SER News

Volume 36 Issue 1

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A LETTER FROM THE EXECUTIVE DIRECTOR

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Dear SER Members,

No matter what you call it—holism, gestalt, "the whole is greater than the sum of its parts"—we are surrounded by systems and experiences that are greater than would be expected based on the individual pieces. It's an important analogy for SER as an organization, and for the thematic topic of this issue - that restoration practitioners and researchers working together will lead to more impactful outcomes than either will find working without the other.

Getting scientists and practitioners to work together, as simple as it may sound, is often difficult. Even the terms we use can divide us—restoration ecologists vs ecological restorationists. It can be easy to feel that the other group doesn't understand the realities of your work, that even shared words don't mean the same things, or that your priorities for a project don't align. Unfortunately, these mismatches can lead to a lack of trust or interest in engaging with the other side, resulting in closed-off communities and conversations about "why don't practitioners apply our work?" or "why can't researchers look at problems that really matter in the field?"

That said, collaborations between restoration practitioners and researchers are on the rise. Practitioners and researchers have so much to share with and learn from each other—the four stories in this issue of *SERNews* illustrate that the opportunities far outweigh the potential challenges. These articles take you from a multi-decade community restoration program in New Zealand to an expansive collaboration along the US-Mexico border, to a Belgian University partnership with projects in Ethiopia and Zambia, to an urban stream restoration program in Chesapeake Bay. They show a diversity of successful partnerships across a range of practitioner and researcher types, organization types, number of partners in the collaboration, and goals.

While the examples of practitioner/research linkages included in this issue vary, several themes carried through. One theme is the importance of setting and having clear expectations for any partnership between research and practice. Another interesting commonality was the need to meaningfully involve all project partners—researchers, practitioners, and stakeholders—in developing relevant research questions and designs. Perhaps the most common theme was the importance of agreeing, up front, on what research will be useful to the project and then applying that research to ongoing or future projects – one author calls this the "wall of knowledge" approach (see pg. 7 in this issue) when research fits together to make a cohesive whole for the project.

The bottom line is that restoration research, when conducted in partnership with real on-the-ground or in-the-water restoration projects, is more likely to be designed to address questions for which practitioners need answers, and then those answers are more likely to

result in evidence-based decision making. Ideally, over time and in growing numbers, these kinds of partnerships will drive the field of restoration forward, improving both our scientific and technical understanding of how to deliver impactful projects.

In addition to the thematic articles, check out the related resources and *Restoration Ecology* recommendations. We also have lots of Society news to share, including an introduction to our two newest chapters, (both bilingual!), as well as opportunities for how you can get more involved in SER. We're also very pleased to announce a new liability insurance program for practitioners (starting in the US, but ideally available in other parts of the world soon). Thanks for being a member of SER, and we hope these stories about linking research and practice give you new ideas about how, in your own work, you can integrate restoration practice and research to help create a restoration whole that is greater than the sum of its parts!

PRACTITIONER-RESEARCHER PARTNERSHIPS

FEATURED ARTICLES ON PARTNERSHIPS BETWEEN RESTORATION PRACTITIONERS AND RESEARCHERS

SERNews is sent out four times a year to SER members – February, May, August, and November. To become a member or update your contact information, email membership@ser.org.

Editor: Alexis Gibson

COVER
Researchers, practitioners, and local community members collect field data as part of a research project. Photo credt: Sybryn Maes.

MEMBERS in ACTION
Been up to anything interesting lately? If you'd like to be highlighted as a Member in Action, email membership@ser.org and we'll keep your fellow members in the loop!

LONG TERM VALUE OF ENGAGED, SKILLED, CITIZEN SCIENTISTS

Mel Galbraith[1,2] and Hester Cooper[2]
1. Unitec Institute of Technology, 2. Supporters of Tiritiri Matangi

Tiritiri Matangi Island, a scientific reserve in the Hauraki Gulf, is typical of many of New Zealand's inshore islands and has been degraded over its history by human occupation. An ecological restoration program began in 1984 to revegetate much of the island and to re-establish native wildlife species, gradually improving the complexity of the island ecosystem. Restoration projects such as this are now commonplace in New Zealand, and have been encouraged by government initiatives since 2010 to lessen the impact of introduced plants and animals to which the native species are not adapted. Tiritiri Matangi is managed by a government agency, the Department of Conservation, in partnership with a community volunteer collective that has formal recognition, the Supporters of Tiritiri Matangi (SoTM) (see www.tiritirimatangi.org.nz).

Tiritiri Matangi Island. Photo credit: Miriam Godfrey.

PARTNERSHIPS IN ECOLOGICAL SCIENCE

The Tiritiri Matangi Island project pre-dates other recent initiatives by decades and differs from many other restoration projects in the way it engages with its volunteer workforce. The original academics heavily involved with the project – Professor John Craig and Dr. Neil Mitchell of the University of Auckland – had significant input into the first working plan for the island (Dept. of Lands & Survey, 1982) and had a broad vision for the island that included both conservation and public participation (Craig et al., 1995). To achieve their vision, the two researchers worked with students for several years on the island before volunteers first became involved in the planting program in 1984. At that time, public involvement in conservation was a controversial approach in New Zealand and was not universally supported by all government agencies. Over time, the persistence of volunteer engagement led to a change in agency philosophies, with public participation becoming an integral part of conservation management. Participants in the Tiritiri Matangi project were at the leading edge of this change in New Zealand.

Volunteer restoration practitioners participating in the revegetation of the island had the opportunity to be involved with field scientists from the start, illustrating a very early example of citizen science in New Zealand. On Tiritiri Matangi a key difference from other community projects was that the planning and "power" did not remain with academics or government scientists. The volunteer workforce

was seen as a true partner and given responsibility to lead projects. An early example of this partnership and trust was a translocation in 1995 of a threatened species, the hihi (stitchbird, *Notiomystis cincta*), to the island to establish a new population. This translocation was largely organized and carried out by high school teachers and pupils. It was only the second time in New Zealand that anyone other than professional scientists had been participants in such a translocation.

These research-practitioner partnerships in turn encouraged other professionals from disciplines outside those generally associated with ecological restoration to engage with the project and offer their skills (Galbraith, 2013; Galbraith & Cooper, 2013). For example, a retired university professor and former head of a statistics department with over 20 years' experience as a biometrician has contributed expertise in both experimental design and data analysis to the restoration project on a voluntary basis. Active partnerships in ecological science between non-professional practitioners continues to play a significant role in informing the management of the island and its protected species.

BENEFITS OF THE RESEARCH PARTNERSHIP

The scientist-practitioner relationship has generated mutual benefits for all participants. Professional researchers have had assistance with the collection of field data by the volunteers since the beginning of the project, and the formal status of SoTM has facilitated access to funding that would not have otherwise been available for research. Volunteer practitioners contribute expertise not only from their particular interests in natural history, but also professional skills from vocations outside of ecological science (for example experimental design, statistical analysis, financial planning, pharmacy) that adds to the knowledge and skill base of participants overall.

For the non-professional (volunteer) practitioners, there are benefits at both the project and personal levels. Many find significant pleasure and satisfaction at seeing ecological gains on the island. Those who have chosen to participate in the research taking place on the island have become highly skilled in ecological field techniques, such as data collection and species management (including banding of birds, handling of reptiles, etc.). This has demystified science, essentially breaking down the barriers that often exclude non-professionals from participation in restoration research. Over time, participation has built confidence within the volunteer organization to develop and carry out its own research initiatives, which in turn has raised the credibility of SoTM and its workforce of non-professional practitioners.

It can take 10-20 years of data collection before clear trends emerge in a restoration project, thus the long term engagement of volunteers has benefitted the project by making longitudinal

Threatened and protected species translocated back to the island and managed through researcher-practitioner partnerships include (from top to bottom): the hihi, elegant gecko, and the rifleman. Photo credits: Mel Galbraith and Simon Fordham (gecko).

ecological studies possible. This type of decadal research doesn't "fit" the traditional research time frames of graduate students. A volunteer may remain engaged for decades (some within SoTM have been with the project since it began 38 years ago!), and the persistence of SoTM creates a formal commitment to ongoing projects. A review of early monitoring projects for translocated species on Tiritiri Matangi revealed a "burst" of research activity around the time of an initial translocation (usually associated with a graduate student project) with little long term follow up. Over time, SoTM has addressed this by engaging its volunteers in the long-term monitoring of several species, with some now monitored (particularly for breeding success) over several decades. This long term data is invaluable to SoTM for future management of the project, and is available to researchers through collaboration.

The benefits on Tiritiri Matangi are best illustrated through non-professionals initiating and contributing to the translocation and management of protected species and ongoing participation in research on translocation success. Examples of such contributions are the translocations of the elegant gecko (*Naultinus elegans*) and the rifleman (titipounamu, *Acanthisitta chloris*), New Zealand's smallest bird. Both species have suffered a reduction in their natural distribution through habitat loss, and the establishment of new populations in secure habitats through translocation is a well-accepted management technique. This is traditionally the domain of professional ecologists, but rigidly controlled through permitting. On Tiritiri Matangi, the translocation of the elegant gecko and rifleman was initiated and managed by SoTM volunteers, with advice and assistance from professional ecologists. Both species continue to be intensely monitored by volunteers.

