in place. LTTR staff faced recruitment and retention challenges—although 12 youth signed up, only four youth completed the Radio Academy. Some of the youth expressed concern about the amount of time their participation entailed (especially for the Radio Academy), and some reported that their peers are simply not that interested in radio as a medium for communication. Only about 12 youth total ended up having their stories aired on IPR.

It's important to note that for communities that already have a youth radio program in place (such as at the replication site—see section below about this effort), there are fewer challenges involved. Therefore, in spite of the difficulties faced in Traverse City, we feel that including radio production is an important part of this model as it did seem to provide positive learning experiences for the youth who ended up participating, and because it is a good way to share the youth-created products with the larger community.

- *Listening to the River* museum exhibition (permanent and traveling)

Great Lakes Children's Museum assumed primary responsibility for the LTTR exhibit. An exhibit development firm called Matthew Martin Design Works, based in California, created one permanent and one traveling exhibition about the *Listening to the River* project. Some content collected by youth during the field excursions was integrated into the exhibits, and youth helped

conceptualize the exhibits, which were designed to communicate the concepts of watershed science to an elementary-aged audience.

The GLCM worked closely with the exhibit designers to develop content and approach to the exhibition. The larger permanent exhibition in the GLCM was installed over the spring and summer of 2008. The traveling exhibit was installed at the Boardman River Nature Center; it then traveled to the replication site (Marquette, MI) and is now being stored at LIAA.

The rationale for the GLCM exhibition

The *Listening to the River* museum exhibition is one of three main ways that the project intended to share participants' field experiences, and the content they produced, with the public. It was hoped that the exhibition would, in particular, be interesting and accessible to 7 to 12 year-old children with their families and in school groups. The rationale was that, even though LTTR excursions themselves would not serve a large number of people, the outcomes of the project could be shared in the more static medium—but still engaging and inspiring setting—of the museum exhibit. In this way, the LTTR project would have a broader reach and engage the public to get more involved in understanding and caring for their watershed. Staff also hoped that the opportunity to be a part of developing an exhibition for the public would motivate at least some youth to participate in the project in the first place.

Findings and discussion

With a limited amount of space (approximately 1500 sq. ft.), and with many concepts about the watershed that could have been included, museum staff and designers needed to be quite strategic and intentional about what to include in—and what to leave out of—the final product. The final exhibition includes some exhibits about natural history (e.g., "Sounds of the Watershed" and "Strata" zones). However the primary focus has to do with the intersection between humans and the watershed.

The focal point of the exhibition is the "Watershedometer," a small-scale model of the Watershed that is located in the center of the gallery. The rest of the exhibits around the room are connected to the Watershedometer. Visitors experiment with "good" and "bad" choices about the ecosystem; the choices they make are reflected in the relative cleanliness or pollution of the watershed system. A large percentage of the total footprint of the exhibit is dedicated to the topic of invasive species.

At the time of our visit in July 2008, there were still many issues that the team knew needed to be resolved. There were inconsistencies in the signage in terms of level of depth, and accessibility to the relatively young audience of the museum. There were exhibits that physically did not work. Additionally, the specific work of the youth—and the visibility of the LTTR project more generally—was hidden in the exhibits. That is, although visitors could see the results of the youth being in the field (e.g., a short video of an interview with a bay expert), there was no context set about the *Listening to the River* project: what it is, why it is important and worth paying attention to.

The traveling exhibit also had some issues. We heard in early interviews with a project partner, as well as from a representative of the replication site, that the traveling exhibit "…did not have as much content as we would have liked," and "I couldn't find a home for the mini-exhibit. It was out in the mall for 80% or 90% of the project and I am still thinking of how to thank the mall manager putting up with us. It didn't work all of the time… Three times, I more or less got the public library to agree to house it, but it was either too big, too tall for their room, or too loud—which is funny [ironic] because it begins with 'shhh, listen.'"[9]

In summary, we agree that an exhibition of the kind envisioned has real potential to serve project goals. A museum exhibition can allow for dissemination of youth experience, particularly when designed with the input of the youth and includes content that the youth themselves collected. And the content has potential to help educate and inspire the public to take better care of their watershed. In reality, developing the museum exhibits while trying to take into consideration the multiple goals and ambitions for this component was a very tall order. LTTR staff wanted to integrate the ideas, experiences and related media products of youth participants, while maintaining a museum level standard of quality. They also wanted to create a flexible format that would allow for other youth in future excursions to be able to contribute to the exhibition content. Further, they were trying to convey ideas about, and to condense a complex and important topic (watershed science and conservation) into a context where people sometimes spend less than five minutes of focused attention. Given these constraints, and given what we saw when we visited the exhibition, we feel that the potential of this component to serve the goals of the project was only partially realized.

- *Listening to the River* website

Throughout a majority of the life of the project, the website took a significantly different form than it does today—it was revised after the project's final "dissemination" conference in January 2010. Due to the timing of our summative evaluation, we do not have user data on the quality and value of the website in its final format. Therefore, in this section, we simply summarize the intent of the website and its contents and organization.

Intended purpose of the project website: The project proposal states: "At the start of the project, LIAA will create a Coalition for Watershed Education Website (CWE Website) that will serve three main purposes: 1-information clearinghouse – program information, dissemination and educational resource; 2-project management – project logistics and vehicle for the collection, aggregation and display of mapped watershed data (available to specific users); 3-display of interactive watershed discovery experiences, blending multimedia with mapped data."

Throughout the life of the project, the LTTR website served as a home base for its work. Since the early days, staff described the website as the core, foundational "map" that would serve multiple purposes as noted above.

[9] We had planned to conduct a follow-up interview with museum representatives to learn how issues and concerns with the exhibition were resolved. However, after several attempts we were not able to reach museum representatives for a follow-up interview in time for the writing of this report.

Given *Listening to the River's* focus on technology, and given the general familiarity with the use of the Internet on the part of youth, it makes sense to take advantage of the World Wide Web as a major tool and resource. The web provides a place for youth to upload and showcase their work. It also serves as a central node for the many community partners—both core and more peripheral—that have been involved in the project. Additionally, a website can be a comprehensive and multi-faceted way for the general public to find out about, and perhaps participate in, *Listening to the River*.

