SER NEWS

Volume 31 Issue 2 | June 2017

Climate Change and Restoration

Table of Contents

Letter from Executive Director Bethanie Walder

Dear SER Members,

For more than 4 hours, I stood, shivered, and occasionally fought sleep on a Saturday night/Sunday morning in late May, watching the northern lights dance across the sky in northwestern Montana. It was a soul-expanding, awe-inspiring morning; a reminder of the power of nature. For one very brief period – maybe just 10 minutes in the middle of the night – the entire sky lit up with green, red and white shimmering waves. We barely slept, yet felt so incredibly alive the next day.

Just a few days later, President Donald Trump announced that he would be pulling the US out of the Paris Climate Agreement. I kept thinking about the northern lights, and took some small solace from that encounter with a previously unknowable, unexplainable natural phenomenon. Climate change, however, is not unknowable or unexplainable, and right now it's not natural, either.

In this issue of *SERNews*, we focus on some of the intersections between climate change and restoration. It's sad to publish this issue just as the US formally begins the process of backing out of the Paris Agreement. At this unique moment in human history, nearly every nation on earth is committing to take action to mitigate the activities that cause climate change. The US abdication of its responsibility as a nation is embarrassing, inexcusable, and will likely be profoundly damaging economically as well as ecologically. Local response across the US, however, shows that this nation is not blind to science. Many individual communities, businesses, and institutions recognize the moral obligation we hold regardless of what the US federal government chooses to do, and they are pledging to take action to meet the international targets to which the US was previously committed.

So what role will restoration play in those targets? As countries and industries begin scaling up to achieve internationally defined targets, many challenges and opportunities will arise, as outlined in the articles featured in this issue of *SERNews*. One of the common themes running through most of the articles is the potential for a focus on single ecosystem services in individual projects to subsume biodiversity and ecological approaches to restoration.

I want to extend a very big thank you to Paddy Woodworth for guest-editing this issue. We weren't always in agreement on which direction individual articles or the newsletter as a whole should go, but the end result is compelling and thought-provoking. We start with Paddy's article, which raises interesting and important cautions to consider. Those cautions are echoed by Justin Jonson, who puts us inside a practitioner's mind as he considers the ramifications of moving from small-scale to large-scale projects. David Wilson's article elevates the significance and importance of peatland protection and restoration in the context of climate change. And we close on a very hopeful note, with Don Falk's book review of *Drawdown*, edited by Paul Hawken. *Drawdown* points out that we do have the tools in our hands to maintain a livable planet, we just have to use them! As a reminder, all guest authors' comments and perspectives are their own, and publication in *SERNews* does not necessarily reflect SER's position.

While US federal actions are out of sync with the rest of the world, restoration and other conservation activities offer inspiration and hope for the future. So, too, does watching the northern lights dance across the night sky.

Bethanie Walder

Climate Change and the Scaling Up of Restoration: Welcome the Opportunities, Recognize the Dangers

Contributed by Paddy Woodworth, author of Our Once and Future Planet: Restoring the World in the Climate Change Century (University of Chicago Press, 2013)

Ecological restoration works -- when sufficient financial and scientific resources are committed to it. The jarrah forest in SW Australia, before and after restoration, where up to 98% of species are recovered in 20 years in Alcoa Aluminium's award-winning project (Photo: Alcoa Aluminium).

The world ecological restoration movement finds itself at an unprecedented moment, as we approach our next international SER conference in Brazil.

We are moving into unfamiliar territory, territory that offers bracing opportunities but also poses disturbing threats, both of them on a scale that we could hardly have imagined at the beginning of this century. This new territory is increasingly shaped, both physically and conceptually, by human-generated climate change. And climate change is still accelerating, despite the Paris accord, in a political context shaken by the recent eruptions of right-wing, anti-science populism. The decision this month by President Trump to pull the US out of that accord casts a dark shadow over the fragile hope that Paris offered us.

Nevertheless, a series of major international agreements over the past decade, including the Bonn Challenge and the New York Declaration on Forests, are a welcome sign that the restoration concept has reached the global policy mainstream. These commitments to 'restore' millions of hectares of degraded ecosystems, while not legally binding, are game-changers for the theory and practice of ecological restoration. The new game will bring great challenges, and very real dangers.

As we attempt to find our bearings in this rapidly expanding landscape, we can find a powerful compass in the new International Standards for the Practice of Ecological Restoration. These standards have been elaborated by our colleagues George Gann, Tein McDonald, Kingsley Dixon and Justin Jonson, and were publicly introduced in December 2016 at the Convention on Biological Diversity's 13th Conference of the Parties, and then again, more in depth, in the previous issue of *SERNews*. It is very helpful, in such a rapidly changing world, that the authors stress from the outset that these Standards are "a *living document* that will improve and expand as the family of restoration practitioners makes use of and provides feedback on this and future editions."

In the paragraphs that follow, I will discuss some of the challenges of maintaining these ecological restoration standards in the context of scaled-up restoration targets and climate change.

It's important to state at the outset that very few volunteer groups, businesses, or agencies have any experience in restoring on the kinds of landscape scale envisaged by the aforementioned recent international commitments.[i] So scaling up is going to stretch the technical capacity of restorationists at unprecedented levels.

This is, of course, a 'good' problem, as it reflects the mainstreaming of the restoration idea in international policy, something SER has worked towards for decades. And therefore, as Justin Jonson argues in his article in this issue, SER members should be at the forefront of resolving the difficult issues that will arise from this mainstreaming, in many different global contexts.

You might think that demands on SER members' technical skills would be challenge enough. But we also need to be aware of an insidious danger that could, if not judiciously addressed, tarnish the unique promise of the restoration movement. The root cause of this danger is that this recent mainstreaming of 'restoration' is not primarily driven, and sometimes driven not at all, by any commitment to, or understanding of, ecological restoration in the holistic sense set out originally in the SER Primer, and developed so comprehensively in the International Standards.

No, the impetus is driven largely by the desire of governments to meet climate change treaty targets, and also to regenerate agriculturally productive lands to meet ever-rising demands for food. These are absolutely legitimate, indeed absolutely necessary, aspirations for humanity's future welfare. But governments will naturally want to meet both goals at the lowest cost possible in expertise and funding.

This means that the focus of most large-scale 'restoration' projects funded through the new commitments may be very narrow, unless we find effective ways to communicate the need for a much broader approach. As things stand, 'restoration' in these commitments often seems to mean the recovery of a single ecosystem service. It could be carbon sequestration, usually through the planting of trees with little regard to appropriate native species, or the recovery of fertile, stable soil for agriculture through revegetation, again without reference to local native biodiversity.

So it is very important that SER uses every local and international opportunity to clarify that such a narrow focus falls far short of the broad and complex vision, and the correspondingly much greater rewards on investment, of ecological restoration.

The distinctive promise of ecological restoration is to be a cutting-edge conservation strategy for the 21st century, with the vision of restoring biodiversity on degraded sites: "The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed," as the SER Primer expressed it, and as restated in the International Standards. To distinguish ecological restoration from other remedial land strategies is no mere semantic or academic quibble.

It's not an exaggeration to say that the future of biodiversity may depend on our making these distinctions clearly understood in the global public sphere. And if we fail in this endeavor, then many environmentalists, and citizens in general, will rapidly become confused and disillusioned with the restoration concept; it will become irrevocably associated with, for example, industrial forestry.

Furthermore, while this distinction between restoration and other remedial land management strategies is being made, we must also cast a critical eye on how these latter strategies are carried out. For example, we must be very wary of commercial enterprises, or state agencies, jumping on the bandwagon of payments for scaled-up 'restoration' to plant alien invasive trees in diverse native shrublands, therefore increasing degradation instead of reducing it.