RECOMMENDATIONS FROM OUR EXPERIENCE

Plan the research direction

All participants and their level of engagement in a project change over time, so it is essential that the restoration philosophies and intentions are recorded formally as a reference and to inform future research direction. For Tiritiri Matangi, SoTM maintains and updates a Biodiversity Plan (SoTM, 2013) produced through a collaborative exercise by researchers and lay practitioners that exemplifies a continuation of the research partnerships that were established at the start of the restoration. The Biodiversity Plan summarizes past restoration activities and outcomes, and provides a guideline for future restoration action. The plan is also valuable for identifying appropriate longitudinal research that volunteer practitioners can initiate and undertake.

Advocacy for ecological research

The role of advocacy, especially by non-professionals, should not be underestimated. From the start, SoTM has produced a regular illustrated newsletter

SoTM volunteer Peter Evans explains the use of nest boxes on a guided walk, and a volunteer bands a rifleman as part of monitoring activities. Photo credits: Peter Flynn (left) and Mel Galbraith (right).

(*Dawn Chorus*) keeping members up to date with events on the island. This communication has been essential in generating and maintaining interest in the restoration project, and in making ecological science accessible to the lay practitioners involved. The newsletter reports on research activity and outcomes and, more importantly, provides a rationale behind the research. A further avenue for community engagement is through the guided walks offered to visitors to the island. Since the island is a public reserve, it is readily accessible and a popular destination for many (TripAdvisor New Zealand, 2022). Many SoTM members are volunteer guides, providing information in the form of short tours where visitors are introduced to the ecological science relating to the restoration.

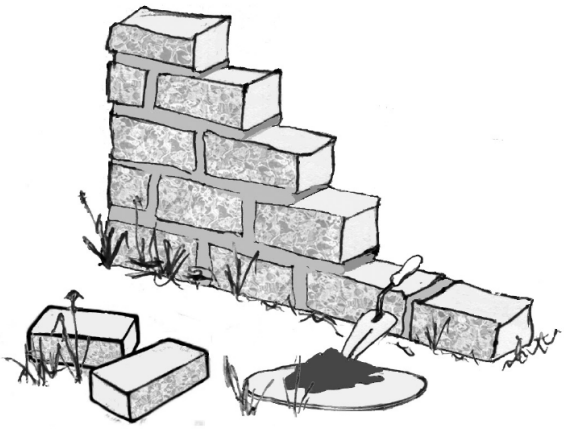
Research activity should benefit the restoration project

The research program associated with any restoration project should always have the project as its focus, not follow academic whims or personal interests of the researchers. The wide skill base that comes from engaging with a range of skilled practitioners has provided SoTM the means to take the lead in research and decide on the information needed for future planning. This has the advantage of building a "wall of knowledge" – information which fits together to make a cohesive whole for the project. Furthermore, research associated directly with the restoration project, and highly relevant to its future, means non-professional practitioners are more likely to engage and participate over an extended period because they see the relevance of the work.

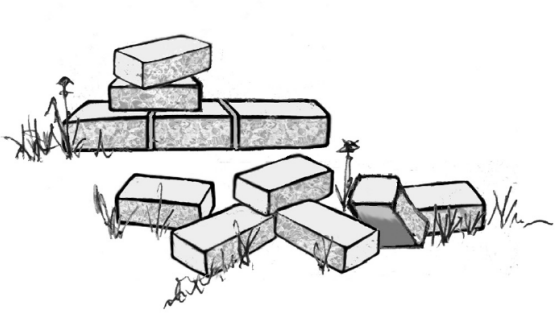
In contrast, where research is driven solely by an individual academic's interests, too often the research topics resemble scattered "bricks" that are less likely to contribute to the success of the project. Volunteer participation is less likely in this situation.

CONCLUSION

Tiritiri Matangi has emerged as an internationally recognized ecological restoration project where public participation plays a critical role to achieve ecological gains. Through cooperative and collaborative research activities, both public and organizational stakeholders involved in the restoration project have developed mutual respect and trust. The success of the Tiritiri Matangi project has generated interest and engagement throughout New Zealand and inspired other projects to follow a similar path.



Practitioner-led research outcomes – building project ecological knowledge



Researcher-led outcomes – potentially unlinked, reflecting individual interests

Concept of a wall of knowledge compared to a scattering of information units

ACKNOWLEDGEMENTS

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DEVELOPING PRACTITIONER/ RESEARCHER PARTNERSHIPS TO ENHANCE RESTORATION OUTCOMES BEYOND REGULATORY MINIMUMS

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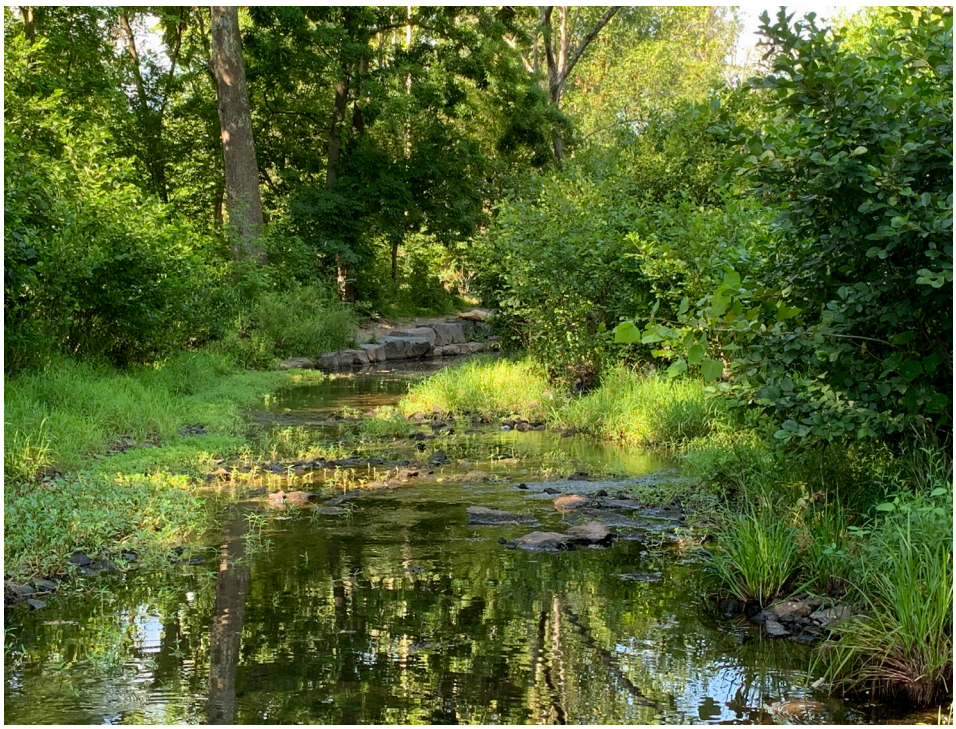
Fairfax County, Virginia, lies just west of Washington, D.C. in the temperate deciduous Piedmont of the mid-Atlantic United States, and is entirely within the Chesapeake Bay watershed. The Bay, the largest estuary in the US, is an ecological treasure. The Bay watershed drains 64,000 square miles and is home to over 18 million people (Watershed | Chesapeake Bay Program), making the implementation of conservation, protection, and restoration complicated. In response to degradation of the Chesapeake Bay, the U.S. Environmental Protection Agency (EPA) requires reductions of nitrogen, phosphorus, and sediment pollution inputs to the Bay. At just over 400 square miles, Fairfax County has over 1 million people and over 1,600 miles of stream. Streams have a significant role in the delivery of nitrogen, phosphorus, and sediment to the Bay and therefore are targeted for restoration by Fairfax County to improve the health of the watershed. Since the EPA regulatory action began, Bay-wide, there has been a slight but well documented reduction in pollution-caused degradation of the Bay (2020 State of the Bay Report).

We began to systematically address degradation of stream ecological conditions and impacts to infrastructure in Fairfax County as early as 2006 by developing watershed management plans (e.g., Little Hunting Creek Watershed), retrofitting stormwater management practices, and implementing restorative practices in stream corridors. As local government land managers, we've joined an army of researchers, practitioners, consultants, and contractors tasked with implementing restoration to meet the EPA's pollution reduction targets for the Bay. Forging a strong bond between researchers and practitioners has helped us in the understanding, improvement, and implementation of the adaptive practice of stream restoration. Although our main goal has been reduction of pollutants as required to restore the Chesapeake Bay, we also prioritize an adaptive management approach to improve local stream function and health, including understanding the ecology, selecting and meeting recovery targets, evaluating restoration outcomes, and improving the tools of restoration.

Researcher-practitioner partnerships work because of a commonality of goals. Successful partnerships are willing to test assumptions and have an interest in



Restored stream 5-years post-project. All photos in this article courtesy of Fairfax County unless otherwise noted.

monitoring and learning to drive better conservation action. Most researchers don't have the resources (like access to land, construction equipment and work crews) to implement restoration projects. Most practitioners don't have the regulatory requirement to establish targeted research programs, budgetary support for experimental manipulations, and the support staff needed for the logistics of maintaining a research effort. Fundamentally, both teams must be comfortable outside of their normal workflows, as there may be some friction when searching for common ground. Differences in assumed timelines, focus of work, required deliverables, and divergent operational processes can lead to challenges.