Website content and organization: On the home page of http://www.listeningtotheriver.org, users can read a welcome statement, and then access the main sections of the site, which are organized as follows:

- About
  - Introduction and Overview
  - Project Background
- Start a Project
  - Develop a Coalition
  - Marketing and Recruiting
  - Using Technology
- Plan an Event
  - Three-day Workshop
  - Single-day Event
  - Media Academy
- Mediascape Stories
  - Grand Traverse Bay Stories
  - Marquette Stories
- Tools and Resources
  - Community Guidebook
  - Other Resources

Each of the major tabs, or sections, of the website represent the major areas (and goals) of the project: the development of a coalition for watershed education ("Start a Project"), the development and implementation of Watershed Discovery Excursions ("Plan an Event"), the sharing of youth data and interpretation with the public ("Mediascape Stories"), and the replication of the model in another community ("Mediascape Stories" [Marquette] and "Tools and Resources").

This menu suggests that it serves two broad purposes for the website beyond defining the project. One is to provide others with information they need if they are interested in implementing this project in their own communities, and the other is to make available the student products as educational material.

The Role of Partnerships

A core feature of this project is that it relies on a wide range of partners who have different assets and interests. It is an eclectic model, requiring people and organizations with varied expertise that would not necessarily connect until brought together around the collective work of this kind

of project. This model as envisioned is complex, and needs to include expertise in areas ranging from watershed science; technological applications, radio and video production; volunteer recruitment and management; among other areas.

Very few single organizations offer this range of expertise. Therefore the model demands collaboration amongst organizations. Project leaders have to know what assets are already available in their communities, and what they will have to go find or develop themselves. For example, the four core organizations of LTTR had strong assets in technology application and access to many watershed science groups. They had an established radio station but not one with a youth radio program in place. And they had less experience in working directly with middle- and high school-aged youth. So, they started with advantages and disadvantages in the model. (We write below about how the replication site started out with a different set of core assets.)

From the very beginning, the core team understood this, and envisioned *Listening to the River* as being first and foremost a coalition of community partners working together to provide watershed and technology education to youth. The team aimed to involve people and organizations who could contribute particular assets and skills to the project, thereby not only helping to actually run the program but also to gain their investment or "buy-in" so that they might also benefit from being involved, and therefore work to sustain the program beyond the life of the original grant.

According to the project's website: "The Coalition for Watershed Education is anchored by four well-established community organizations operating in varied but intersecting domains. They have expertise in technology, broadcast, exhibit design and water resource management among other areas…."[10] In addition to these core partners, LTTR worked with partners they called "consultants," an advisory committee, "content specialists," "volunteer guides," and "supporting organizations." Early in the project there were also two young-adult interns working with the team.

Below we discuss what we found about the role of partnerships in the *Listening to the River* model.

Being involved with the *Listening to the River* project adds capacity to, and is valued by, local organizations. We learned that partner organizations appreciated their involvement with LTTR. For some, it was because the project provided programming that was valued both by the youth participants as well as the adults running the partner organizations. For example, a leader of the local 4-H club said:

> *One of the benefits was the widening or the expanding of the image of 4-H [which] for so many people is just animals and the fair and so, for 18 years [I've had] people call and say 'my child is interested in 4-H, but we don't live on a farm and we can't have an animal.' I like to have lots of different actions, and so to be able to say, 'we have this watershed project and they are interested and we are partnering with…' and so that is one of the reasons why I like to be involved in a community-wide basis.*

[10] http://www.listeningtotheriver.org/who.asp Retrieved 2-13-09

Another community partner told us:

> *For a teenager to say, 'hey - I have all of this great equipment and [I can] go out and be creative and let's do these types of things…'—just to be given the responsibility and trust meant a lot to them—the kids loved it.*

A representative of a local youth organization pointed out that the documentation that is an integral part of the LTTR project helps him make a case for his own programs:

> *[I see LTTR as] an ongoing partner. We are going to be working in the areas that can relate to what they are trying to do and the conservation district that we work with is responsible for the Boardman River, and stream bank restorations… so I really see that there is a lot of opportunity for us to create good video and audio production with them. For me, it is beneficial because it documents the program of what we are doing and I have something that I can take out and show people.*

(We recently learned that the use of this documentation helped lead to a very large ($4M) project: the SEEDS 21st Century Learning Program, which incorporated some of LTTR activities in winter/spring 2010. See the Addendum to this report.)

For a local nature center director, the benefit was that the presence of LTTR provided a way to bring watershed content into her own programs and nature center:

> *The Listening to the River exhibit was a nice addition, because it was different from what else we had here, and also because I wanted to bring in a watershed focus to the nature center, as a way to tie everything together…. I created a sheet for our volunteers who are out in the Nature Center greeting visitors, with some talking points and some explanation of what Listening to the River is. So they could feel more comfortable talking with visitors about [the exhibit] and this bumps up the educational value of it…*

<u>The wide range of partnerships ranged from very short-term, to extended in length</u>. Many but not all of the organizational partnerships ended after brief periods of participation. One exception is that of a partnership with an individual who is an expert in aquatic biology and has a passion for watershed education. This person has been a particularly strategic partner—even though she has moved between organizations several times during the life of the LTTR grant, she has continued her relationship with LTTR, and has brought that connection to all the organizations where she has worked. This suggests that pursuing partnerships with both individuals and organizations is key to the long-term sustainability of a project like LTTR.

<u>Importance of keeping partners involved</u>. If one of the reasons to make community partnerships a major feature in a project is to contribute to its sustainability, then clearly keeping those partners involved is important. We heard from one partner that he wasn't as involved as he would have liked to be, both in terms of the amount of time that he contributed, and in terms of participating in product development:

> *Just to give me a call and say 'we finished the product… would you come over and take a look and give us some feedback?' That would have been nice. I think they maybe could have done a little better job on reaching out to the people that they used as resources like that.*

One partner, who got involved with the project mid-way through the grant period, and who stayed involved for longer than most, also preferred a greater level of engagement in the project:

> *I did participate in bits and pieces here and there, and then the last spring break program I was able to participate in the whole thing and so that was really good for me to see it from beginning to end, one of the programs, instead of just being a natural resource person who comes in at the beginning or end of various pieces.*

These sentiments lead us to think that people have their own intrinsic reasons for being involved in projects like this one. We have found that sometimes projects worry about using other people's time or basing the partnership on money. But it is important to understand these partnerships fundamentally as relationships with people.

Importance of being clear about expectations of partnerships. As we discussed in the Components section above, the success of projects based on partnerships relies on clarity and genuine communication about expectations from both sides. We heard from several partners that what was expected of them was, indeed, clear from the beginning. Others felt that the lack of understanding about their role hindered their ability to contribute to the project to their greatest ability.