Ecological restoration has a very important contribution to make in the struggle to decelerate climate change and reduce its impacts: restored landscapes generally sequester more greenhouse gases than degraded ones, as David Wilson and Florence Renou-Wilson point out in their article on peatlands in this issue of *SERNews*.

But it is vitally important that the broad and unique promise of ecological restoration as a conservation strategy is clearly distinguished from other remedial activities in the necessary haste to cope with climate change.

'Rehabilitation,' for example, is a legitimate and useful (when done well) improvement in the ecological health of a site, recovering some ecosystem's functions and some species previously lost to degradation. But, I stress again, it falls far short of ecological restoration and must not be categorized as such.

Regarding the International Standards and the treatment of this question, I would like to offer some feedback in the form of a caveat here. The Standards describe a 'restorative continuum' (pp 33-34) ranging from basic mitigation through more complex rehabilitation to full ecological restoration. This seems quite misleading, because calling all these different remedial activities 'restorative' blurs the very distinction we need to clarify.

I believe that the formula used in the National Standards for the Practice of Ecological Restoration in Australia,[ii] which proposed (p 35) a pyramid of 'environmental repair' ascending from mitigation through rehabilitation to full ecological restoration, made the necessary distinctions in much sharper focus. I would suggest that the authors consider going back to this formula in the next edition of this living document.

Overall, however, the International Standards perform several invaluable functions. They offer both a lucid introduction for newcomers to ecological restoration, and a bracing refresher course for veterans. And they offer, albeit implicitly, a well-grounded framework to respond to a major conceptual challenge to ecological restoration, that presented by the 'novel ecosystems' theory.

What's in a name? From one perspective, Irish oak woods infested with alien invasives might look like 'novel' ecosystems, but from another we see them for what they are: chronically degraded landscapes in need of restoration (Photo: Paddy Woodworth).

This topic merits mention here because, just as the profile of restoration is being raised in the world at large, its core theoretical principles are being questioned by some of our own most distinguished colleagues.

Richard Hobbs and other leading theorists have argued forcefully that the model for ecological restoration set out in the SER Primer is somehow redundant in our era of rapid global change. They claim that so-called 'novel ecosystems' (an unfortunately misleading phrase, as I and others have argued elsewhere)[iii] are the new normal.

Last year, in a remarkable article entitled *Degraded, or Just Different?*[iv] – a title that speaks volumes – Hobbs explicitly declares that restoration, "in the sense used by SER," can only be envisaged in contemporary conditions on a very small scale: "There will continue to be a place for efforts to restore one or two hectares of land," he writes, relegating a thriving global practice to a minor boutique niche. On larger scales, he says, "restoration can legitimately focus on restoring functionality or ecosystem services rather than just the original biodiversity."

I therefore fear that the policy shifts proposed by Hobbs and his colleagues play, however inadvertently, right into the hands of the political and corporate forces who would prefer to plant industrial (and usually alien) forestry plantations to meet the Bonn Challenge targets, and to achieve specific climate mitigation services, than to practice biodiverse ecological restoration.

At this extraordinary moment of opportunity for restoration, it is not only possible and desirable, but necessary and ethically imperative, for SER to advocate the maximum possible application of our International Standards to the new wave of scaled up restoration projects. Restoring ecosystem functionality and services is essential, yes, but it is not enough, and it is our job to set the bar as high as possible, not to lower it. As the Standards document itself puts it:

"Ecological restoration therefore seeks the highest and best recovery outcomes practicable to both compensate for past damage and to progressively effect an increase in the extent and healthy functionality of the planet's imperiled ecosystems."

Paddy Woodworth is the author of *Our Once and Future Planet: Restoring the World in the Climate Change Century* (University of Chicago Press, 2013), which, according to a review in *Science*, "Through reflections on the primary literature and his interviews of many of the major players… skillfully dissects the arguments surrounding the purpose and direction of ecological restoration." He is the co-organiser, with Justin Jonson, of the linked symposia on 'Big Ideas, Big Practice' at the SER conference in Brazil in August. He will also be presenting at the 'Restoring Wetlands into the Future' symposium at the same conference, where his topic is 'Braced for change, mindful of complexity, resisting 'novelty,' committed to restoration.'

[i] There are notable exceptions, of course, including the Pacto pela Restauração da Mata Atlântica in Brazil,Working for Water in South Africa, the Gondwana Link in Australia and the South Bay Salt Pond Restoration Project in the US have all been restoring on landscape scales for some time. These projects have much to teach us, but it is probably also fair to say that they are all themselves still on a steep learning curve.

[ii] A forerunner of the International Standards, published by SER Australasia in March 2016.

[iii] SER colleagues led by Carolina Murcia offer "A Critique of the 'novel ecosystems' concept" in Trends in Ecology & Evolution 29(10) · July 2014 DOI: 10.1016/j.tree.2014.07.006. I analyze the theory in Our Once and Future Planet: Restoring the World in the Climate Change Century (University of Chicago Press,

2013), and return to the subject within an article in the forthcoming issue of The Annals of the Missouri Botanical Garden.

[iv] Hobbs, R. J. (2016), Degraded or just different? Perceptions and value judgments in restoration decisions. Restoration Ecology, 24: 153–158.

Scaling up Restoration in a Time of Change—Observations from Western Australia

Contributed by Justin Jonson, Managing Director of Threshold Environmental Pty. Ltd.

Gearing up for Exponential Growth

International restoration targets have reached a new quantum of aspirational scale. Support continues to gain pace at the highest levels, and a growing awareness of the economic value inherent in protecting and restoring our natural systems is building within the finance sector. Climate change has been an important driver for this recognition. Extreme weather events have increased in frequency and severity, indicating that business as usual cannot continue without incurring hefty costs. Yet in real physical terms, the challenge of restoration at scale still requires some bold and innovative thinking to effectively meet these ambitious goals. The onus of ensuring the delivery of these targets, and most specifically of guaranteeing their ecological quality, falls on the SER community and its associates, and warrants our careful consideration.

A necessary first step in advancing this call for action has been the elaboration of a common language to describe the specific activities and outputs associated with the work of ecological restoration and related fields. The development of the *International Standards for the Practice of Ecological Restoration*provides a more specific framework to describe and evaluate our work, while still remaining inclusive in scope. And as a living document, the Standards can serve as a common point of reference for continual improvement, and ongoing expansion of scale, in practice.

The Monjebup North Ecological Restoration Project in Western Australia shows the combination of both structural and species diversity that can be achieved when following the principles of ecological restoration (photo: Justin Jonson).

Recent global restoration initiatives, including the CBD's Aichi Biodiversity Target #15, the Bonn Challenge on Forest Landscape Restoration (150 million hectares restored by 2020, 350M hectares

by 2030), the NY Declaration on Forests (10 goals including, #1 Halve global forest loss by 2020), and the Initiative 20X20 (20 M hectares restored in Latin America and Caribbean countries by 2020) are so large-scale that they are hard to fathom from current operational perspectives. These targets are nested within an even bigger conceptual basket: the estimated two billion hectares of degraded land identified in the WRI and University of Maryland's Atlas of Forest and Landscape Restoration Opportunities map. That's a lot of land. While these initiatives present as a unified approach, they actually propose a broad suite of 'restoration' activities, including sustainable agriculture and forestry. This dynamic, whereby a diverse array of 'landscape restoration activities' including ecological restoration, are nested within a greater matrix of global targets, is practical (see boxes for examples of reforestation activities underway in Australia to combat climate change). However, urgent questions remain: how will different activities be prioritized, how will funding be equitably disbursed, and to what extent can we ensure that our efforts result in a net positive gain?