Creativity and patience make the best match for a successful partnership. In our partnerships with researchers, we've made use of five best practices:

Monitoring stream and stream corridor attributes, informed by research partners before and during restoration design, to increase understanding of mechanisms behind change.
Recognition of the need for scientific monitoring and the benefits of fostering relationships within the research community led Fairfax County, with the USGS Virginia and West Virginia Water Science Center (USGS VA-WV WSC), to develop a 20 station long-term water resources monitoring program in 2008 (data at gage stations is available in real-time at the USGS portal like this station). The USGS VA-WV WSC and Fairfax County aquatic ecologists measure physical and biological components of water quality within the context of urban stressors like higher stormflow and nutrient/sediment inputs that contribute to stream degradation.

The goal of this program is to understand the aquatic response to the implementation of land use changes and best management practices (BMPs) implemented through upstream watershed improvement projects. The monitoring program has allowed for a comprehensive analysis of water quality and quantity in Fairfax County streams, computation of annual nutrient and sediment loads, and an examination of trends over time in water chemistry and biological data (Porter et al. 2020; Jastram 2014). For example, trend data showed that stream specific conductance is increasing throughout the County at rate of approximately 2.5% per year and that these increases are most commonly observed in spring and fall, not the winter when de-icing salts are applied and an increase in conductance would be expected.

Monitoring early in the design process through post-construction (left); long-term monitoring of floodplain ecosystem processes is enabled by partnerships with the USGS. Right photo credit: USGS VA-WV WSC.

Taxonomic and functional diversity of aquatic macroinvertebrates has also increased in most watersheds, but many of these improvements are being driven by increased diversity and composition of organisms tolerant of urban stressors. The USGS VA-WV WSC scientists have also joined our newest research/practitioner partnership to gather a large suite of parameters prior to a watershed-wide restoration project. Robust and scientifically defensible baseline data improves research by adding depth and breadth to findings and improves management by making it possible to assess changes over time and in response to treatments.

To close the gap between potential ecosystem recovery and measured aquatic biological health, project designers and practitioners must learn how to use this level of fine-scale data to customize restoration for a specific location. Fundamental research can provide the necessary information to preserve areas of high-value local ecology. In one project, a 20-year citizen science effort identified a spring peeper (*Pseudacris crucifer*) population in an otherwise degraded urban stream corridor. The restoration design for the site was modified to incorporate sufficient habitat creation, mitigation, and replacement for the frogs while restoring the stream to compensate for uncontrolled stormwater flows. Citizen scientists add an additional layer to the research/practitioner partnership.

Photo credit: USGS.

Establishing clear expectations regarding management recommendations, e.g., feasibility. The application of research to drive practice is not a traditional outcome of most ecological research programs. A logical conclusion from a research project (e.g., reduce impervious surface or remove conflicting infrastructure) may not be feasible in practice (e.g., due to social value conflict or prohibitive cost). Researchers need to work with practitioners to help identify their information needs in order to develop effective science that will address key uncertainties. Practitioners need to involve researchers early in the process to help set reasonable restoration targets. Dr. Greg Noe, USGS Bascom Geoscience Center, initiated a long-term research program in Difficult Run, the second largest stream system in the county, to understand stream corridor biogeochemistry. Dr. Noe's research pin-pointed the importance of reconnecting floodplains to the degraded stream channels to remove sediment and phosphorus pollution from streams prior to their entering the Chesapeake Bay. Identification of the well-connected floodplain network throughout Difficult Run and quantification of its efficiency (the floodplain captures about 75% of all the sediment eroded upstream; Hopkins et al. 2018) has led to the understanding of the need to preserve these and similar systems.

This and other research led to the development and prioritization of restoration designs that improve floodplain connectivity as part of the channel reconfiguration. Dr. Noe is entering the 15th year of long-term research to understand the effects of watershed changes and stream restoration on downstream riparian ecosystems. Offshoots of this work have included characterizing the stream and floodplain geomorphology (Hupp et al. 2013), nutrient biogeochemistry (Noe et al. 2013), vegetation dynamics (Rybicki et al. 2015), and ecosystem services assessments (Hopkins et al. 2018). Having the basic research about how streams function led to changes in how and when restoration is applied in Fairfax County.

Approaching partnerships with flexibility and adaptive science. It can be a challenge to balance and match the needs of practitioners and researchers. Flexibility is needed to find research questions that can be completed without

Monitoring performed in partnership with the USGS (top) and in-house monitoring team (center and bottom) tracks water quality, floodplain processes, and post-restoration recovery.

specific timeframes, with fluid experimental design, and in collaboration with multiple partners. As an example, a recent expansion of Dr. Noe's work to understand the function of floodplains established during restoration highlighted the need to include more replicate sites at the beginning of the study. We planned for a resilient experimental design even with the potential reality that some of the sites could be dropped from the study due to budget cuts, out of sequence management actions, or project deadlines. Additionally, there may be complications as stakeholders are not always open to additional constraints on the project to meet research goals, while researchers may not be able to fit the dozens of practices (and variations on practices) into their research model. Having clear and open communication between the stakeholders, research community, and restoration practitioners will help identify more opportunities for collaboration. Where research collaboration may not work, open communication networks may achieve alternate priorities for practitioners, such as improved stakeholder engagement opportunities.

Creating a positive feedback loop. Internally, the growth of our partnerships has been facilitated by the addition of inhouse and consultant restoration ecologists on project design teams. Like many other county service providers, engineers are tasked with solving infrastructure issues, and often have the training necessary to understand the hydraulics, geotechnical, and

structural issues at the foundation of more complicated restorative actions. Adding ecologists and restoration ecologists to our team has created a positive feedback loop incorporating more opportunities for research involvement on projects. With the goal of improving restoration outcomes for the local stream corridor as well as downstream ecosystems, we've expanded our monitoring to include the restorative actions, not just the underlying ecology. Examples of program improvements include an increased understanding of the vegetative communities, improved designs for revegetation, and committed to post-restoration maintenance. Incorporating the Society for Ecological Restoration Principles led to the adoption of a holistic definition of what restoration success means. A restoration recovery wheel for our community is now an available tool for our most ecologically sensitive projects.

Focusing the collaboration on completed projects. From a practitioner viewpoint, completed projects have fewer active stakeholders, making scheduling and access less complicated. In addition, chronosequences (sites with similar ecosystems but at different ages) make historic land management efforts accessible to time-limited research programs. For example, in a collaboration with researchers at the University of Maryland, Dr. Stephanie Yarwood and graduate student Lindsay Wood, we compared floodplains with intact vegetation communities to pre- and post-restoration sites to characterize the consequence of restoration projects on the floodplain soil microbiome. This research revealed that differences in bacterial and fungal community compositions between pre- and post- restoration sites were more subtle than those between restoration and analog sites, but there was a trend for increased fungal biomass following restoration (Wood et al. in prep). In partnership with George Mason University and the United States Geological Survey (USGS) Bascom Geoscience Center, master's student Katherine Napora will be working at completed and reference stream restoration sites to identify how floodplain soil development after restoration leads to carbon and phosphorus

Time series through construction, Dead Run stream. Images courtesy of Stantec Consulting Services Inc.

trapping. The need to maintain and grow a high-quality soil biome following restoration is gradually being understood, and research collaborations like these will help us develop new restoration designs and practices to improve soil biotic health even when the researchers aren't working on new restoration projects or engaged in project design.

Degradation of urban and suburban streams is now a widely recognized ecological impact (Booth et al., 2016). Committing to conserving, protecting, and restoring the streams requires an iterative process, site specific planning, and research partners in order to improve stream function and ecological health. Understanding which of the stream processes are normal and which are the result of human mismanagement is one of the best outcomes of having a strong research/practitioner partnership. A collaborative approach, like the one we're learning to implement, creates the opportunity to improve the practice, the benefits, and the science of ecological restoration .

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PRACTITIONER-RESEARCHER PARTNERSHIPS: PERSPECTIVES FROM TWO SIDES OF THE SAME COIN

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If we start from the premise that good restoration is strengthened by good research, and that good research relies on high quality data and benefits from real world experience, then practitioners and researchers represent two sides of the same coin. But how often do we manage to flip the coin to see the other side, learn from each other, and work towards common goals? Not often enough seems to be the answer.

Researchers and practitioners still mostly work in isolation from each other, with one side of the coin focused on generating the scientific knowledge that the other side then tries to apply. But in this age of restoration urgency, we can't afford to maintain this default setting when partnering could bring us a better chance of generating more impactful results on the ground.

IF WE CAN, WE SHOULD: A PRACTITIONER'S PERSPECTIVE

Opportunities for restoration practitioners to engage with the research community can take many forms, from sharing project data on portals hosted and used by the research community (such as ISRIC, SEOSAW, 2ndFOR, ForestPlots.net, etc.) to developing more formal research partnerships. The level of engagement and which form it takes will depend on the priorities of the restoration organization and the resources available. But if we can engage, we should.