Summary: The CWE consisted of a core group of four organizations who brought a diverse set of skills, connections, and areas of expertise to the project. This configuration is what gave LTTR its particular flavor, colored its style and approach, and ultimately determined its level of success. In a multi-faceted project like *Listening to the River*, with the ambitious, long-term goal of enhancing watershed stewardship, it makes sense to recruit and involve a range of community members. In general, it worked to fund the four initial organizations, who then recruited and worked with other people and organizations to add to and enhance the offerings of the core group. However, designing and implementing a project with multiple partners requires a strong commitment to constant communication, persistence, and clarity around the structures of the project. The maintenance of community connections and relationships needs funding and leadership, as well as clear benefits to participating partners, in order to be sustained.

III. The Replication of the Model

One of the primary goals of LTTR was to document the CWE's strategies for informal watershed-science education so they could be adapted for use by other communities throughout the Great Lakes Region and beyond. As part of this goal they produced the *Listening to the River* Community Guidebook and found a regional site in Marquette, Michigan to pilot the LTTR model. The host of the project was the Upper Peninsula Children's Museum (UPCM).

The UPCM was an ideal site for the replication of the LTTR model. Their educational philosophy is similar to that of LTTR in that they focus on involving youth and family in informal learning experiences. The UPCM already had multiple partnerships in place with community youth groups, such as local Girl and Boy Scout troops and the Great Lake Center for Youth Development. The museum also had their own youth media program in place, called "8-18 Media." Through 8-18 Media, youth of the ages 8 to 18 work together to produce written articles for a monthly newspaper, as well as audio pieces that run weekly on one public and one commercial radio station in Marquette.

Given that one of the elements of the LTTR model is the creation of partnerships for watershed education, the UPCM partnered with the Superior Watershed Partnership (SWP) to carry out the pilot. The SWP is dedicated to the protection and restoration of the rivers and watersheds of the Upper Peninsula of Michigan. They implement environmental restoration projects and provide technical and educational assistance to a variety of Great Lakes protection initiatives. The LTTR partnership in Marquette was not expanded beyond that between the UPCM and the SWP, in spite of a desire by the program coordinator. (According to the program coordinator, there are 15 local watershed councils that were sources of possible, but unrealized partnerships.)

The program coordinator and the lead for the technology and production of radio pieces both are staff at the UPCM. The scientists who provided watershed education and GPS support both are part of the SWP.

Effectiveness of model replication. As described by the project coordinator for the replication site, their role was *"to follow the model, see how it all worked and see what variations we might come up with."* Over the course of about seven months, the replication site held nine different events. They tested two of three delivery models developed by LTTR—leaving out an extended single-media academy, such as the Radio Academy held in Traverse City. They focused mostly on the LTTR delivery model of the three-day (24 hour) workshop, holding five of these sessions. The youth produced radio pieces for four out of five of these, videos for two out of five and slide shows for all of them. Each session followed the LTTR model of a segment of watershed education followed by exploration in the field and then production of the media pieces. The site also held one three-day (16 hour) event that resulted in the production of one radio piece. The remaining sessions were shorter—taking place in one day and focused mostly on learning about GPS and watershed education. One of these events resulted in a radio piece produced by youth in the 8-18 Media program who were part of the excursion. A UPCM member described one excursion this way:

> *In one instance, kids from six different charter schools [came] and we did a one-day thing with them. We did GPS and then we went out to a site where a flood had destroyed a dam and showed them where the water used to be and where it is now and did watershed education right there on that spot. A couple of 8-18 Media reporters reported on that, because the charter students weren't going to have time to produce pieces themselves.*

The replication site posted their pieces on the LTTR website, including a GPS coordinate for each of the events on the LTTR web-based map, and the radio pieces were aired in the 8-18 Media slots on both the public and commercial radio stations.

Changes to the model and effects of those changes. For the most part, the Marquette site ran the LTTR program as designated in the Community Guidebook, and as directed by the LTTR staff. A minor change that was made at the replication site had to do with the use of and focus on GPS. In the original LTTR model, the youth found GPS coordinates for each piece they produced and then uploaded the pieces on the web-based map. At the replication site, the youth were trained in and used the GPS equipment, but they produced only one coordinate for each excursion. The project coordinator explains that it was too difficult to get accurate readings, and therefore not very useful for the purposes of the map:

> *So, when you look at the big map of all of the stories in Marquette, those GPS placements are pretty vague, in that we may have found 12 or 15 things [but] we found we weren't getting GPS locations by 6 feet. [Rather] we were getting them by 50 or 100 feet and in the end, I think the importance of the GPS diminished… it was another part of technology and another part of the training, but not necessarily very essential to the process..*

Instead, the use of the GPS became a team-building activity where one pair of students would hide a snack and mark the coordinate and another pair would have to go and find it. The staff member described the adaptation:

> *I think the kids all recognized that it was part of the learning to be comfortable with technology and we put it right at the beginning of our outdoor experiences and so it became a team building activity in the outdoors, going for a walk, the snow under my feet, working with a new partner, trusting the pair that had gone before us to give us the information.*

The effects of this change are that the map has fewer data points, and participants got less experience using the GPS for a practical use—i.e., learning how to collect data, and mark it accurately on a map—which is a part of the scientific process. However, this appears to be a minor issue—although the media pieces may not be located exactly, the process of using the GPS was still important as the youth learned to use the technology, and to practice team-building in the process.

The replication site did not produce video pieces for each of the three-day events. Because they had a radio expert on the staff of the UPCM, they focused, for the most part, on the production of audio pieces. This allowed the site to capitalize on what they already knew how to do well and to save resources. They did bring in an outside expert for two of the events, a young woman

who is a news anchor for a local ABC news affiliate, to help with the production and editing of videos. The students enjoyed working with a young person involved in the media, and in general appreciated the opportunity that radio provided to share their pieces with the public (posting to a website is somewhat commonplace for this generation).