The Business of Nature

No matter what sector of the industry you are involved in, ecological restoration is a product delivered with a fixed operational budget. While we in the SER community may share a feeling of reverence toward natural systems, the business of ecological restoration is large, expanding, and without specific oversight. Depending on the service provider, the cost and quality of the restoration outputs can vary significantly. Recent analyses of the growing size of the restoration economy in the U.S. estimated 2014 sales and revenues for firms engaged in restoration work to be approximately $9.46 billion. While this investment is very welcome news, what did we actually get for the money? It's great that business is booming and jobs are being created, but the true metric to gauge our success should be the net ecological output realized. After all, it is the quality and quantity of the end product that gives this business its raison d'être. As an industry, we would do well to develop an understanding of the sort of returns on investment we can provide for different restoration treatments, both in quantity and quality. This would allow us to compare costs and outcomes of different 'restoration activities' and build a product portfolio to help define, prioritize, cost, and evaluate global initiatives. Linking this bottom line of business ethos with practitioner certification and International Standards would considerably advance the effectiveness of our efforts.

For example, in the southwest of Western Australia, **per hectare funding rates** for 'revegetation' projects can differ by a ratio of 20 to 1. This is a direct consequence of the diversity of funding bodies, each with their own s**pecific mix of desired deliverables**. The funding bodies also set the **project scope**and determine the specifications of the work. The money available is what you, the operator, have to work with. In this way, operational budget constraints put intense pressure on service providers, and create an unavoidable tension between staying true to the foundational principles of ecological restoration and maintaining financial solvency. In my business, I personally choose to work with those organizations who support the delivery of our most ecologically informed work. However, these funding sources are not necessarily 'cashed up'. They generally operate at relatively small scales, preferring to spread their available resources across multiple projects to manage risk. As they are focused on conservation outcomes, they don't source investments seeking direct financial returns and are therefore reliant on the ebb and flow of public and philanthropic donations. Moreover, an element of competition develops with these small-scale funding sources, as both professional and community stakeholders seek access to a relatively small common funding bucket.

The Nature of Business

Competing for a small funding bucket will not deliver on large-scale aspirations. Big business uses economies of scale to increase profitability and corner marketplaces. They streamline production systems to reduce transaction costs, while sourcing resources in bulk to capture discounted rates. Classic economic theory is all about maximizing outputs and minimizing costs. Classic industrial

land-based service providers, such as those in forestry or agricultural sectors, have understood and adopted these business principles. Those industries have the luxury of producing products that provide financial returns on investment. They have gained access to large investment streams, and have demonstrated capacity to deliver projects at scale. It is these classic industries who are currently well placed to capitalize on the business of restoration, as both the scales of operation and demand for pipeline ready projects increase. But can and will they adapt to the specificity required for ecological restoration? Restoration is not, and will never be, cookie cutter manufacturing.

Continued segregation between operators at both ends of the operational spectrum will not serve our ambitious goals. An unprecedented opportunity is here to innovate and modernize, to join forces and collaborate. In order to effectively and efficiently meet global targets, ecological restoration professionals with specialized knowledge and techniques need to find new ways to translate their skills and knowledge to large-scale modes of practice. Traditional industries, from their side, will need to shift away from classic profit-focused ideologies towards new modes of operation, where extra efforts to focus on the detail around ecological productivity take precedence over those of mere financial gain. This is the alliance we need to spur forward if we aspire to achieve a net gain in restored ecosystems.

This 2013 photo shows a site at the Monjebup North Ecological Restoration Project after seeding, with a worker planting seedlings in strategically located zones to match species with specific niche requirements (photo: Ben Boxshall).

In Australia, it took an industrial effort to clear the land for agriculture, and it will take an industrial effort to restore it. While clearing is all about brute force - two D8 bulldozers pulling a 400-foot oversized anchor chain and ball - quality restoration is all about detail. Undisturbed native vegetation presents a rolling mosaic of plant communities driven by small changes in soil types and extensive

disturbance histories. In Western Australia, a biodiversity hotspot, the ecological detail is expressed at a very fine scale, but the amount of degraded land in need of restoration is vast. Early innovators in the region identified direct seeding of local species as an effective and efficient means to re-establish native vegetation. After all, with millions of hectares of marginal agricultural land suitable for restoration in the central wheatbelt zone alone, bringing back that intricate mosaic by hand-planting seedlings is an inefficient proposal.

Agricultural equipment in Western Australia has been modified to re-establish plant communities at scale through the direct application of seed sown with precision placement. Here, modified equipment performs broad acre direct seeding at the Monjebup North Ecological Restoration Project in 2013 (photo: Lien Imbrechts).

In truth, the romantic vision of large-scale ecological restoration is not one that supports a long honeymoon. As a practitioner, when you arrive at an empty field that seems to go on forever, the weight of responsibility falls heavily on you and your team to kick-start a new trajectory of recovery. Restoration projects larger than 100 hectares require machinery, horsepower, hydraulics, steel. Applying theory to practice, at scale, is tough, too. The bigger the area, the more significant are the trade-offs in management decisions to be made. Getting seed mixes right is challenging. Every additional species included presents a new transaction. Every additional soil type change is a new transaction. Every invasive weed and pest to control is a new transaction. With increasing biological richness comes an increased measure of management; comes greater effort. The delivery of a large restoration project taxes the mind, raises the stress levels, brings you out of your comfort zone. It means spending long hours in the field and staying up late at night preparing for the next day. You're juggling a million balls and then the unforeseen torrential downpour adds a new challenge. Bolts shear and tires flatten. Did I mention nerves of steel? You need those, too.

Is there a limit to effort when undertaking an ecological restoration project? Can we ever do enough?

Can we, in our understanding of the natural processes which drive germination, recruitment, succession, persistence and initial assemblage, set the initial conditions on track for a viable trajectory of recovery? With swaths of degraded land as our canvas, we must indeed call on brute force to get the big results we need. Yet the business of nature relies on the fine and subtle detail that shapes our sense of place, and makes it unlike any other. Marrying the nature of business to the business of nature at large scales is the greatest challenge ever presented to the SER community. It is imperative we rise to it.

Breakout Box

CARBON FUNDED RESTORATION: Climate change has been the main driver for initiating large-scale international targets for restoration, especially in relation to carbon sequestration objectives. In Western Australia, three main types of carbon offset plantings have been implemented, and these serve to highlight some of the trade-offs and challenges associated with large-scale reforestation projects.

1) Monoculture Carbon Plantations

This style of carbon offset demonstrated early and rapid reforestation at scale in Australia. One leading carbon offset company established approximately 25,000 hectares of Eucalyptus monoculture plantations over a 3 year period. These carbon plantings are established in line with classic forestry approaches. They represent a robust approach to the establishment of a carbon pool, where long-lived fast-growing Eucalyptus mallee trees are planted at controlled stem densities. These carbon pools are also resilient to fire, readily re-sprouting from an enlarged root, or lignotuber. By controlling tree stocking density and following consistent establishment protocols, they are easy to measure, and generally produce a consistent carbon yield across the entire estate. However, they are very homogeneous, with non-native species, and offer fewer overall co-benefits, especially in regards to biodiversity and conservation.

In an open carbon market, this reforestation approach produces the highest per hectare carbon sequestration values over short and medium time frames. If reforestation finance is available through the sale of carbon offset units alone, this approach is a highly competitive driver of land use change.

2) Mixed-species Biodiverse Carbon Plantings

'Biodiverse carbon plantings' can result in preferentially selected species, such as the large tree Eucalyptus occidentalis shown here, which is fast growing and easy to establish (photo: Justin Jonson).