At WeForest—an organization carrying out forest and landscape restoration projects across the tropics—we see engagement with the research community as a way to strengthen our restoration strategies. These partnerships help us better understand the socio-environmental systems we operate in and how our restoration work can impact those systems (and vice versa). We also see partnering with researchers as a way to contribute to the wider restoration community, by facilitating research that can improve restoration knowledge and practice.

In addition, as practitioners, we are now engaging with a new wave of restoration funders who are better informed and interested in the science behind the projects they wish to finance. This is a testament to the efforts of the research community to make their work more relevant in addressing global challenges and more accessible to non-researchers. Demonstrating a commitment to the advancement of restoration science is a unique value proposition, and one that increasingly speaks to funding organizations.

FLIPPING THE COIN: THE RESEARCHER'S PERSPECTIVE

WeForest and KU Leuven, a Belgian University, launched a research agreement in 2019 to study the ecology and restoration potential of dryland forest ecosystems in Africa, with WeForest's restoration sites in Ethiopia and Zambia providing the study areas for this ongoing research. But what are some of the benefits and the challenges of working alongside a restoration organization to carry out research?

For researchers, working with a restoration organization helps in better understanding the local setting. This is essential for arranging the logistic aspects of fieldwork, and is even more important for understanding the types of land use, governance, forest disturbances, and challenges faced by communities and restoration practitioners. Having the opportunity to learn from and

Fieldwork with community partners. Photo credit: Sybryn Maes.

exchange knowledge with practitioners and the local communities they work with can help refine research hypotheses and objectives. An example of this is a new research project led by KU Leuven at WeForest's sites in Zambia investigating the links between "resilience" and restoration success. Early-stage engagement with the WeForest team and local community partners shifted our concept of resilience, from considering resilience solely in terms of the biophysical (ecological resilience), to encompass a broader definition focusing on "socio-ecological" resilience. This will make the project more complex, with implications for how the research questions and objectives are defined, how and what data is collected, and how the results are interpreted. But ultimately, it should increase the impact of our work and produce outcomes that are of more practical use and relevance for the restoration projects and the local communities.

Partnering with a local restoration organization also makes it easier to involve local communities in the research project because the groundwork of building trust and communication already exists. In Zambia, community members involved in WeForest's restoration projects shared their knowledge of local land-use history, allowing us to identify a network of study sites representing forest recovery post-disturbance. Beyond project scale, being affiliated with an organization like WeForest helped us establish new contacts and collaborations (e.g., with local universities & researchers) and to not be viewed as "helicopter researchers" who just arrive, collect some data, and then leave. Research projects are often relatively short term (e.g., a few years) so establishing these local links can help extend the "life" of the project and lead to new opportunities for longer-term research.

Another big benefit of partnering is undoubtedly the potential to access a large amount of data, which a single researcher would not be able to generate by themselves. It's critical to understand and agree on how this data will be used in the research project and to allow practitioners to contribute to joint publications that result from its use. Joint publications are vital for knowledge sharing among restoration organizations, researchers, and practitioners worldwide and co-authorship provides visibility to both researchers and practitioners involved in the project.

A key challenge that researchers can encounter in partnering with restoration organizations is that practitioners' time and resources are often stretched thin. Practitioners' main priorities are

operational, not research-related; therefore, their input or resources (e.g., vehicles) won't always be available immediately. As a researcher, it's important to factor this into planning and allow extra time to get the input needed. For the WeForest-KU Leuven partnership in Zambia, it was important for us to provide a detailed estimate of the support needed for the duration of the research project, which allowed for a realistic discussion of what could be provided and allowed the project teams to plan ahead.

FORGING A PARTNERSHIP

There is certainly no shortage of research opportunities out there, and, increasingly, a demand for practitioner involvement. Research funding is often contingent upon researchers demonstrating the value of their work to stakeholders, including practitioners, policy makers, and private sector partners. But how can practitioners and researchers forge links that go beyond a one-directional sharing of data to become a true partnership?

Through existing contacts within the research community, WeForest has built some long-lasting partnerships with key researchers and institutions like KU Leuven. In turn, these connections have opened up new opportunities with more research partners.

Photo credit: Sybryn Maes.

Even without pre-existing contacts it is possible to build new practitioner-researcher partnerships. It can be as simple as contacting a researcher whose work is of interest and discussing ways to collaborate and contribute to each other's work.

In negotiating our partnerships, we have learned some valuable lessons along the way that may help other practitioners and researchers to strike up mutually beneficial and equitable partnerships. Some of our top tips for building successful partnerships are as follows:

Early input is best. Research agendas are still largely driven by researchers, with practitioner consultation or involvement coming later. Both sides of the coin should be more proactive in approaching each other with research ideas that can be co-developed, opening the door for joint funding and mutually beneficial outcomes. As an example, early discussion of ideas between WeForest and KU Leuven resulted in the inclusion, as part of a PhD project, of research on forest-water relationships at WeForest's Desa'a Forest project in Ethiopia.

Define the shared objectives, roles, and responsibilities. Practitioners and researchers have different priorities so it's important to define common goals and how to work together to achieve them.

Be clear about each other's expectations. It's important to be realistic about what each party can offer the other and about what can be achieved through the partnership.

Agree on what is useful. Journal publications (the most common research output) are not always the best way to communicate results to practitioner organizations, communities, and other stakeholders. This does not mean that practitioners are disinterested in contributing to peer reviewed publications; quite the contrary (see our earlier point about ensuring practitioners can contribute to

publications). It simply means that practitioners and researchers should communicate during the early stages of the partnership on what other specific outputs are needed and feasible to produce to meet practitioner and stakeholder needs.

Establish clear and regular communication. The course of research or restoration "never did run smooth," so it's important to keep each other updated on progress and any challenges that arise within the partnership. Regular update meetings serve to remind both partners of shared objectives and expectations.

Restoration practitioners and researchers have a lot to gain by working together. Fundamentally, we share the common purpose of trying to address the most pressing challenges facing our planet today. As two sides of the same coin, we have complementary skill sets and the potential to pool our resources and amplify the impact of each other's work. So, what are we waiting for?

Photo credit: Sybryn Maes.

A SHARED VISION FOR ENHANCING ECOLOGICAL RESILIENCE IN THE UNITED STATES - MEXICO BORDERLANDS: THE SKY ISLAND RESTORATION COLLABORATIVE

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The Sky Island Restoration Collaborative (SIRC) is comprised of people living and working in the United States-Mexico borderlands that have self-organized to address shared goals of ecological restoration and improve the social, cultural, and economic well-being of communities (Norman et al., 2021b). This collaboration is founded on a recognized need to improve management of our shared geography for biodiversity and conservation (DeBano et al., 1995) and to maximize restoration impacts using available funding (Norman et al., 2021b). Our grassroots partnership organically embraces restoration practitioners, land and resource managers, and research scientists, with representation from agencies, government and non-governmental organizations, and educational institutions, across state and international boundaries of the Madrean Archipelago Ecoregion of North America (Figure 1). In this article, we describe SIRC's integration of science and practice to sustain biodiversity, improve resilience to a changing climate, and re-establish an ecologically healthy relationship between nature and culture in the United States-Mexico borderlands.

"Sky Islands" describe the isolated mountain ranges surrounded by lowland desert basin environments that comprise the Madrean Archipelago Ecoregion of Arizona and New Mexico, United States and Chihuahua and Sonora, Mexico (Warshall, 1995).

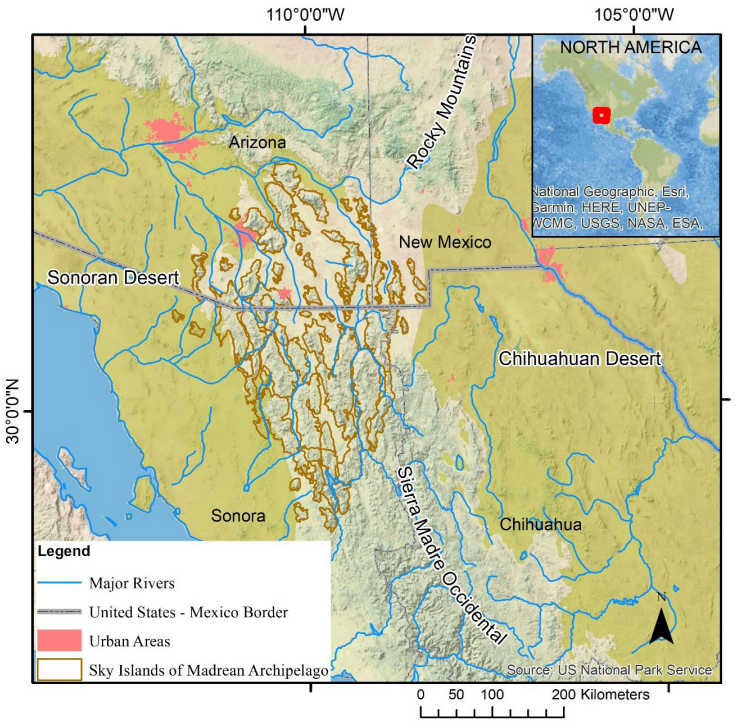

Figure 1. Map of the Madrean Archipelago Ecoregion Sky Island complexes, United States-Mexico border, urban areas, and major rivers.