Learning opportunities and benefits to youth at the replication site. Based on interviews with adults and reviews of participants' products, we can infer that the replication site created positive learning opportunities. The pieces they produced were of at least as high quality as those produced by the original site; they covered a variety of topics in some depth, and contained language that demonstrated the youth's knowledge of basic watershed science and characteristics. The adults we interviewed reported that the youth had good learning opportunities:

> *We got kids from down state and kids from Green Bay who were new to town …they began to enjoy the outdoors through the watershed view.*
>
> *There were kids pointing a microphone, out of their comfort zone. They weren't standing up pointing it, they were leaning and getting into the sand. That is definitely where technology really met with the content beautifully.*
>
> *…we stood by the babbling brook that came out of the earth and began with the stream and we followed it under concrete, by a mall and we got the same recording of it, gurgling through… [the youth encountered] lovely individual science things like picking up the rock and finding that bug.*

The replication site seemed to be able to create a successful balance of curriculum and student-driven approaches to the youth field experiences. A representative of the Superior Watershed Partnership explained:

> *The watershed education and the GPS training, those are more curriculum centered, although there is plenty of room for discussion and there are a lot of activities associated with those two particular aspects. The more student-driven, inquiry activities were what we did out in the field, out collecting and taking photographs and trying to come up with a story. .. Some kids needed more direction, more help with the technology, and with just finding stuff that was cool to consider doing a story about.*

Capacities that were built at the replication site. The 8-18 Media program's involvement in the LTTR pilot significantly strengthened the technology capacities of 8-18 Media. As one staff member explained:

> *The Listening to the River equipment from Traverse City forced me to learn a lot, and allowed me to use a lot newer equipment and see what was possible. I was dealing with extremely old computers and after taking part in Listening to the River with very nice equipment, computers and computer programs it spurred me to work a little harder to get some grants to get 8-18 Media some new computers. We are starting to do multi-track recordings. We did a trip down to Traverse City and I was able to do a YouTube video of*

our trip. And I was able to do an elaborate slide show of [a different trip], because of what I learned from Listening to the River.

Through LTTR, the UPCM was able to offer a program that helped other local organizations meet their goals, and some of those organizations contributed to the replication site by providing youth. For example, the library has a program called Teens About Books. The LTTR model fit perfectly with the librarian's goal to have her group be in the outdoors, build teamwork and work together on a project where they write and edit. This was a new partnership for the UPCM and it was made possible by the LTTR program.

Both the UPCM and the Superior Watershed Partnership received extra exposure within the community through being featured in the media as a result of the partnership with LTTR. The Program Coordinator at the UPCM reported that the project provided "properness"—or imprimatur—to the Children's Museum and that the project may potentially strengthen partnerships with agencies that have been involved in LTTR through the museum, such as the library. The SWP felt that parents whose children were in the program became familiar with their organization when they may not have been before. As part of the Watershed Partnership's mission is to educate people about the water in the region, and about caring for watersheds, participating in LTTR helped to serve that mission.

These vignettes are good examples of the benefits of partnerships and mutual capacity-building that this model can foster.

The roles of the home site and the Community Guidebook in the replication process. The Marquette site staff described particular parts of the Community Guidebook as critical in the replication process. These sections include the ones on Watershed Discovery, on Use of Technology and on Partner Coalition. Even with the Community Guidebook, however, all of the staff involved in the replication site reported that they had still relied heavily on the Traverse City staff for their expertise and guidance. The technology person reported having a steep learning curve for the technology required for LTTR, and using LIAA extensively as a resource, including a visit by LIAA staff to the museum for a technology "Powwow." UPCM staff reported that even with the Guidebook and their direct connection to the original site, they still could have used more guidance in how to make organizational connections so that the missions of both partners were fulfilled. This speaks to the point we made above about how each community starts out with both assets and areas of need that require additional support and resources.

An independent science education expert[11] reviewed the Community Guidebook and gave us her assessment of its usability and value. In general, her review corroborates the experience of Marquette. She believes the project is not only innovative, but also is a needed supporting

[11] Our reviewer has been a K12 educator for 19 years, with involvement in four National Science Foundation projects as a lead teacher or program director. She was an administrator of the Parks as Classroom Grant in conjunction with the Big South Fork National River and Recreation Area. She served as a founding Board member of the South Fork Watershed Association. She also developed a K-8 curriculum matrix involving teachers, scientist and university educators; and designed and facilitated content studies programs, curricula study programs and classroom instructional strategies programs.

mechanism for communities interested in watershed education. She thinks the Guidebook offers support in how to plan and implement this program and noted that because there is a growing emphasis on the environment in communities, a coalition that provided such a program would be a rich resource for K-12 teachers. Her assessment is that the LTTR project is a successful model that could be replicated. She sees the Guidebook as offering a map to give a group a direction to begin the process and to understand what works and what might be challenging. Her full review of the guidebook can be found in Appendix B; below we list salient points:

- The technology piece was seen as a strong motivator for student involvement.
- Budget information would be useful, in particular for the costs of the technology but also for the activities, volunteers and the summit.
- A description of the expertise needed to implement the activities and technology would be useful as well as suggestions for where to find resources for purchasing or borrowing the necessary technology, access to servers and technology training.
- A description of where to go to find the staffing necessary to facilitate the activities would be helpful for an organization (or person) that did not already have access to staff.
- A section on how to involve local K-12 schools would be a good way to connect the project to teachers who need this kind of resource.
- The various checklists were seen as quite helpful as were the flyers.
- It would be helpful for potential facilitators to see the activities, perhaps as a video on the website.
- The Mediascape stories are wonderful marketing tools and one might be included in the Guidebook's Power Point presentation.

Important conditions, capacities and leadership for successful LTTR replication. The replication site had a number of different factors that contributed to their successful replication of the program:

- As we noted in the partnership section above, a group that wants to replicate this project either needs to have the assets of a range of organizations that bring key areas of expertise to the table, or they need to be willing to "invent the wheel" and to construct the necessary elements. The replication site had existing connections to youth-based organizations in their community and built on these partnerships with LTTR. They also had extensive experience in connecting and working with youth.

- The 8-18 Media program at the UPCM provided a context and the expertise for recruiting youth already interested in media, and also for producing radio pieces.

- The staff at the replication site agreed that institutional support—and having radio, science and 'run-around' positions—are all essential. As in Traverse City, the expertise of the core partner organizations ensured that all of these roles were fulfilled. This underlines the importance of partnership as a foundation for this project.