This approach is less homogeneous than monoculture plantations, and includes multiple local species and associated co-benefits, however, the extent to which conservation targets are being met is less easily defined. The flexibility of species selection and stocking targets is useful for establishing resilient carbon pools, but this can also influence a bias toward certain traits over others. Any fast growing local tree species that is a) highly adaptable to a number of different abiotic conditions, b) long lived, and c) stores a large amount of carbon at maturity may be preferentially selected in the planting mix. The downside is that less common or niche-specific species are generally overlooked. Large projects require large quantities of seed, and it is often widely distributed and common species that produce the most viable seed stock in sufficient quantities. This can result in the establishment of simple species assemblages. Good managers are able to pick up on broad variations in soil types and adapt their species mixes accordingly. Yet many localized patches with specific abiotic characteristics, i.e. those places where peaks in biodiversity manifest themselves (e.g. rocky outcrops, sandy rises, low-lying waterlogging zones), are planted with the same generalist mix of common species, thereby missing out on essential biodiversity.

3) Carbon Funded Ecological Restoration

While arguably the best approach to the establishment of carbon sequestration pools for maximizing co-benefits, it is both the most technically and financially demanding. It requires detailed site planning, including fine scale soil mapping and local vegetation surveys, expert seed collection and specialized propagation techniques. On ground operations are required to closely align with the data-rich site plans, and are executed with high attention to detail. This approach uses reference ecosystems to re-establish locally representative plant communities. Rare and locally significant species are included within the greater matrix, and planting compartments are established true to soil type and landscape position. However, this added heterogeneity also brings variability in carbon yields across the planting area. For accurate carbon measurement, it requires extensive monitoring.

The Yarraweyah Falls carbon-funded ecological restoration project shown here at the 100 hectare scale. A natural mosaic can be observed as the direct seeded site reaches 3 years old (photo: Justin Jonson).

Framing up Carbon as a Pathway to Restoration at Scale

While much of the industry rhetoric is around targeting degraded land for carbon funded reforestation, over the last ten years I have seen land availability as the primary limiting factor to doing this work. This is surprising news, especially considering Western Australia's grossly over-cleared agricultural production landscapes, including the 14 million hectare 'central wheatbelt' which is estimated to be over 90% cleared.

However the operational reality is that Australia is a free market economy. Land value in production landscapes is determined by the acreage of arable land. As a consequence,

landholders are generally averse to transitioning large areas of arable land from cropping or grazing enterprises to permanent woody vegetation plantings, which are no longer considered ‘arable’ and lose their market value.

This effect of decreased capital value in land when shifted out of agricultural production has had a dampening effect on carbon-funded land use change. Generally, unless a farm is bought in full for this purpose, only very small areas of land have been offered up for carbon-funded revegetation or restoration initiatives.

Given the challenge of gaining access to land, and the trade-offs inherent in different types of carbon plantings that may be applied, perhaps the big operational opportunity for the restoration sector moving forward is at the whole-farm scale. The redesign of farm production systems to support the intensification of agricultural systems and freeing up of less productive land for alternative uses is a likely pathway toward achieving greater outcomes at scale. Whether this is by working with groups of existing landholders or through the purchase, redesign and sale of strategically placed land holdings, the opportunity is there to apply the principles of ecological restoration to achieve these ends. Such landscape restoration requires the overlap of both production and conservation objectives, but the burden of the cost to achieve this cannot fall on the land holders alone. Carbon payments may help facilitate this transition, but care must be taken to avoid the roll out of reforestation projects which lack the full suite of co-benefits that can be achieved with ecologically informed plantings. Carbon funded ecological restoration presents the opportunity to meet multiple ecosystem services in one land use change. With billions of hectares identified as degraded, our next step is to determine where best to focus our works.

Peatland Restoration in Ireland & Globally: Opportunities & Challenges for Mitigating Climate Change

Contributed by David Wilson[1] and Florence Renou-Wilson[2]

[1]Earthy Matters Environmental Consultants, Donegal, Ireland
[2]School of Biology, University College Dublin, Ireland

Note: Some references provided by the authors were excluded here for ease of reading. A version with all references can be read here.

Peatlands are unique ecosystems in the context of the global carbon cycle because, in addition to being home to distinctive assemblages of flora and fauna, they are simultaneously net sinks for carbon dioxide and sources of another greenhouse gas, methane. Globally, peatlands are large carbon sinks, and are estimated to contain a third of the total soil carbon pool. The accumulation of vast quantities of carbon in peatlands occurs over many thousands of years from the slow build-up of partly decomposed plant remains (carbon-rich organic material) under the water-saturated, oxygen-depleted conditions that prevail in natural (i.e. intact) peatlands. This accumulated peat mass makes peatlands a fascinating historical archive of past environmental and cultural change. They are also unique ecosystems on which the livelihoods of certain human populations have critically depended.

The Republic of Ireland, where we have done most of our research, contains large areas of wetlands that constitute some of the most ecologically diverse habitats in the country. Peatlands, in the form of bogs and fens, are the main subclass of wetlands in Ireland, and cover 14-20% of the territory.

They represent between 53 and 75% of total soil organic C stocks in Ireland. However, less than 20% of the original peatland area in Ireland is considered to be worthy of conservation. The remainder has been extensively modified by land-management, which includes drainage and associated conversion to other land-uses such as grassland, cropland (a very small proportion in Ireland), plantation forestry, peat extraction (for energy, horticulture and domestic purposes) and heather management.

Land use change typically transforms a peatland from a net carbon sink to a large carbon source and decisions on land use are often made without regard to, or knowledge of, their climate impacts. This lack of awareness is a major barrier to the implementation of appropriate climate mitigation measures in peatlands (Regina et al. 2015).

Opportunities

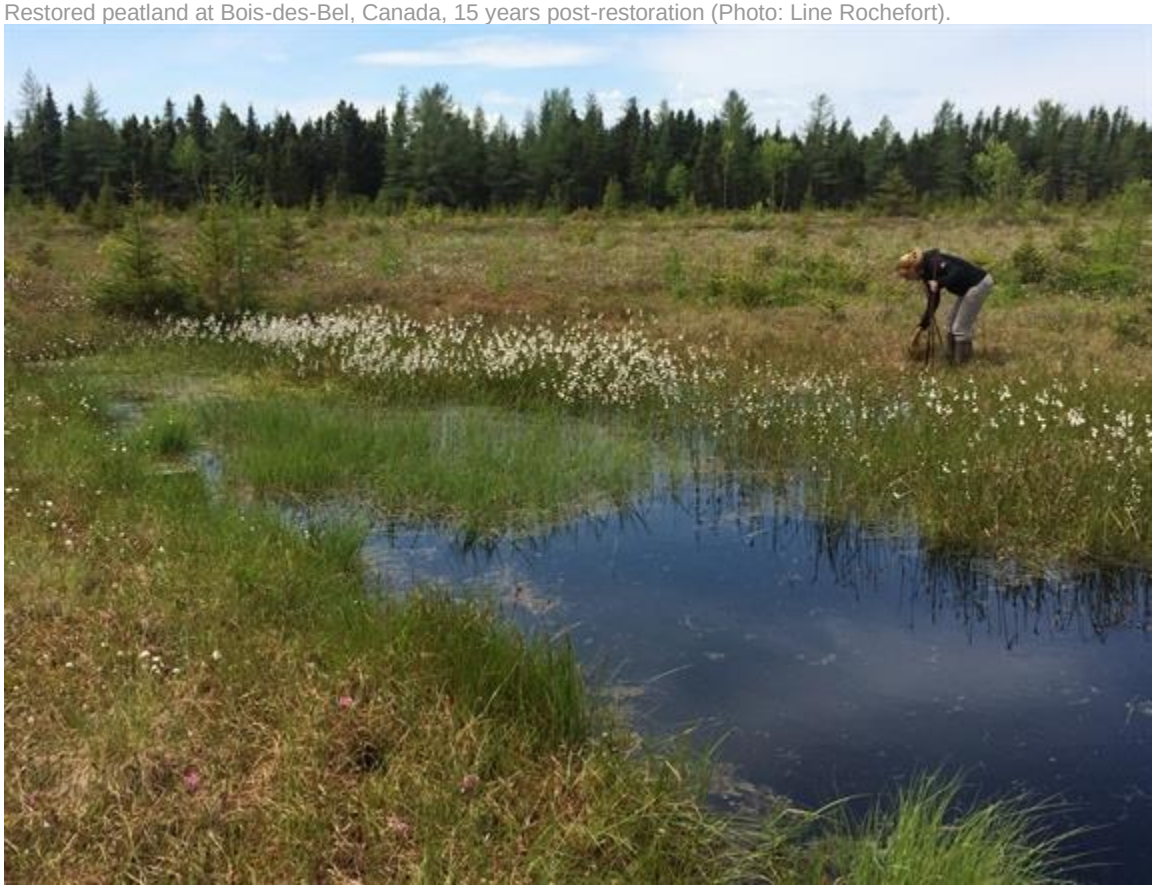
Given their outsize impact on the global climate system, maintaining and enhancing the resilience of intact, natural peatlands may be the best and most cost-effective defense against climate change. Going one step further on the mitigation ladder, rewetting and restoration of degraded peatlands has been named a “low-hanging fruit, and among the most cost-effective options for mitigating climate change” by Achim Steiner, UN Under-Secretary General and Executive Director UN Environment Programme. Increased biodiversity is also a likely synergistic outcome of such action but will not necessarily result in convergence towards the pre-disturbance peatland plant and animal communities.