OUR HOME

This Ecoregion is a globally recognized biodiversity hotspot on the border of Mexico and the United States (Conservation International, 2020), that supports isolated patches of montane habitats separated by intervening valleys of grassland,

desert scrub and subtropical thorn scrub (Warshall, 1995). The borderlands region hosts exceptional cultural and biological diversity, but faces unique challenges in addressing environmental health, security, and climate change (Updike et al., 2013). Extended drought and changes in rainfall intensities associated with climate change have a disproportionate impact on the naturally arid environment as well as on the many vulnerable rural communities, largely made up of farmers, ranchers and other local people whom inhabit "colonias" (Norman et al., 2013, 2012, 2004). Many of these people have traditional and cultural knowledge that is valuable for restoring landscapes and sustaining livelihoods in this arid landscape (Norman, 2020; Norman et al., 2021b).

Colonias *are rural neighborhoods within 250 km of the United States–Mexico border that lack adequate infrastructure, housing, and/or other basic services (Norman et al., 2013, 2012, 2004).*

A history of livestock grazing, mining, logging, fire suppression, groundwater extraction and other land uses has left many stream and upland ecosystems degraded (Sheridan, 2006). The border wall along the international boundary affects critical water resources and hydrologic function near the border (Quijada-Mascareñas et al., 2012). The wall has also disrupted dispersal and migratory pathways for many culturally and ecologically important species, including the jaguar (*Panthera onca*) (Peters et al., 2018). An ecologically, socially, and economically resilient environment in the borderlands benefits both nations, strengthens binational cooperation, and helps perpetuate years of past investments in conservation in the region (Good Neighbor Environmental Board (GNEB), 2014; Peters et al., 2018).

INTEGRATION

Restoration practitioners, land and resource managers, and research scientists of the SIRC began developing experiments together in 2014, to test hypotheses, qualify procedures, and quantify impacts on shared project landscapes that benefit everyone (Norman et al., 2021b). SIRC acts as an umbrella and a vehicle for information sharing, training, and successful project implementation. Collaborations include implementing cost-effective and simple restoration practices such as installation of rock detention structures (RDS; Figure 2); collection and propagation of local plant materials; job creation to enhance the local restoration economy; and provision of educational programs for youth and residents, to involve them in local efforts and train them to be restoration

Figure 2. Photographs of rock detention structures (RDS) in riparian areas in the Madrean Ecoregion, including a.) a one-rock dam (Tosline et al., 2020), b.), a check dam (Norman et al., 2015), and c.) a gabion (Norman et al., 2014).

practitioners (Norman et al., 2021b). This socio-environmental approach, and willingness to try new and innovative methods, has helped SIRC to continue to grow our partnership and expand into neighboring areas. Efforts by our grassroots collaborative were highlighted in a recent special issue in the journal of *Air, Soil and Water Research* featuring an editorial describing the SIRC evolution into a broad landscape-scale restoration initiative and shared projects (Norman et al., 2021a).

***Rock detention structures** (RDS) are low-tech, low-cost, natural infrastructure comprised of rock material that are situated perpendicularly in arid or semi-arid channel systems to slow flows and conserve soils (e.g., one-rock dams, check dams, or gabions; Figure 2)(Norman 2020).*

The partnership and integration of restoration practitioners, land and water resource managers, and research scientists facilitates successful projects (Figure 3). Co-location, interest, and collaboration between partners creates a platform to document costs and benefits of restoring hydrologic and biologic processes and promote the conservation of biodiversity. Partners work together to conduct research-based investigations and implement restoration concurrently. SIRC proactively employs adaptive management by monitoring projects during implementation (in addition to post-implementation), testing efficacy of restoration interventions at various locations, and adjusting project administration to better achieve desired benefits (Norman et al., 2019; Simpson, 2018a, 2018b).

COSTS AND BENEFITS

The costs of restoration are often uncertain but critical to document as data becomes available for management implementation (Palmer et al., 2007). We have assembled an example of costs and benefits of SIRC projects for comparison, based on the trained installation of RDS. Most SIRC projects are designed to achieve multiple resource goals and combine treatments which helps make them more "cost effective" over time. Restoration implemented in conjunction with RDS can include native seed collection, planting, prescribed fire, fuels reduction, habitat improvement, education, and outreach (Figure 4) (Norman et al., 2021b).

Costs are dependent upon the availability of materials, labor costs vs. volunteers, accessibility, engineering design of larger structures, permitting, and legal requirements (Tosline et al., 2020). In addition, due to variability in RDS, sizes and number needed to restore or fortify a riparian area or wetland, and the variability of the environmental conditions being treated, it is difficult to come up with an exact price per structure or area (Norman, 2021a). And at some locations, as mentioned, projects benefit from additional restoration practices—such as planting vegetation (Weaver, 2021). These additional restoration practices, which increase the cost of a project, can help stabilize the site and improve wildlife habitat, and could also extend the project's life, reducing maintenance costs after the fact, and delivering additional returns. Profit-gains (benefits) are not accounted for in cost estimates but there are many, as quantified and vetted by the research partners of the SIRC. We document a range of costs by structure and by riparian distance of using one-rock dams, check dams, and gabions (Table 1).

Benefits of RDS installation have been quantified in terms of the ecosystem services they provide (Costanza and Folke, 1997; Norman, 2020) for flood regulation (Norman et al., 2010), erosion control (Norman et al., 2017; Norman and Niraula, 2016), vegetation and habitat provisioning (Norman et al., 2014; Wilson and Norman, 2018), increased water availability (Fandel, 2016; Norman et al., 2019, 2016) and purification (Norman and Niraula, 2016), carbon sequestration and storage (Callegary et al., 2021), and social values (Petrakis et al., 2020). In addition to these benefits, RDS have the potential to act as climate adaptation or mitigation strategies (Norman, 2021b; Norman et al., 2021c, 2016, 2014, 2010; Tosline et al., 2020; Wilson and Norman, 2018) or "nature-based solutions" (Gooden and Pritzlaff, 2021; International Union for Conservation of Nature, 2021; Norman, 2022).

GROWING GRASSROOTS EFFORTS INTO THE FUTURE

SIRC participants have communicated the results of several regionally important collaborative restoration projects over the past 5 years, including: the development of wildlife corridors (Manteca-

Figure 3. Practitioners, managers, and scientists from Arizona Department of Environmental Quality (ADEQ), Arizona State University (ASU), Borderlands Restoration Network (BRN), Cuenca Los Ojos (CLO), Phoenix Zoo, Sky Island Alliance (SIA), Tucson Audubon Society, US Bureau of Land Management (BLM), US Bureau of Reclamation (BOR), US Fish and Wildlife Service (USFWS), US Forest Service (USFS), US Geological Survey (USGS), US National Park Service (NPS), Watershed Management Group (WMG), and private landowners at an initial SIRC meeting (2015). Photo credit: SIRC.

Table 1. Table describing range of prices for various structures to restore and revegetate channels based on price per structure and per kilometer of treated stream channel (from SIRC practitioners (Gerencia de Restauración Forestal, 2018; Norman, 2022; Tosline et al., 2020)).

Design	Price/Structure	Price/km
Check dams	$850	$37,358
One rock dam	$656	$37,383
Gabions	$32,000	$168,602

Figure 4.a.), b.), and c.) Photos of restoration practitioners at Borderlands Restoration Network and volunteers installing one-rock dams. Photo credit: Tess Wagner.

Rodríguez et al., 2021); restoration impacts on vegetation and birds (Flesch and Esquer, 2020); creating low-water plant palettes (Campbell, 2020); and the importance of maintaining wildfire regimes and reducing risks (Laushman et al., 2020; Villarreal et al., 2020). Social values and community efforts are portrayed that describe: social valuation of restoration (Petrakis et al., 2020); how a youth group learns leadership and restoration skills (Weaver, 2021); how RDS can sequester and store carbon (Callegary et al., 2021) and a summary of a multidisciplinary study of installing RDS (Norman, 2020). In 2022, partners continue to unite our shared goals and nurture binational projects between agencies, nonprofit organizations, and private landowners. Table 2 portrays some examples of new collaborative projects where participating agencies, landscapes, and driving themes overlap.

CONCLUSION

The Sky Island Restoration Cooperative (SIRC) is committed to building a resilient landscape founded on scientific research and restorative action to reverse degradation and conserve biological diversity using natural infrastructure solutions (Figure 5). The collaborative employs a variety of restoration techniques from low-cost/low-tech rock detention structures to sophisticated watershed planning, conducts research to monitor and quantify effects, and creates outreach to engage more people (Norman et al., 2021b). SIRC focuses on grassroots restoration efforts where everyone is welcome to share knowledge, labor, and skills, including research scientists, educators, restoration practitioners, students, residents, visitors, land and resource managers, and volunteers. We appreciate this opportunity to share the actions from a local grassroots effort in the United States-Mexico border that can have influence, not only in this ecoregion, but in other arid and vulnerable environments around the world (Norman, 2022). It is our goal to engage with more people and larger groups of land managers and leaders who are interested in developing ecological, social, economic, and climate resilience.

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Learn more about the SIRC in this video:
https://www.usgs.gov/media/videos/sky-island-restoration-collaborative

Figure 5. Drawing of RDS in the southwestern United States and northern Mexico "Sky Islands" by Valer A. Clark.