- Technology is a cornerstone for LTTR, yet for a small museum or other similar organization, could prove to be quite challenging to obtain. All of the equipment used at

the replication site was borrowed from Traverse City and was sent two or three times to Traverse City to be "re-booted." A UPCM staff person explained:

> *It probably wouldn't be as exciting without Listening to the River equipment and we can't buy that. We may be able to borrow it from Traverse City if we do one in the summer, but without money we couldn't do what we did.*

The replicability of the LTTR model. The experience at the replication site suggests that to a large extent LTTR developed a replicable model. The model provides a clear structure for providing youth with an outdoor learning experience interwoven with technology, and the opportunity to weave the two together in creating a story about their watershed. Small changes to the original model, such as limiting the use of the GPS, did not seem to diminish the benefits of the model. The replication site was able to capitalize on existing partnerships, programs and staff to bring to life their unique watershed phenomena, such as a flooded dam, a bog and a sugar shack. In fact, the replication site may have been somewhat more successful than the original site in recruiting youth. This is most likely a result of the partner organizations having more direct experience working with youth, thus greater initial capacity to build upon. In all likelihood, replications of the LTTR model will always have varying emphases and degrees of success and challenges that arise naturally out of the different foundational capacities of local partners.

One limitation to replication is the availability of technology. This replication site suggested that the technology—especially the software on the computers—could be simplified. For example, the recording software was quite complicated; the site suggested that perhaps software could be chosen that was less complicated for youth to use. The simplification of the technology also might reduce the need for sites replicating the model to have outside support for learning to use and trouble-shooting the software and equipment.

Given those and other challenges raised earlier in this report, the focus on technology—if addressed carefully and funded adequately—can provide productive and satisfying experiences for youth. A SWP partner explained:

> *I am not sure that every kid came away with deep appreciation of a watershed as much as I maybe would have liked, but certainly just by being out there, and experiencing some things they had never experienced I think was helpful, to most kids. Maybe their appreciation for watersheds came through a little bit more by osmosis than the curriculum part of it…. I think the technology was essential and it wouldn't be the same program without it, because they were able to do produce something that they were proud of, through the technology.*

Variations in local technology capacity are likely to introduce some variation into replications of the model. The important principle is that the model requires at least some use of technology for locating, gathering, recording, and displaying field data.

IV. Lessons Learned About the *Listening to the River* Model

The *Listening to the River* project had both significant success and great challenges to overcome. Overall, the project was successful in creating a technology-based watershed education project in their community, in building a coalition of partners who contributed multiple resources to the project, and in creating a model that was successfully replicated in another community. However, this project was highly ambitious, with the goal of creating multiple complex components; it is not surprising that some components were more effective than others. In this final section of our report, we summarize what we think are the key lessons learned from this investment.

Using watersheds as a context for science education

We think that using watersheds as a context for informal science education has the potential to help increase the likelihood that youth will appreciate and therefore take better care of, their local watersheds. Implementing this kind of project needs careful attention to the particular partner organizations and what strengths and resources they contribute. It needs to include a group who can provide both the actual technology to study watershed, and the know-how for its use. And it needs people who are smart about the science of watersheds, and who care about imparting that knowledge in an accessible way to young people who may be exploring their own watershed for the first time.

For someone interested in replicating *Listening to the River* in their own community, any of a range of scientific disciplines and environmental issues could be more or less emphasized. A community may have more assets in one area than in others, and could draw on that local expertise to customize the field experiences for youth. We suspect that people who are interested in watershed education, as well as the participants of such efforts, are interested in and see the value of both more "pure" scientific study (or at least gaining insights into how scientists study watersheds) as well as in fostering an appreciation for watersheds as important environmental resources.

The context of project replication

The Great Lakes region was a logical place to pilot an environmental education project about the watershed. Not only is there an obvious focus of attention—the watershed itself—right outside the local peoples' doors, but there are already quite a few watershed management and education groups in place, with their assets to draw from.

Theoretically everyone in the world lives in a watershed that needs to be understood and cared for, and yet we speculate that doing this project in places where the watershed is more hidden, such as in an urban environment—and especially if there isn't much watershed education already going on—would be quite a bit more challenging to implement. Yet it might be these areas that most need this kind of program. The challenge would be to identify local people and groups that can bring the project to bear in such communities. We think it is worth considering supporting the implementation of this project in more challenging areas to learn more about the model and its essential features.

Managing multiple partners that it takes to do this model

A great challenge in this project was defining and then managing the roles and responsibilities of various partners. An important lesson learned from this investment is that project management takes considerable resources, time and attention. It requires advance planning, and skilled people whose primary role is to manage a diverse group of partners. It requires the cultivation and management of the roles and assets of collaboration itself.

Focus on technology

This project's focus on technology had major strengths: it provided a "hook" for recruiting participants, it allowed youth to capture and share their experiences, it inspired some participants to continue with technology studies, and it was a forum for the involvement of passionate adults. The focus on technology also added limitations and constraints: it sometimes limited the ways in which youth could work together, it was logistically challenging to manage, it was expensive, and it could potentially limit replication options. In the end—provided there is a clear goal in mind for its use, and someone whose primary job it is to manage this component—the focus on technology in a project like this provides clear benefits to its participants, and to those who view the products produced.

Quantity and quality of science content

The major content focus of this project was on watershed science. We learned that the youth participants were, indeed, able to articulate (via the products they produced) things that they learned about what makes a watershed what it is, and why watersheds are important. One of the greatest struggles for project leaders was finding a balance between explicitly teaching important scientific ideas about watersheds, and allowing participants to discover their own interests in the field. We learned that some youth needed more help than others in choosing a focus for their projects, and it wasn't always obvious for the adults how to guide them in this regard.

In some ways this apparent struggle could be seen as a strength of the project and part of its essence. That is, there is not a set "curriculum" for the content of LTTR, and self-directed exploration is one of the hallmarks of informal science education. This flexibility allows for each community to decide what content they want to focus on, and the extent to which they want to teach only "hard science" or a more multi-disciplinary approach. It also underscores that the design of powerful educational experiences requires a lot of knowledge about teaching and learning: i.e., science knowledge is different from knowledge about how to help people learn science.

The youth experience and products produced

We learned that the products produced by the youth—the photographs, videos, sound clips, and radio stories—were a source of pride and satisfaction to those who produced them. The products created a context for focusing youth's attention while in the field, for teaching them new skills, and for sharing what they learned with each other, their families, and the community.