A peat dam in a rewetted raised bog in Ireland (Photo: Florence Renou-Wilson).

There is a growing global interest in peatland restoration and in ending non-sustainable uses of peat by focusing on ‘sustainable’ services and benefits, especially the climate mitigation benefits that peatlands provide to society as a whole. In Canada and North America, peatland restoration has

often involved a close collaboration between the peat extraction industry and peatland scientists to develop best practice approaches (e.g., Rochefort et al. 2003). In much of northwest Europe there is a consensus among policy makers and environmentalists that the long term aim of restoration on drained, degraded and damaged peatlands should be the regeneration of the vegetation of natural or undisturbed peatlands, in order to re-establish peat-forming and carbon sequestering processes. The first step to achieve this goal is to rewet the ecosystem. Therefore, management plans developed thus far have generally aimed to maintain, enhance and/or restore some of the functions of an intact ecosystem.

Restored peatland at Bois-des-Bel, Canada, 15 years post-restoration (Photo: Line Rochefort).



Rewetting on its own can have several objectives, such as nature conservation, greenhouse gas emissions reduction or the promotion of other management practices on saturated organic soils, such as paludiculture – the preservation-focused cultivation of marshlands (IPCC 2014). Rewetting can be achieved by various management practices, all of which have in common the critical parameter that the water level is raised and kept near the soil surface. Re-establishing a high water table or optimizing its position has been proposed as a successful management measure for mitigating emissions (Smith et al. 2007), although the difficulties of maintaining an optimum water table position following rewetting have been recognized (e.g., Price et al. 2003).

Industrial peat extraction site in Ireland (Photo: Florence Renou-Wilson).

The rewetting of sites that have been extremely degraded, such as industrial cutaway peatlands and marginal grassland over organic soils, could also be considered additional “low-hanging fruit” mitigation measures to reduce emissions from drained peatlands – the rise in the water table creates a low oxygen environment within the peat that strongly reduces the activity of aerobic microbes and leads to a strong decline in carbon dioxide emissions to the atmosphere. In all cases, the high carbon dioxide emissions observed at drained sites will be reduced immediately upon rewetting. With successful recolonization by suitable plant species (especially the Sphagnum mosses), the ecosystem may also go one step further and begin to sequester carbon again, although the time needed for recovery of the carbon sequestration function may vary from several years to many decades (Tuittila et al. 1999, Wilson et al. 2013). This will depend on the type of restoration methods employed, how long these methods are continued, and the pre-rewetting climate and hydrological boundary conditions of the site.

Despite the promising potential of rewetting peatlands, greenhouse gas dynamics in a peatland are extremely complex and indeed rewetting of drained peatlands frequently results in a sharp surge in methane emissions in the years immediately after rewetting as the emerging vegetation cover provides fresh substrates for methane production (Tuittila et al. 2000). However, the evidence to date (e.g., Wilson 2016a, Wilson 2016b) suggests that restoration of drained peatlands is, in most cases, strongly beneficial to climate change mitigation, particularly where the previous land use had resulted in very high greenhouse gas emissions.

Challenges

In Ireland, restoration to the pre-disturbed peatland ecosystem may be impossible in some cases, or at the very least, highly difficult to achieve. Industrial peat extraction for energy purposes leaves a

residual peat layer that can be highly nutrient rich (i.e. fen peat) and is, therefore, extremely problematic in terms of restoration to a pre-extraction nutrient poor ecosystem. This contrasts with the outcome of peat extraction for horticultural substrate purposes in Canada for example, where only the upper layers are removed, and restoration (in its strictest sense) is relatively easier to achieve.

Domestic peat extraction site in a raised bog in Ireland (Photo: Florence Renou-Wilson).

Cultural legacies and contemporary political controversy also makes peatland restoration in Ireland problematic. Large areas of Irish peatlands have been impacted over the centuries by small-scale extraction of peat by farmers and landowners. This has established a strongly supported right to “cut turf” (known as turbary rights). Restrictions on this right have become an extremely sensitive political issue, particularly when it coincides with sites designated under EU environmental directives. Given the large areas in the country potentially affected by turbary cutting, the financial and political cost of restoration of all these degraded peatlands is likely to be prohibitive for the Irish government, unless better communication of the environmental imperatives can engage rural communities with these projects, and reward them for this engagement.

Predicted increases in Ireland’s forest cover, as envisaged under the Food Wise 2025 policy (the 10-year Strategy for the Irish Agri-Food Sector) and the inclusion of land use, land use change and forestry (LULUCF) within the scope of the new EU climate change framework may put pressure on (a) peatlands in general (“marginal” organic soils may be planted with coniferous monocultures) and (b) potential areas for peatland restoration may instead be re-afforested. While the amount of carbon sequestered in the trees and litter may be larger than the amount of carbon lost from the peat over a single harvest rotation (30-40 years), forestry establishment on natural peatland sites - especially conservation areas - is not acceptable due to the loss of unique flora and fauna and to the long-term impact on carbon stored within the peatland.

For peatlands drained for agriculture, it is an even bigger challenge to convince farmers of the benefits of rewetting land, and in the absence of appropriate financial incentives such proposals are likely to fail. However, studies in the United Kingdom have demonstrated that the long-term benefit of peatland rewetting and restoration on some specific ecosystem services, such as improvement of water storage and quality, has the potential to balance high financial investment (Grand-Clement et al. 2013). In Belarus, researchers have successfully demonstrated a reduction in greenhouse gas emissions and enhancement of biodiversity values through the restoration and sustainable management of large areas of currently degraded peatlands. As a consequence, policy-makers have now developed a scheme for the sale of carbon credits to secure further peatland rewetting activities and, therefore, future biodiversity protection and enhancement (Tanneberger and Wichtmann 2011). With other examples in Germany (www.moorfutures.de) and the UK (The Peatland Code), new tools (standards and technical guidance) are being developed to enable the corporate sponsorship of the rewetting and restoration of peatlands for climate change mitigation. These actions typically result in additional co-benefits that are not easily monetized (e.g. biodiversity, watershed protection), but are of great value nonetheless - economically and otherwise. The continuous development of a rigorous quantification and officially certified recognition system of climate change mitigation and co-benefits, should help develop regional carbon markets to fund further peatland restoration and rewetting projects (Bonn et al. 2014).