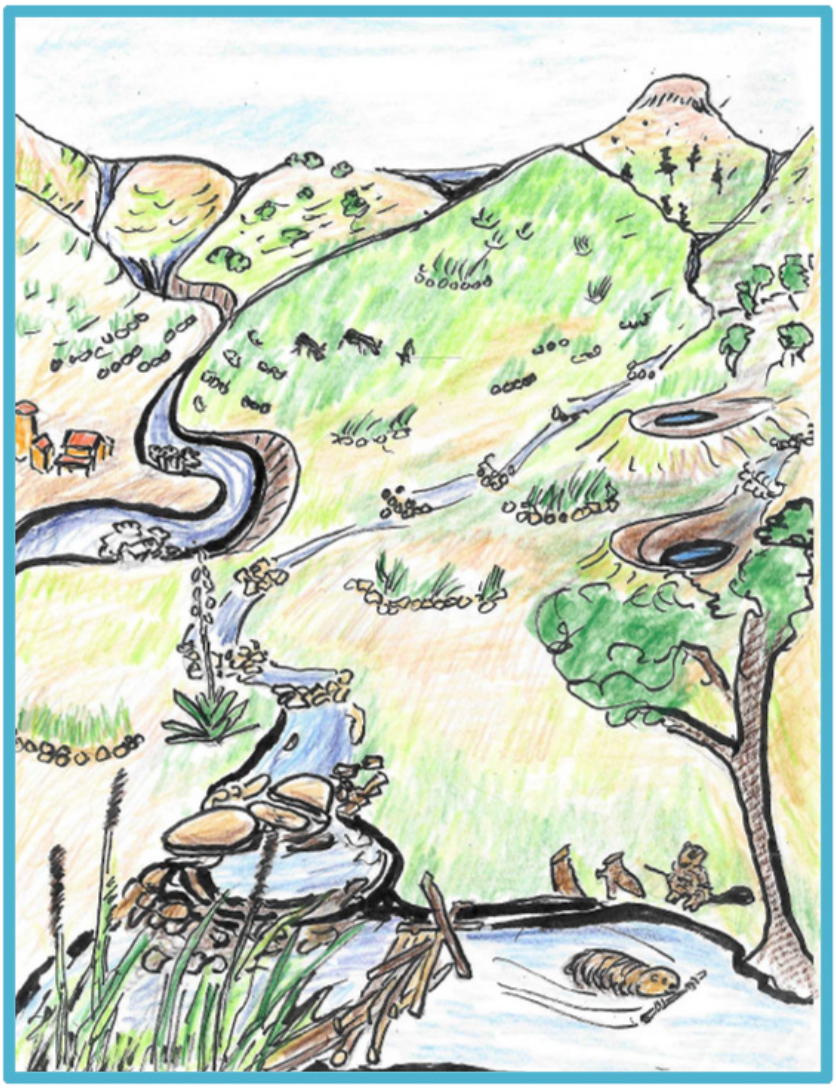

Table 2. Eighteen new SIRC projects, colored by theme (where orange represents "Conservation", pink represents "Community Outreach", blue represents "Hydrological", and green represents "Ecological"), and portraying the overlap of shared goals, study sites, and agency interaction (labeled as research (R), land manager (M), practitioner (P), or a combination thereof).

	Conservation			***Outreach***		***Hydrological***							***Ecological***				
Project Name	Research and Restoration at Mt. Graham, AZ, US	Catalina-Rincon Restoration Project, AZ, US	Smith Canyon Experimental Watershed, AZ, US	Planting a Resilient Food Future, AZ, US	Participatory GIS with ejidos and ejidatarios, SON, MX	Hydrogeology Assessment at Patagonia, AZ, US	Water-sourcing at Quitobaquito Springs, AZ,	Investigation of Leaky Weirs, AZ, US	Low-impact Development study in Phoenix, AZ, US	Hassayampa Sustainable Development, AZ, US	Nogales Green Infrastructure, SON, MX	Tijuana Stormwater Conveyance. BCN, MX	Vegetation Assessments at Structures, AZ, US	Researching Impacts of Fire in Sky Islands, US & MX	Impacts of Mesquite Encroachment, AZ, US	Documenting Cienegas and Recovery, US & MX	Gila Watershed Riparian Investigation, AZ & NM, US
Arizona Depart. Env. (M)			x					x					x				
Arizona State University (R)											x						
AZ Dept of Forestry & Fire Mngt. (M)		x															
AZ Game and Fish Department (M/P)		x											x				
AZ Sonoran Desert Museum (R/M/P)		x											x				
Babocomari Ranch (M)																	
Borderlands Restoration Network (P)			x	x									x				
Cienega Ranch (M)								x					x				
City of Phoenix (M)									x								
Cuenca los Ojos (P)													x				
Desert Laboratory on Tumamoc Hill (R)				x													
Flood Control Maricopa County (R/M)									x	x							
Gila Watershed Partnership (R/M/P)																	x
Malpai Borderlands Group (M)													x				
Maricopa County Air Quality (M)									x								
Pima County Flood Control (R/M)		x															
Pima County Emergency Mngt. (M)		x															
San Carlos Apache Tribe (M/P)	x														x		

Table 2. cont.

	Conservation			Outreach		Hydrological							Ecological				
Project Name	Research and Restoration at Mt. Graham, AZ, US	Catalina-Rincon Restoration Project, AZ, US	Smith Canyon Experimental Watershed, AZ, US	Planting a Resilient Food Future, AZ, US	Participatory GIS with ejidos and ejidatarios, SON, MX	Hydrogeology Assessment at Patagonia, AZ, US	Water-sourcing at Quitobaquito Springs, AZ,	Investigation of Leaky Weirs, AZ, US	Low-impact Development study in Phoenix, AZ, US	Hassayampa Sustainable Development, AZ, US	Nogales Green Infrastructure, SON, MX	Tijuana Stormwater Conveyance. BCN, MX	Vegetation Assessments at Structures, AZ, US	Researching Impacts of Fire in Sky Islands, US & MX	Impacts of Mesquite Encroachment, AZ, US	Documenting Cienegas and Recovery, US & MX	Gila Watershed Riparian Investigation, AZ & NM, US
Strategic Habitats Enhancement (P)	x																
SW Climate Adaptation Center (R)											x						x
The Nature Conservancy (R/M/P)									x						x		
Trust for Public Lands (M)								x									
University of Arizona (R)	x	x		x	x			x						x			
University of Baja California (R)											x	x					
University of Sonora (R)					x												
University of Texas (R)														x		x	
University of Wyoming (R)																x	
U.S. Bureau of Indian Affairs (M)		x													x		x
U.S. Bureau of Land Management (M)									x	x			x				x
U.S. Bureau of Reclamation (R/M)													x				
U.S. Fish and Wildlife Service (R/M/P)								x					x				
U.S. Forest Service (R/M)	x	x	x			x							x	x			
U.S. Geological Survey (R)		x	x		x	x	x	x		x	x	x	x	x	x	x	x
U.S. National Park Service (M/P)		x					x						x				
Watershed Management Group (P)											x						

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FEATURED RESOURCES

UPDATES FROM THE RESTORATION RESOURCE CENTER, *RESTORATION ECOLOGY*, AND THE WEBINAR LIBRARY

RESTORATION RESOURCE CENTER
FEATURED RESOURCES

THE SOUTHEASTERN PLANT CONSERVATION ALLIANCE – BUILDING CAPACITY THROUGH NOVEL PARTNERSHIPS AND LEVERAGING SHARED RESOURCES

Carrie A. Radcliffe and Emily E.D. Coffey

The Southeastern Plant Conservation Alliance (SE PCA), part of the Plant Conservation Alliance, is a partnership of professionals bridging gaps between local and national plant conservation efforts to prevent and restore the loss of plant diversity in the southeastern United States. Participants include government agencies, land managers, botanical gardens, university programs, and other professionals. The alliance is tailored to multiple interests to provide training opportunities, fill information gaps, identify conservation needs, prioritize efforts, and work collaboratively to conserve imperiled plants. This SER2021 presentation shares how the Alliance is working to build capacity and promote novel partnerships by adapting successful models and creative solutions

SE PCA
SE PLANT CONSERVATION ALLIANCE

Photo: Intaba

RIPARIAN REFORESTATION PROJECT: BERG AND BREEDE RIVER SYSTEMS, WESTERN CAPE, SOUTH AFRICA

Intaba Environmental Services

This project submission describes the Reforest Action Project located in the Western Cape, South Africa. The project focuses on rehabilitation of riparian zones along the Berg and Breede Rivers. Initiated in January 2021, the project goals include growing and planting 100,000 indigenous trees per year in a total of 40 sites per year (120 sites over 3 years). This is a total of 300 000 trees to be planted in approximately 60Ha of private land over 3 years (each site is an average of 0,5Ha in total). This project was featured as a Restoration Story with SER in 2021.