We also learned that the products of the project ranged in depth and quality. Some were very short, and covered somewhat superficial ideas about the watershed. Others were of more depth and detail, and displayed knowledge of core watershed science concepts. An important lesson learned from this investment is that, for youth to create high-quality products that can be disseminated in a public forum, it requires a significant amount of time, resources, and content expertise as well as people who have experience with and understand youth. We also learned that—although there are benefits to allowing youth to explore in an open-ended way—in the end there needs to be a structure and framework for putting together a high-quality final product.

Project and process documentation

LTTR had three primary mechanisms for project dissemination: the website, the Community Guidebook, and an end-of-project dissemination conference. During the course of the project the website was a work in progress, and served as an iterative home base for the work of youth. In its final form, the website may now be a good source of information and support for those interested in replicating this project. The Community Guidebook has turned out to be a helpful tool, but may require more assistance in order to be of use than was originally planned. It appears that the nature of this work requires more than a guidebook, depending on the assets and expertise already in place.

Creating a museum exhibit

As noted earlier in this report, our knowledge of the nature and quality of the final museum exhibition is limited. However, based on what we did see, and on what we learned in subsequent comments from the exhibit team, the creation of a museum exhibit in the context of this kind of project should be approached with caution.

We learned from our interviews that the museum staff and exhibit designers wanted to convey rigorous and accurate science content through the exhibition. They also wanted to make sure to include the data—i.e., the sites, sounds, and ideas—collected and put together by youth. Additionally, the team wanted to create an exhibition model that would flexibly allow for content to be added or changed over time, either at the Great Lakes Children's Museum, or in other communities that create such an exhibition.

It is very easy to under-estimate the complexity of creating an exhibit with the kinds of vision the project had, and it may that the exhibition team was trying to meet too many goals in one component—which led to none of them being well-implemented. Perhaps the problems of the exhibition could have been avoided if a rigorous formative evaluation had taken place; to our knowledge it did not, and in our experience many of the kinds of problems we saw in the exhibition can be avoided if formative evaluation happens at the right time, and is taken seriously. Another possible contribution to the problems with the exhibition may be that the design team lived very far away (on the West coast), and they may have felt significant pressure to accomplish too much—at great expense to the quality of the product—in each visit they made.

It is an important lesson learned that those who want to create an exhibition with multiple and potentially contradictory goals need to design around a strong topic that is of interest to the

community, and that can successfully be implemented in a museum context. And it is important to conduct formative evaluation around the key ideas and designs of the exhibition.

We think that the creation of a science museum exhibit is an optional component of this model. It was an important part of the vision, but the lesson is that it is extremely challenging. We think this component has the potential to enhance the field excursions, and be a powerful contribution to the project, but we think LTTR can be replicated well without building an exhibit.

Evaluation of future replications

We suggest that it would be very useful to continue to study what it takes to replicate *Listening to the River* in a wide range of contexts, in particular in places where there aren't already a lot of watershed education opportunities. The initial investment in *Listening to the River* shows promise for success; evaluation can portray, and help make a case for this project as a sustainable effort.

Appendix A

List of Evaluation Activities

- Participated in and presented at the "Building An Appreciation of Watersheds: Informal Science Education Summit" (February 2005)
- Conducted initial "theory of action" kickoff meeting with project staff; conducted interviews with youth participants and interns (July 2006)
- Participated in "Blue Sky" exhibit design charrette (November 2006)
- Conducted in-depth update phone interviews with core project staff and partners (Fall-Winter 2006-07)
- Conducted phone interviews with project partners (December 2007-January 2008)
- Conducted phone interviews with youth participants (January 2008)
- Reviewed project website and intro video (February 2008)
- Observed Radio Academy "Final Showcase;" conducted informal interviews with participants (June 2008)
- Conducted two-day site visit: Reviewed museum exhibition and interviewed visitors and staff; interviewed core staff; reviewed Community Guidebook draft; conducted focus group with Radio Academy participants; observed LTTR booth at "Bay Day" (July 2008)
- Conducted phone interviews with three representatives of the replication site (December 2009)
- Conducted review of completed Community Guidebook (February 2010)
- Conducted review of completed website (February 2010)

Appendix B

Listening to the River
Community Guidebook Review
February, 2010

1) First impressions

As a watershed coordinator my first impressions were visual:

- The guidebook is attractive and colorful. The photos are engaging and very appealing.
- The sections were divided into subjects one would need guidance to start a community effort.
- The similar colors were confusing, attractive but confusing. I wondered if these subjects were related and if not, did the color represented a progression in activity? Especially the more I used the guidebook. I was curious what the guidebook would be like if the resources were with the descriptions in the early sections instead of in the back where you had to search without any page numbers.
- I would not number each section differently. If you are training others using this manual you have to preface a page number with …" Turn to Watershed Discovery page 2" instead of saying turn to page 2. I have been in this type of activity and it is frustrating…number 1…..through the end of the guidebook. If you allow these guidebooks to be copied the present numbering scheme will make coping much more difficult. A

Second level of first view of the guidebook:

- I knew this was an informal science education project, but I thought there was a lack of outreach to the schools. I even went deeper looking for some type of school recruitment or activity and it did not "pop out" for me.
- The activities looked very interesting, but I would definitely want training before attempting to implement them.
- The use of technology is great, but I was curious about the expense and the expertise I may need to replicate the activities?
- I was curious if there were contacts or a list of agencies who would allow us to use their server for the tech activities.
- I also thought there would be a listing of web sites in the resource section such as state agencies, national agencies, etc. I do understand the guidebook's goal is to assist a group to develop a program, but this list may include agencies for consideration. Just another form of awareness.

2) ***Audience***

A) The guidebook appears to me to focus on non-profit or informal education organizations who are interested in creating an awareness/education program about water quality, movement and local water environments. It seems to be focusing on the environmental

interactions around water sources. It definitely seems to be geared towards educating the youth (ages 14 and up) about watersheds.

B) As a K-12 educator, the emphasis appeared to be as an informal program and does not mention a coalition with schools or municipalities, which in a rural area would be valuable. I would expect this task for an experienced educator, scientist or environmentalist. Any level of educator could spearhead the original meeting to create a coalition but one would have to have connections within the community, museums (if available) and/or in the local government to pursue this avenue due to funding issues and time constraints. Support of such an endeavor would be extremely important.

3) Rationale and feasibility

A) The vision of the CWE is very clear as to why the would be an important project. "They wanted teens to go beyond just learning about the water cycle; they …" the statement continues of course and is most persuasive. Also the stats on the number of adults (41%)who have understanding of a watershed is a clear rationale. Being an educator my first thought is age 14 is too old, a program with younger children involving the children with their parents would be fantastic….but I know you start have to start somewhere. I definitely think the "stories of the CWE" and the description of the process lay out the potential benefits of the project.