Drainage ditch in a peatland in Malaysia (Photo: Chris Evans).

Meanwhile, tropical peatlands are under significant and increasing pressure from logging and oil palm cultivation. Unfortunately, the restoration of these ecosystems is highly problematic as it is much more difficult to rewet and maintain a stable water table in tropical peat than in boreal and temperate peat soils because the hydraulic conductivity of tropical peat is extremely high (Page et al. 2008). Given the very high greenhouse gas emissions associated with drained tropical peatlands,

particularly in southeast Asia, rewetting/restoration would be particularly desirable, although its implementation is challenging due to a wide range of physical, climatic, social, economic and political factors.

Summary

The potential for climate change mitigation through global peatland restoration is high given that degraded and drained peatlands are a major source of greenhouse gas emission to the atmosphere. However, “technical” challenges exist at the site scale (e.g. keeping the site wet, ensuring recolonization by desirable plant species) and upscaling of restoration efforts to larger areas of degraded peatlands may be impeded by a plethora of factors – some of which have been highlighted here, while others are likely to be region or country-specific.

References

Bonn, A., M. S. Reed, C. D. Evans, H. Joosten, C. Bain, J. Farmer, I. Emmer, J. Couwenberg, A. Moxey, R. Artz, F. Tanneberger, M. von Unger, M.-A. Smyth, and D. Birnie. 2014. Investing in nature: Developing ecosystem service markets for peatland restoration. Ecosystem Services 9:54-64, DOI:10.1016/j.ecoser.2014.1006.1011.

Grand-Clement, E., K. Anderson, D. Smith, D. Luscombe, N. Gatis, M. Ross, and R. E. Brazier. 2013. Evaluating ecosystem groods and services after restoration of marginal upland peatlands in South-West England. Journal of Applied Ecology 50:324-334.

IPCC. 2014. 2013 Supplement to the 2006 Inter-Governmental Panel on Climate Change Guidelines for National Greenhouse Gas Inventories: Wetlands, IPCC, Switzerland.

Page, S., A. Hosciło, H. Wösten, J. Jauhiainen, M. Silvius, J. Rieley, H. Ritzema, K. Tansey, L. Graham, H. Vasander, and S. Limin. 2008. Restoration Ecology of Lowland Tropical Peatlands in Southeast Asia: Current Knowledge and Future Research Directions. Ecosystems 12:888-905.

Price, J. S., A. L. Heathwaite, and A. J. Baird. 2003. Hydrological processes in abandoned and restored peatlands: an overview of management approaches. Wetlands Ecology and Management 11:65-83.

Regina, K., A. Budiman, M. H. Greve, A. Grounlund, A. Kasimir, H. Lehtonen, S. O. Petersen, P. Smith, and H. Wosten. 2015. GHG mitigation of agricultural peatlands requires coherent policies. Climate Policy:10.1080/14693062.14692015.11022854.

Rochefort, L., Quinty, F., Campeau, S., Johnson, K. & Malterer, T. (2003) North American approach to the restoration of Sphagnum dominated peatlands. Wetlands Ecology and Management, 11, 3-20.

Smith, P., D. Martino, Z. Cai, D. Gwary, H. H. Janzen, P. Kumar, B. McCarl, S. M. Ogle, F. O'Mara, C. Rice, B. Scholes, and O. Sirotenko. 2007. Agriculture. Pages 499-540 in B. Metz., P. R. Davidson, P. R. Bosch, R. Dave, and L. A. Meyer, editors. Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK.

Tanneberger, F., and W. Wichtmann. 2011. Carbon credits from peatland rewetting: Climate - biodiversity - land use. Schweizerbart Science Publishers, Stuttgart.

Tuittila, E.-S., V.-M. Komulainen, H. Vasander, and J. Laine. 1999. Restored cut-away peatland as a sink for atmospheric CO2. Oecologia 120:563 - 574.

Tuittila, E.-S., V.-M. Komulainen, H. Vasander, H. Nykänen, P. J. Martikainen, and J. Laine. 2000. Methane dynamics of a restored cut-away peatland. Global Change Biology 6:569-581.

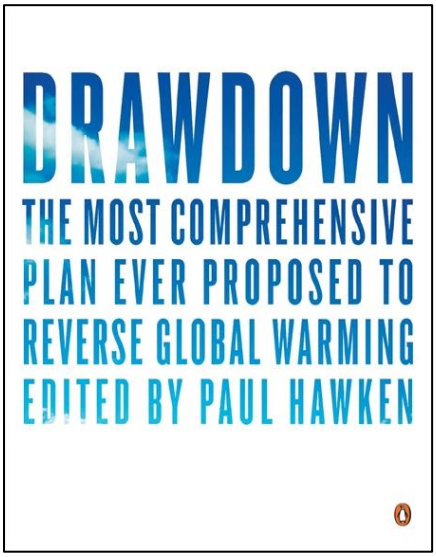
Wilson, D., C. Farrell, A., C. Müller, S. Hepp, and F. Renou-Wilson. 2013. Rewetted industrial cutaway peatlands in western Ireland: prime location for climate change mitigation? Mires and Peat 11:Article 01, 01-22.

Wilson, D., Blain, D., Couwenberg, J., Evans, C.D., Murdiyarso, D., Page, S., Renou-Wilson, F., Rieley, J., Sirin, A., Strack, M. & Tuittila, E.-S. (2016a) Greenhouse gas emission factors associated with rewetting of organic soils. Mires and Peat, 17, Article 04, 1–28, doi: 10.19189/MaP.2016.OMB.222.

Wilson, D., Farrell, C., Fallon, D., Moser, G., Muller, C. & Renou-Wilson, F. (2016b) Multi-year greenhouse gas balances at a rewetted temperate peatland. Global Change Biology, 22, 4080-4095, DOI: 10.1111/gcb.13325.

Drawdown: A Call to Climate Action for the Restoration Ecology Community

Contributed by Donald Falk, Professor, School of Natural Resources and the Environment, University of Arizona. Don is a founding SER Board member and served as SER's first Executive Director.



All restoration in contemporary times takes place in a rapidly changing world (Falk 2017, in press). The interacting effects of climate change, land use and degradation, human resource extraction, altered disturbance regimes and hydrogeochemical cycles, and spreading invasive species combine to create conditions that are increasingly challenging for the practice of ecological restoration as originally conceived. Thus, both as professionals and planetary citizens we are compelled to understand how our world is changing, the forces that are driving this change, and any ways that we can decelerate anthropogenic change of the Earth system.

While the daily news and scientific literature often emphasize the overwhelming scope, pace and magnitude of global change in all of its manifestations, somewhat less attention is given to the range of strategies for reducing these impacts. Unfortunately, the net effect of this imbalance can be to convey an impression that rapid, radical change to the Earth system is inevitable, especially with respect to anthropogenic climate change. This breeds resignation, acceptance of things we should not and need not accept. In fact, nothing could be further from the truth.

It is in this spirit that restoration ecology scientists and practitioners should engage with *Drawdown*, a new project lead by visionary thinker Paul Hawken. The essential question Hawken and his collaborators (full disclosure: I played a very small part in the project) are asking in this ongoing project is: are there technologies, strategies, and approaches that can be deployed now that would reverse our catastrophic path toward irreversible climate change? The fact is, we don't hear enough about these solutions. The enormous contribution of *Drawdown* is to make us fully aware that reversing anthropogenic climate change (specifically, by reducing atmospheric concentrations of greenhouse gases) is entirely achievable if we put our minds and resources to it.