RESTORATION ECOLOGY EDITOR-IN-CHIEF PICKS

CHALLENGES IN MEASURING MULTIPLE IMPACTS HINDER PERFORMANCE RECOGNITION IN FOREST LANDSCAPE RESTORATION: EXPERIENCE FROM SEVEN FIELD PROJECTS

Stephanie Mansourian and Daniel Vallauri

Together with partners, World Wildlife Fund (WWF) has been carrying out Forest Landscape Restoration (FLR) pilot projects since 2000. The purpose of this article is to review the metrics of success from seven WWF projects from Latin America, Asia/Pacific, Africa, and Europe that were set up as large-scale, multi-objective, forest restoration projects. The authors highlight and illustrate quantifiable indicators independently defined by these projects and identify current monitoring weaknesses, then propose a typology of ecological, social, and economic key performance indicators illustrated by metrics from real projects. They highlight the need to develop a common framework for monitoring FLR, well-designed but simple enough to be used by FLR practitioners.

MEASURING THE SOCIAL CHANGES FROM RIVER RESTORATION AND DAM REMOVAL

Craig Leisher, Sebastiaan Hess, Kate Dempsey, Molly L. Payne Wynne , Joshua Royte

The number of dam removals in the United States is expected to increase in the coming years, yet we know little about the social effects of dam removal on local people. In this article, the authors assess how two dam removals on a large river in the U.S. state of Maine changed local people's recreational use and perceptions of the river. Through focus groups and interviews, they defined stakeholders' social areas of interest and how those interested changed over time. Five years after dam removal, perceptions of the river and recreational opportunities improved, as did the percentage of people saying the river was part of their family's life. This paper can serve as a case study for assessing the social impacts of restoration through traditional social science means like phone surveys.

PUBLIC PARTICIPATION IN DECISION-MAKING ON CONSERVATION TRANSLOCATIONS: THE IMPORTANCE AND LIMITATIONS OF A LEGISLATIVE FRAMEWORK

Lisette Klein and Koen Arts

Conservation translocations are a frequently used management tool applied by nature conservationists, yet many translocations have a low success rate. This may be caused in part by a lack of consideration for societal dimensions of the project, especially public participation. The authors identified and analyzed processes that affect the implementation of public participation, and under which circumstances a legislative framework enables meaningful public participation. Through interviews with key actors in Scotland, the authors found that that inclusive decision-making was either unintentionally or deliberately neglected and that there was a mismatch between conservationists' expectations on how public participation should be implemented and recognized fundamentals of public participation. Their results demonstrate that while a legislative framework raises awareness and provides guidance, it is unrealistic to expect that a legislative framework alone will solve current challenges in engaging the public.

WEBINAR LIBRARY
IN CASE YOU MISSED IT...

SER hosts a webinar series to engage with restoration experts from across academia and the applied field; we also partner with our chapters to bring additional regional webinar perspectives. We are continuously adding new recordings to our Webinar Library and access to recordings is a member benefit. This month we are featuring presentations related to practitioner-researcher partnerships and collaboration.

Perceptions of Ecological Restoration Success – Practitioners' Views
Mel Galbraith

OBN, 30 Years of Science-Practice Collaboration in the Netherlands
W.A. (Wim) Wiersinga

Connecting Stakeholders to Leverage Knowledge for Ecological Restoration Projects
Elise Gornish

Photo top to bottom: Mel Galbraith, Martin van der Nat/Getty Images, skeeze--272447/pixabay

SOCIETY NEWS

UPDATES ON MEMBERSHIP, POLICY & PRACTICE, THEMATIC SECTIONS, AND MORE

MEMBERSHIP NEWS

Laura Capponi
SER

MARK YOUR CALENDAR TO STAY CONNECTED WITH SER THIS YEAR

Over the last 18 months SER membership has grown by over 40%, and we now represent over 100 countries! I hope you will help us sustain this momentum by staying connected with SER, renewing your membership, and telling your colleagues about SER's programs and activities. As an organization that serves a global community, we are continuing to create opportunities that support, engage, and mobilize this member network. Below are some ways you can participate in SER this year. As always, please contact me at laura@ser.org if I can answer any questions or connect you with a resource.

SER Global Board Election (February-April): If you are interested in having a bigger and bolder impact on the field of restoration, consider nominating yourself for SER's Board of Directors. The Call for 2022-2024 Board of Directors is open until 7 March and voting will begin soon after. Whether you run for office or vote in the election, your participation in this process is important! Find more information here.

Arid Lands Research (ongoing): With generous support from the Kuwait Institute for Scientific Research, this biannual thematic series of *Restoration Ecology* focuses on disseminating research breakthroughs and identifying best practices and approaches to arid lands restoration. Given the prevalence of arid lands globally, the increased challenges of desertification, and the simultaneous increased attention to efforts to achieve Land Degradation Neutrality, this thematic series fills an important gap. Those wishing to discuss ideas or submit manuscripts should contact the Editor-in-Chief, Stephen Murphy (stephen.murphy@uwaterloo.ca).

Monthly Webinar Series (ongoing): Webinars provide an opportunity to engage with restoration experts from across academia and applied practice. We host at least one webinar each month. You can find more information on upcoming webinars here.

CERP application deadlines (April/October): Apply to be credentialed as an expert in the field of restoration. Through their distinct backgrounds in the biological and physical sciences, their hands-on restoration skills, and their continuing education to keep up with emerging science and practical aspects of restoration, SER's certified practitioners are recognized by employers, project funders, agency staff, and others as top candidates for restoration jobs and restoration projects. Application deadlines are 30 April and 31 October this year. Questions? Contact John Salisbury at certification@ser.org.

Make a Difference Week (June): Make a Difference Week (MAD-Week) is a week-long program that connects local, hands-on restorative actions to create a collective, global beneficial impact for the planet. This year it will take place from 4-11 June. Members are encouraged to engage in three ways: 1) by hosting MAD-Week events in your region; 2) by participating in MAD-Week events; and 3) by financially supporting MAD-Week as partners. Learn more: makeadifferenceweek.org.

SER2023 (ongoing): The 10th World Conference on Ecological Restoration is happening 26-30 September 2023. SER2023 will be hosted in Darwin, located in the Northern Territory of Australia. The region's deep connection to aboriginal techniques for management of lands is coupled with world-class research into restoration at Charles Darwin University and proximity to unique landscapes, make this an ideal location for SER2023. We are also committed to offering SER2023 as a hybrid conference and will share more details later in 2022. The calls for proposals and abstracts will open

later this year. Conference Co-Chairs are Bruce Clarkson and Anita Toledo Barros Diederichsen. Members interested in serving on the planning committee should contact Alexis Gibson at alexis@ser.org.

Chapter Engagement: Fifteen Chapters and Sections convened in January for the Chapter Relations Committee to discuss Chapter and Section priorities for the upcoming year and share updates. The COVID pandemic has impacted face-to-face meetings over the last two years, but many of the regional chapters are looking forward to re-connecting with their members this year through hybrid and local gatherings, expanded communications, and increased engagement with students and universities within their regions.

New Regional Chapters. The SER community is also thrilled to formally welcome two new chapters: SER Eastern Canada (SER-EC) and SER Ibero-America and the Caribbean (SER-IAC), which will be ramping up activities soon! SER-IAC is the new name of the Sociedad Iberoamericana y del Caribe de Restauración Ecológica (SIACRE), an organization with whom SER had partnered for many years before this new partnership was formalized by both boards in late December 2021. SER-EC and SER-IAC are SER's first formally bilingual chapters and we are looking forward to this opportunity to provide more services and benefits in Spanish, French, and eventually Portuguese.

WELCOME NEW BUSINESS MEMBERS

All Business Members are listed in the Restoration Directory on SER's Restoration Resource Center. The directory provides a resource to identify and locate environmental restoration leaders in private and public industries.

Jiangsu Green Rock Ecological Technology Co., Ltd. was established in 2003. It is a national high-tech enterprise and belongs to the ecological protection and environmental governance industry. Located in Jiangsu Province, China, Jiangsu also has the distinction of being SER's first Business Member on the Asian continent! Learn more: http://www.lvyan.cn/

RES is the nation's largest ecological restoration company, and is restoring a resilient earth for a modern world. We restore our land and waters with ecological integrity and innovation, project by project. We support the rehabilitation and stewardship of nature's resources alongside responsible human progress. https://res.us/

Business Members also now receive ***Business Member Insider***, a specially curated Society update featuring advanced news and invitations to special events that we think will be of particular interest.

At our October event, members participated in a small group "meet and greet" with SER policy leaders and Board members and discussed new initiatives of the Society, including the forthcoming International Standards for Mine Site Restoration, Global Restoration Observatory, and 10 guiding principles for the UN Decade on Ecosystem Restoration.

UNIVERSITY PARTNERSHIPS

SER's Student Association Program enables students to come together and connect with both emerging and seasoned restoration professionals across SER's global network, participate in SER conferences, and take advantage of resources. Interested in forming a student association at your institution? Contact Laura Capponi at laura@ser.org.

Active Student Associations (as of February 2022)

Brigham Young University
British Columbia Institute of Technology
Colorado State University
Duke University
Eden Project Learning
Northern Arizona University
Ohio State University Student Association
Paul Smith's College
SUNY College of Environmental Science & Forestry
Temple University
Texas A&M University
Trent University
UNED University of Costa Rica
Universidad de Puerto Rico en Aguadilla
University of Arizona
University of California Riverside
University of Colorado at Boulder
University of Lagos Nigeria
University of Michigan-Restoration Ecology Club
University of Nevada, Reno
University of North Texas
University of Oregon
University of Washington
University of Waterloo
University of Wisconsin - Stevens Point
Yale School of the Environment

Academic alignment with SER's Certified Ecological Restoration Practitioner (CERP) program offers eligible academic institutions to differentiate themselves as preparing the next generation of restoration professionals for the workforce.