B) As a person involved with watershed projects I did not need to see the bigger picture, but as a novice I had to search for the larger ideas…there are strategic impact ideas missing from page 3 (Background) and after a search I found them in the support materials and they were still brief and not specific. I did recognize the list of partners on one of the pages 4 (Marketing), it might be helpful to have a listing of fields in science, environment and technology which may be helpful and why. The impacts or the example of impacts may be a great marketing information need for some organizations.

C) The project not only is innovative, but a needed supporting mechanism for communities. A guidebook such as this should be user friendly to any part of the country. There is a growing emphasis again on earth science in K-12 and as there is a growing emphasis on the environment in communities. I am not sure how well prepared these teachers are involving their students with their own community and subject such as watershed. If a coalition was available it would be a fabulous for any school to utilize as part of their academic curriculum, or environmental club or science club.

Too many community projects fail due to lack of planning and this guidebook offers a support in how to prepare for planning and implementation of a program. Addressing both youth and adults is a plus, preparing future participants as volunteers. The youth of today would/could be volunteers of tomorrow.

D) This would be very feasible in our community. It actually provides a wonderful guide to improve an ongoing project being implemented. The present project involves adopting testing sites, water testing training, and clean up efforts. This guidebook is truly a map to engage students/adults in becoming consistently involved with the watershed and the community. I do believe many of the training activities could be done without honorariums if the proper agencies

were involved. This could youth training program would not only compliment, it would fulfill a missing component. I do think there are missing components concerning cost. The story and a total cost and a charge, but I am not sure the registration fee mentioned for the CWE would be accepted in the rural region we live it. But again it is a suggestion. A sample Summit budget report would have been a nice example for the discussion.

E) The project mentioned earlier was funded by a state grant. Volunteers were trained in water testing collections, adopted a particular location and quarterly water samples are collected. The process was to provide the local watershed association a baseline of water quality for the region (Kentucky and Tennessee region near the Big South Fork National River and Recreation Area). My understanding this program is not being implemented now. The problem with most grant funded projects is when the funding runs out; the project ends unless it is supported by an organization or school district. This particular project involves training of youth and may be feasible due to the local experts available for community service programs such as National Park scientist, local water department employees, city park managers and (as surprising as it may be) coal companies' environmental engineers. I can also think of many schools in a three state of the Appalachian region this would be of great value to their environmental projects.

4) *Design and usage*

A) I did not see this as pick and choose. This was a description of an apparent successful model which could be replicated. As mentioned earlier, I was unsure of what type of organization would be using the model due to the emphasis on the ISE. I do not think it was so much you have to do this, you may have already created a group of "thinkers". But the guidebook offers you the story, a map if you will to give you a direction to begin the process. The suggestions of what works, pitfalls, and materials offer you shortcuts to use at your discretion. The trainings for example are adaptable to the local need. I still prefer participating in activities before I facilitate the activities (or even viewing the activity online would be helpful.)

B) The sections all seem important.

I would like to address the last couple of questions by listing comments as I went through the guidebook.

1. I do know a example budget for activities would be most helpful.
2. I did love the section on the youth, what "they told us" and the marketing plan for teens.
3. As I read through the volunteer section, I was again questioning cost (pg11 – what will be offered to volunteers – where would one find these funds?)
4. To be used in areas without an ISE program, staffing would be a problem. How would one work around this issue? Using a local agency? What kinds of agencies would support these activities?
5. Safety issues? Are outdoor safety issues covered? What about immunization that would be recommended for specific outdoor activities? Hepatitis, tetanus, others? It is amazing when working with community members the lack of knowledge of outdoor prevention items, such as how to dress. Just a thought. I had to add this to my work with high school students,

they would come in short shorts and tank tops. Also open cuts or wounds exposed to certain environments can create medical problems.

6. Technology – what would be the cost for GPS units? A Parabolic microphone? A camera? Jump drives? Storage media? Computers? Not all locations could find support for these items, so why not list websites of where they could be found and let the organizations decide on possible purchasing through some fund raising event, and providing a "check out" system? But storage and providing the equipment would need to be added as a consideration. What about a replacement process? Training on use process? These technology activities are wonderful and their use descriptions are wonderful, but I think it is something not all regions would have available.

7. The planning checklists process is great!

8. Under watershed discovery and curriculum activities, I may have overlooked it, but I find Watershed Histories a great piece for students (and adults). It gives a piece of ownership!

9. The Checklist: Building a Partner Coalition for you Project, newspapers are still an active part of many small communities.

10. Again, the flyers are wonderful, but any equipment needs to be available.

11. Since media is a part of this project, make sure ALL FORMS have a release form allowing permission to use names, photos, video, and audio. Also make sure there is an alternative for students whose parents will not allow the use of student names, photos, video, and audio.

12. Tie projects to national programs with national data collection databases.

13. Make sure you are not gender specific…Sample Press Release Uncles are mentioned but not Aunts…females in science would not appreciate this. (I know this seems petty, but we need to make sure we treat it the same.)

14. Again, I did not see an involvement with K-12. I think a section on school involvement would be helpful in many regions.

Summary

I would love to suggest this resource for other projects! This would be a great guide on where to start, in creating a student watershed project. If needed, I have schools in Virginia, Tennessee and Kentucky which are at different stages of implementing watershed/water quality programs.

After visiting the website, the story came together for me and I think the Mediascape Stories are one of the best marketing tools. It would be nice to have one of those incorporated into the PowerPoint. All of the materials are online also, so I would want to renumber pages and remember not all agencies or organizations can print in color. I am not sure about sharing the amount of the NSF grant. It may seem overwhelming to replicate this project or even attempt this project (especially in this economy) knowing Listening to the River originated from a grant which received $1.4 million dollar to support the Coalition. Maybe some of this information should be near the end of the guidebook instead of the front, just a thought.

I definitely see the use of the technology a huge plus for motivating the youth to develop media programs and it would be a great hook for them to publish on You Tube or Facebook (which I did find the link to the program on both sites). This would also be a great project for No Child Left Inside.

I have attached a couple of similar programs I think would benefit from collaboration.

Very well done!