It's gripping and exciting reading. Once you pick up the book (or visit the website of the ongoing project by the same name, http://www.drawdown.org/), you realize immediately that there are real solutions based on existing technologies that can be implemented now.
Thus, *Drawdown* demolishes the conventional wisdom – which we all accept all too easily – that reversing climate change is too difficult, too expensive, too controversial, too unreliable, too untested. In fact, the more you study the *Drawdown* solutions, the more you realize that we are being sold an intolerable status quo by political and economic forces that benefit in the short run from destruction of the planet and our way of life. In a very real sense, *Drawdown* calls those lies out from the shadows and gives us hundreds of ways to move forward.

The *Drawdown* solutions are not all technological. While much of the project focuses naturally on energy, transportation, materials, and the built environments (among the main source of GHG emissions), many of the solutions concern social change, such as increased educational

opportunities for women and girls, food production, and urban settlement patterns. The land use solutions are the most immediately relevant to restoration ecologists, and Hawken is no stranger to our community (many SER members will recall his brilliant address to the SER World Conference in Madison, Wisconsin in 2013). These include exploration of reforestation and afforestation; protection and restoration of coastal wetlands, peatlands, temperate and tropical forests and protection and expansion of indigenous land tenure. This is familiar ground to the restoration ecology community, and *Drawdown* shows us how we can contribute our skills toward this larger goal.

As a research delegate to the 2015 UNFCCC Conference of Parties (COP21, the “climate summit”) in Paris, my main focus was to link the ecological restoration community with people concerned about climate change. Globally, land use and degradation account for roughly 15-20% of GHG emissions. Let’s use our skills and talent to take ownership of that part of the big picture.

Reference

Falk DA. Restoration ecology, resilience, and the axes of change. 2017 (in press). Annals of the Missouri Botanical Garden.

Society News

Dear Colleagues,

April was a month to celebrate science with the March for Science taking place on Earth Day in more than 600 cities around the world and the People's Climate March just a week later with more than 300,000 people marching in Washington, DC. SER joined our colleagues at the Society for Wetland Scientists during the Washington, DC March for Science. The rain did not dampen our passion for science and the critical role independent scientific inquiry plays in bettering human society.

SER's Executive Director, Bethanie Walder, with Society of Wetland Scientists staff and members at the Science March.

In conjunction with the march, we called out to SER members to tweet about the work they do using the #actuallivingscientist hashtag. This hashtag was started by an Alabama biologist who wants to expose more people to real scientists. I do need to give full credit to the amazing Gwen Thomas of SER-Texaswho brought this to our attention. We had a nice response from our members. If you missed it, check out our Storify page where we compiled everyone who responded to both our and the SER-Texas shout out.

We want to keep this going and you don't need a Twitter account to contribute. We know a lot of you will be in the field over the next couple of months (and for some of you the "field" may be an office or lab behind a stack of books and papers) so let's promote the great work you're doing. SER has more than 2,000 followers on Twitter and more than 6,000 followers on Facebook (where we'll share the Storify link); these include your peers as well as members of the public who care about restoration and the environment.

If you'd like to join your colleagues email me (marguerite@ser.org) and put #actuallivingscientist in the subject line. Include a photo of you in action along with your name and a short description of your work and we'll tweet it with the hashtag #actuallivingscientist (seriously, check out SER's Storify page for inspiration). I'll let you know when to expect your moment of Twitter fame.

***

Speaking of the celebration of science, we have three new Student Associations to welcome to SER:

- UC Davis, California
- University of Wyoming (Restoration Outreach and Research a.k.a UW ROaR)
- University of Tennessee at Knoxville

We are very excited to have these future leaders in our field as members of the Society and we look forward to telling you a little more about them in later issues of SERNews.

***

We don't want to forget to thank our colleagues at the International Network for Seed-Based Restoration (INSR) for the great webinar on seed-based approaches to ecological restoration. We had more than 600 people sign up, which is a webinar record for us! If you missed it, don't worry, we've archived the webinar on our website. Because there were so many questions and not enough time, we archived both the questions and answers in the forum section of ser.org where you can still contribute to the conversation with your questions and observations. Many thanks to Stephanie Frischie, Chris Helzer and Todd Erickson who presented a terrific webinar and Marcello Devitis who collected the questions, provided answers and posted everything online.

***

SER is delighted to announce that at our March 2017 Board meeting, current SER Board Treasurer Jim Hallett was nominated and elected to serve as SER's new Chair Elect. In addition to serving as SER's Treasurer since late 2015, Jim chairs our Publications Committee, and he is a highly engaged member of our Science and Policy Committee. In the past 18 months, Jim has represented SER at international meetings in Ghana, China, Canada, Mexico, and Ethiopia. He is also quite active with the SER-Northwest Chapter. Jim is a research ecologist and Adjunct Professor of Biology at Eastern Washington University.

As background, SER follows a slightly unusual process whereby our Vice Chair position is a split position. A Chair Elect is nominated and elected by the Board of Directors based on specific qualifications. That person is seated as the Vice Chair/Chair Elect for the one year prior to becoming the Chair. The person then serves as Chair for two years. When their Chairmanship is over, they serve as Vice Chair/Past Chair for one year. And then the cycle begins again. In total, serving as Chair is a 4-year commitment, with 1 year as Vice Chair/Chair Elect, 2 years as Chair and then one year as Vice Chair/Past Chair.

Cara Nelson has been serving in the Vice Chair/Past Chair position, and she will be stepping down from that role in July when Jim steps up. Cara has been an incredible force on the SER Board and within the field of ecological restoration in general for more than 20 years. We cannot thank her enough for her amazing dedication to this issue and this work. We'll have a more proper send-off for her in the next issue of SERNews, so keep an eye out for that.

Speaking of Past Chairs, SER recently added a Past Leaders Page on our website to highlight the incredible work that so many of SER's past leaders have done both inside and outside of SER. Both as part of their work with SER and independently, our past leaders (and I'm sure our future leaders as well), are playing critical roles developing, advancing and improving the field of ecological restoration all around the globe. This new page on our website highlights their inspiring work!

We're also very pleased to welcome Nancy Shaw onto the Executive Committee as SER's new Treasurer once Jim becomes Vice Chair. Nancy is currently a Representative-at-Large to the SER Board. She is very active with the SER-Great Basin Chapter and she is also one of the founders of the International Network for Seed Based Restoration (INSR). She, too, has been traveling to many different meetings, in different parts of the world, to represent SER and INSR. Thanks for taking on this new responsibility, Nancy!

***

Last but by no means least: SER2017! This is SER's 7th biennial World Conference on Ecological Restoration and we're looking forward to meeting our members, as well as the members of our conference partners: the Brazilian Society for Ecological Restoration (SOBRE) and the Ibero-American & Caribbean Society for Ecological Restoration (SIACRE). The need to foster productive two-way communication is more important than ever as the world increasingly embraces the imperative of restoration. The conference will provide a dynamic and engaging platform for knowledge sharing among not only scientists and practitioners, but also the many other stakeholders involved with ecological restoration.

If you can't make it to the conference, we are going to encourage the attendees to tweet their conference experience. Just follow the hashtag #SER2017. If you don't have a Twitter account, don't worry! You can find SER's Twitter feed on our website. Follow along starting August 27th.

Best,

Marguerite Nutter
Member and Communications Director

Certification Updates!

SER's new Certified Ecological Restoration Practitioner (CERP) program was officially launched in January 2017!