Once an institution's program is aligned, graduates of are guaranteed to be eligible for certification as Certified Ecological Restoration Practitioners-in-Training (CERPITs). Thus, alignment creates a clear pathway for graduates to obtain professional certification and launch careers in ecological restoration. Additionally, institutions with CERPIT-aligned programs receive a premium listing in SER's Academic Directory, helping them to attract students who are passionate about the field of restoration.

Learn more about how your academic program can partner with the CERP program here.

CERPIT-aligned Institutions (as of February 2022)

British Columbia Institute of Technology
Grand Valley State University
Niagara College
Simon Fraser University
Universidad Autónoma de Nuevo León
University of Victoria
University of Washington, Seattle
University of Wisconsin, River Falls
Utah State University
Virginia Tech
The Ohio State University

SER FORGES NEW PARTNERSHIPS TO ADVANCE ECOLOGICAL RESTORATION

Megan Taylor
SER

SER recently signed new partnership agreements with the Union for Ethical Biotrade (UEBT) and the Center for International Forestry Research and the International Centre for Research in Agroforestry (CIFOR-ICRAF), to strengthen the application of ecological restoration and create tools that bridge the gap between research, practice and policy. "These partnerships benefit SER and members by expanding our presence across the global stage, introducing our network to new audiences, and elevating the ecological restoration field as a driver of solutions-based approaches to our planet's most pressing priorities," said SER's Membership and Strategic Development Director, Laura Capponi.

UNION FOR ETHICAL BIOTRADE

UEBT promotes the ethical sourcing of ingredients from biodiversity to secure a better future for people and regenerate nature. UEBT's membership, composed of companies in the food and beverages, cosmetics and personal care, and natural pharmaceutical sectors, are required to establish benchmarks for improving their sourcing systems and practices so that they align with the Ethical BioTrade Standard.

SER will work with UEBT to strengthen the practical applications of UEBT's Biodiversity Action Plans (BAPs) to include opportunities for, and components of, ecological restoration in ingredient sourcing to support biodiversity-positive supply chains. SER and UEBT will also develop a program to train Certified Ecological Restoration Practitioners (CERPs) to conduct BAP assessments for UEBT verification and/or certification.

"Ecological restoration is a viable and cost-effective tool to protect and enhance biodiversity across supply chains, and SER is excited to work with UEBT and its members to unlock the restorative potential of regenerative agriculture," said SER's Executive Director, Bethanie Walder. "The SER-UEBT partnership also recognizes the expertise of CERPs and the value they can offer to companies wishing to implement solutions across the restorative continuum."

CENTER FOR INTERNATIONAL FORESTRY RESEARCH AND THE INTERNATIONAL CENTRE FOR RESEARCH IN AGROFORESTRY (CIFOR-ICRAF)

CIFOR-ICRAF delivers evidence and solutions to transform how land and renewable resources are used and how food is produced. By using a collaborative, action-oriented approach, CIFOR-ICRAF works to conserve and restore ecosystems, support sustainable supply chains, and respond to accelerating climate change, malnutrition, biodiversity loss and desertification.

SER will work with CIFOR-ICRAF to produce and disseminate technical reports and practical tools featuring evidence-based restoration to help bridge the divide among restoration research, policy, and practice. The two organizations will also design and lead joint workshops, webinars, and global consultations to elevate the role that scientific and practice-based evidence plays in shaping restoration policy and practice.

"SER is especially enthusiastic about CIFOR-ICRAF's Transformative Partnership Platform" said Bethanie Walder. "This effort to collect and disseminate real-world evidence will improve the effectiveness of future restoration projects. Using evidence-based decision-making will increase the beneficial outcomes and impacts of ecological and ecosystem restoration activities, including those in agricultural landscapes. This, in turn, will help achieve the UN Decade on Ecosystem Restoration's goal of transformative societal change."

SCIENCE, POLICY & PRACTICE UPDATE

Bethanie Walder
SER

For this first issue of 2022, we want to give you a preview of some of SER's key activities planned for 2022.

PRACTICE

Trainings. Members have asked for more trainings, and we heard you!

SER has finalized the content for a virtual 8-hour introductory arid lands restoration training in partnership with the US Bureau of Land Management. Once the US-BLM completes their internal version of the course, SER will be releasing a self-directed public version; we expect this to be available by the end of 2022.

SER's International Network for Seed-Based Restoration will be completing a series of video trainings related to seed technology (some of these will be released in 2022, some in 2023).

With our new insurance partner, Conservation United, we will be testing out some short, risk-management focused trainings for practitioners/restoration businesses (e.g. training to recognize and prevent sexual harassment; training on how to work with subcontractors). You can find more information about these sessions on the SER Community Calendar.

Certification. Launched in 2017, the first cohort of our Certified Ecological Restoration Practitioners (CERPs) will be undergoing recertification this year on the 5-year anniversary of the program. We've been thrilled to certify more than 600 practitoners and practitioners-in-training since the launch of the program, and this year we will be focusing on contining to expand the CERP program globally.

SCIENCE AND PRACTICE

Restoration Monitoring Framework. In March we will be releasing the Ecosystem Restoration Interoperability Framework for Projects and Programs (Framework) in conjunction with Climate Focus and the Global Restoration Observatory. The Framework is intended to help better capture restoration project data and thus to better document restoration outcomes and impacts. SER co-led this project with Climate Focus starting in January of 2021 and the final product will be released shortly after this issue of *SERNews* is published. We will be hosting several virtual sessions, through SER and partners, to introduce restorationists to the Framework and to encourage its use. We are also updating the RRC project database to ensure the data you submit through SER will contribute to this valuable undertaking. Nearly 100 people, many of them SER members, have contributed to contributed to development of the Framework; we would especially like to recognize George Gann (SER International Policy Lead) for his leadership in this project.

POLICY AND PRACTICE

Mining Standards of Practice. In December we submitted the International Principles and Standards for Ecological Restoration of Mined Areas for publication in *Restoration Ecology*. We are now waiting for the peer review comments and, if accepted, we expect to see publication of the Mining Standards in the second quarter of 2022. We will be coordinating a global launch for the Mining Standards and holding a series of events to promote their use, including a virtual symposium featuring many of the contributors.

UN Decade Standards of Practice: As mentioned in the previous issues of *SERNews*, we are partnering with the International Union for the Conservation of Nature Commission on Ecosystem Management (IUCN-CEM) and with the UN Decade Best Practices Task Force (BPTF) to host a collaborative process to create Standards of Practice for the UN Decade. Thanks to all of you who replied to our survey with sample SOPs, and we look forward to continuing to engage the SER membership in this process. The final product will be released in the 4th quarter of 2022.

SECTION UPDATE

THE INTERNATIONAL NETWORK FOR SEED-BASED RESTORATION WELCOMES NEW BOARD MEMBERS

Leah Prescott
INSR Treasurer

Thank you to all members who voted for the slate of nominees for the International Network for Seed-based Restoration (INSR) Board in the recent election. We welcome new board members Alison Agneray (Secretary) and Hanumanth Coimbatore Ravindranath (Director at Large), while current Secretary, Stephanie Frischie will become Director at Large.

Continuing their terms are Nancy Shaw, Chair; Simone Pedrini, Chair Elect; Rob Fiegener, Past Chair; Emma Ladouceur, Director at Large; Danilo Ignacio de Urzedo, Director at Large; Karin Kettenring, Director at Large; and Leah Prescott, Treasurer. You can find bios for all board members on our Board page.

We thank Marcello De Vitis, outgoing Director at Large, for his service on the board since 2017 and Julie Etterson, outgoing Director at Large, for her service on the board since 2020.

ALISON AGNERAY
SECRETARY

Alison is a PhD candidate at the University of Nevada, Reno with Dr. Elizabeth Leger studying native seed mixes for use in restoration. Prior to this, she worked as the regional program coordinator for the Great Basin Institute where she mentored and managed 110+ personnel, including other experienced biologists implementing wildland monitoring programs. Alison is a highly effective communicator with a passion for connecting diverse stakeholders to the latest evidence-based restoration strategies. Her experience preparing technical documents, conducting ecology research, working with diverse audiences, and coordinating complex projects has prepared her well for this role as the INSR Secretary.

HANUMANTH COIMBATORE RAVINDRANATH
DIRECTOR AT LARGE

Hanumanth is a core member of Junglescapes, a non-profit that restores degraded forest ecosystems in a biodiversity hotspot in India. Junglescapes received the SER Full Circle Award in 2017. An active SER member, he has made oral presentations at the SER conferences in Iguassu and Cape Town. He is a faculty member of the Foundation Training Program on the Practice of Ecological Restoration, conducted jointly by SER and BNCA in India.

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KEEP IN TOUCH

Know someone interested in ecological restoration? Share this issue of SERNews with them.

For information on how to become an SER member, drop us a note at membership@ser.org or visit our website: www.ser.org/membership.