Listening to the River

Addendum: Leveraging Capacity and Partnerships

Inverness Research completed its summative evaluation data collection in 2009; we began writing our final report at that time. As we were in the process of doing that, we learned from Listening to the River (LTTR) staff that several important partnerships with the community arose in the latter part of the project. We felt those partnerships were important to document, and we conducted a phone interview with a Land Information Access Association (LIAA) staff member who has been involved with LTTR throughout the life of the project. This document, an addendum to our full summative evaluation report, describes those partnerships and gives a summary of our assessment of this work.

SEEDS 21st Century[12] Partnership

In January 2010, SEEDS, a Traverse City based non-profit, received a five-year grant to place Coordinators in 11 area schools that have high numbers of students who quality for free- and reduced-lunch rates. The Coordinators provide after school programs to supplement the school day, with the goal of building student self-esteem and connection to school, which can result in better grades, attendance and behavior. LIAA provided a day-long introduction to LTTR for seven of the 11 coordinators, training them how to run a 3-day/24 hour workshop session. The Coordinators learned about the exercises and activities that happen in the field, about the media production that takes place after the field work, and about how to use technical equipment involved. Since then, LIAA has been lending equipment to Coordinators as they felt it was appropriate to fit in to their programs.

According to the LIAA staff person who explained this partnership to us, the youth in the SEEDS partnership "enjoyed playing with the gear" but they did not produce many products. Apparently, the SEEDS program struggles with keeping students invested in a regular schedule. "The community they are dealing with is challenged with [getting participants to] stay consistent with anything." The more successful groups were ones in which the Coordinators supported parents and children working together; several of these family teams completed media projects. Two of these projects are posted on the LTTR website, and one of them was featured at the LTTR dissemination conference.

The most important result of this partnership seems to be that the SEEDS coordinators now have training in watershed education and documentation, and they have access to LIAA's physical resources and their expertise throughout the life of their grant. The LTTR project has thus enhanced the capacity of some local educators to serve students in new ways.

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[12] Retrieved 7/14/10 from http://www.morningstarpublishing.com/articles/2010/04/06/grand_traverse_insider/news/benzie_area/doc4bba4f9a32ae1535210608.txt: "SEEDS 21st Century Learning Centers is based in Traverse City and provides after school academic and cultural enrichment programs at select schools throughout northern Michigan. For more information, visit www.ecoSEEDS.org."

Focus on the Watershed Partnership

The Land Information Access Association has been providing technical assistance, mapping services, and training and support of various kinds – "innovative ideas for sustainable communities" – for over 15 years. One of the persistent barriers they report facing is educating people about what LIAA does, and then recruiting them to participate in their local programs. LIAA and LTTR staff decided that one way to provide watershed education training to the community was to partner with well-known watershed conservation and education groups. They reasoned that, by leveraging the capacity and reputation of already-established watershed groups, and then contributing their own technical expertise, they would have a stronger program to offer the community.

Based on this supposition, they created a program called "Focus on the Watershed." In this program, they have partnered with three groups: 1) the Grand Traverse Conservation District, 2) the Watershed Center of Grand Traverse Bay, and 3) the Inland Seas Education Association. LIAA proposed that they could partner with these groups who have "built-in constituents" or a volunteer community, and then LIAA could help them make videos on topics of interest to these organizations.

LIAA held three week-long "Focus on the Watershed" training sessions in May. Participants were trained in the use of video recording and editing equipment, along with how to tell stories through video. The partner organizations were asked to include a representative in these training sessions to help guide the volunteers in framing the focus of their videos so that they would be relevant to the organization's mission and to the goals of watershed stewardship. These partner representatives also provided the participants with accurate information about watershed science and ecology. In this training the LIAA team drew on LTTR organizing principles and ideas that were tested and refined throughout the life of the NSF grant.

One factor the LIAA staff was taking into consideration was their desire to include family groups in the Focus on the Watershed training. Although, due to logistical factors, families did not participate in trainings directly, there were children involved in the video productions that resulted from this partnership. Children of the adult participants, along with child participants in the partner's programs, either were video-taped as part of the productions, or they conducted some of the interviews themselves. Also, through this partnership some children went to the Inland Seas Education Center and participated in an excursion on the bay. Therefore, LIAA feels that there was quite a bit of watershed education for youth that occurred as a result of this partnership.

Sixteen video projects were created by twenty five participants as a result of the Focus on the Watershed initiative (over 30 participants attended the initial training sessions). These videos were presented to the community at the State Theater, a local non-profit movie theater. LIAA staff reported that 245 people came to this premier event. The video projects were also played on UpNorth TV, the public access cable channel that serves Northwest Michigan, and continue

to be available on the web.[13] Each participant and the partner organizations were given DVD copies of their video projects.

Inverness Research perspective

Below we summarize what we feel are the key lessons learned about the most recent LTTR partnerships.

Leveraging capacity through partnership: It appears that the most important lesson learned from these recent LTTR/LIAA efforts is that LIAA understood the value of forming partnerships where they could contribute their expertise to the existing capacities of the partner organizations. In this fashion, drawing from LTTR principles and designs, LIAA created synergistic relationships that leveraged and added to the capacities of all organizations involved, such that each partner contributed in arenas where they are most capable and so that all gained.

The LIAA staff person that we interviewed for this update said that, "What made this last [Focus on the Watershed] project successful was to get out of the way of the content and focus on our technical expertise. We let the partner organizations focus on the content, on the watershed part. We delineated what was expected of them ahead of time…"

Tapping community interest in watersheds: LIAA reported that the Focus on the Watershed participants "were more ambitious that we were telling them to be." They were creative and wanted to do a lot of different things outside of the prescribed production formula. This presented challenges because dealing with these projects took more time, but "the projects were better" because of it. The high public attendance at the showing of the Focus on the Watershed video presentations was an unexpected and welcome surprise. This experience suggests that those who replicate the LTTR approach in other cities would do well to seek out, tap, and build on existing community interest in watershed education.

Continuing the work of LTTR: The LIAA staff member that we interviewed reported that the dissemination of the LTTR expertise that was developed through the original NSF grant will reside at the UpNorth Media Center that is housed at the LIAA office. He speculates that, although the LTTR NSF grant period ended in June 2010, the project concepts, philosophies, and practical application of technologies will continue through these recent partnerships. He anticipates that through these relationships with both volunteers and organizations, people will come back to do more of this sort of work. "The UpNorth Media Center can handle that because that's it's job."

[13] See: http://www.upnorthmedia.org/watchupnorthtv.asp?SDBFid=2073