The SER Board Executive Committee approved the nominated members of the CERP program committees. You can find more about these amazing volunteers on our website.

Additionally, some of those CERP program committees require members and chairpersons to be certified. For example, all members of the certification committee (the committee that reviews applications) must be certified through CERP. Members of those committees submitted their applications to the SER Board Executive Committee, which then approved our first 13 CERPs:

- Joe Berg
- Paul Davis
- Lynde Dodd
- Jennifer Ford
- Jennifer Franklin
- John Giordanengo

- Michael Hughes
- Mickey Marcus
- Carolina Murcia
- Chris Polatin
- David Polster
- Joshua Tallis
- Michael Toohill

SER accepted our first round of general applications for the CERP program from January-March 2017. In addition to the 13 committee member CERP applications, we received 77 applications: 61 applications for CERP and 16 applications for Certified Practitioner-in Training (CERPIT). Applicants represented our global restoration community from the United States, Canada, Australia, Chile, Colombia, and Denmark.

We are just now finalizing the review of those applicants and expect to announce our first group of CERPs in early June.

The next CERP application window will be open from July 17 through September 15, 2017. You can find out more about the certification program www.ser.org/page/certification.

SER Midwest Great Lakes 2017 Annual Meeting

Contributed by Stephen Glass, SER MWGL Chapter President

MWGL conference attendees at the poster pub session on Friday evening.

Over 180 restoration ecology students, practitioners, scholars, and contractors converged on Grand Rapids, MI, March 24-26 to attend the 9th Annual Meeting of the Midwest-Great Lakes Chapter of

the Society for Ecological Restoration, hosted by the Grand Valley State University Biology Department.

The theme of the meeting, Assembling the Restoration Community, addressed the ecological, social, and cultural aspects of ecological restoration through a series of workshops, symposia, two plenary sessions, and a keynote presentation. In addition, the meeting hosted 20 posters and over 40 contributed oral presentations.

A special feature of this year's conference was the attendance—for all three days of the meeting—of Bethanie Walder, Executive Director of SER.

Bethanie Walder, SER Executive Director (right), who attended the entire three-day conference, talking with an SER MWGL member during the poster pub on Friday evening.

The chapter held its annual business meeting on Saturday afternoon. The meeting began with an address to the group by Bethanie, who provided an update of SER activities. Next, Jen Lyndall, immediate past president of SER MWGL and current SER Certification Program Coordinator, explained the new program, its goals, and how it works. Jen encouraged people to apply for certification during the next application period.

Lauren Umek, awards committee chair, presented awards for the best student poster, best student oral presentation, and an award recognizing the student who traveled the greatest distance to attend the meeting. Dan Gibson (oral presentation), and Sean Wylie (poster), each received $100 and an Island Press book. Brad Gordon received $50 for furthest distance traveled.

The meeting concluded in traditional fashion on Sunday, March 26, with a selection of three off-site

field trips to ecological restoration sites in western Michigan. These included: Lake Michigan Coastal Wetlands and Dune Restoration; Ottawa County Parks Dune and Riparian Restoration; and West Michigan Oak Savannas: Protection, Restoration, and Research.

I attended the West Michigan Oak Savannas field trip, led by Justin Heslinga of the Land Conservancy of West Michigan; Jesse Lincoln of Michigan Natural Features Inventory; and Priscilla Nyamai, of Grand Valley State University. We visited two sites. First up was Huckleberry Hill, owned by Lowell Township. Huckleberry Hill is a "relatively intact and high-quality remnant that has responded readily to recent shrub and tree clearing." There, we learned from Jesse Lincoln about current and planned management activities that include removal of planted pines. The pines are being removed because, Jesse declared: "Planted pines are the tombstones of oak savannas."

Next stop in Lowell Township was the Bradford Dickinson White Nature Preserve, "a more severely-degraded remnant in the early stages of restoration." At this site, land manager Justin Heslinga, and researcher, Priscilla Nyamai have created a unique management partnership that aims "to identify plant community changes in response to thinning and burning." With this adaptive management approach, management concerns can create research opportunities and research findings can inform management in a relationship that benefits both parties. To get a sense of the project, you can view this short video featuring both Justin and Priscilla discussing how they are collaborating together, as a practitioner and scientist, to implement and assess this oak savanna restoration project.

SER Section Update: International Network for Seed-Based Restoration (INSR)

Contributed by Nancy Shaw, SER Board Member, Representative-At-Large and Director-At-Large of INSR

The entire INSR Board and many members will be attending the SER 2017 7th World Conference on Ecological Restoration in Iguassu Falls, Brazil from August 27 – September 1, 2017. INSR is hosting a full-day session "Seed-based Restoration: Innovations, Opportunities and Challenges" organized by Stephanie Frischie, Kingsley Dixon and Olga Kildisheva. The session will feature presentations by experts from seven countries who will discuss all aspects of seed-based restoration from seed sourcing to seed deployment. We are also beginning to organize a similar session with a dryland theme for a November 2017 symposium in Kuwait. The final NASSTEC (NAtive Seed Science, TEchnology & Conservation) conference is scheduled for September 25-29, 2017 at the Royal Botanic Gardens, Kew, UK.

Recent additions to the INSR website include a section on Native Seed Protocols, which can be found on the Resources tab. There you will find manuals, databases and tools on seed collection, cleaning, seed strategies and more. To facilitate communication and discussion among seed users, there is now an INSR Discussion Forum on the SER website that is open to members and non-members. Just follow this link to find instructions for contributing to the forum.

Please consider joining SER's INSR Section – it is free to all SER members. We also wish to encourage organizations involved in any aspect of seed-based restoration to consider partnering with INSR. Please visit the Partners page on the INSR website and scroll down to find the application form.

Native Seed Updates: Click on the links to read the full stories.

US Forest Service, Bend Seed Extractory: The Bend Seed Extractory (BSE), a facility of the US Forest Service, Pacific Northwest Region located in Bend, Oregon, USA, is dedicated to seed and only seed. They extract, process, test, package, and store seed for more than 3,000 different species and their seed lots vary from a few tablespoons to thousands of pounds. *Contributed by Kayla Herriman*

Seed Banking in New York City and Beyond: Over the last 25 years, New York City's Greenbelt Native Plant Center has produced more than 15 million plants for lands within the city. Along with the Mid-Atlantic Regional Seed Bank, they are providing seed for regional restoration projects. *Contributed by Clara Holmes and Ed Toth*

Collecting Hudsonia tomentosa in Long Island, New York.

Putting Research Results to Work: Are you interested in communicating your scientific results to the public or to policy-makers? Read more about it in "Taking a holistic approach to ecosystem restoration using native seeds," which discusses the importance of considering economic, ecological and social values when applying research results to the practice of ecological restoration. *Contributed by Holly Abbandonato*

Native Seed, Seedlings and Forests Restoration in Lebanon: Collaborations in Lebanon are working to ensure availability of genetically appropriate seed, high-quality seedling production and best practices for reforestation. Programs involve the public and private sectors, as well as international organizations.*Contributed by Karma Bouazz*

Section Update: Large-Scale Ecosystem Restoration Section (LERS)

SER met with the new leadership of LERs in May and we are very excited to have an incredibly dynamic group of people heading up the section. Since its inception in the fall of 2013, LERS has partnered with the National Conference on Ecosystem Restoration (NCER) to provide a forum for researchers, practitioners and more to share their experience on large-scale ecosystem restoration. The new board is hoping to work more closely with SER and expand its presence in other conferences.

To better serve its members, LERS fielded a 10-question survey in the 2nd quarter of the year to learn more about their membership's interests and concerns. While past president and self-described data nerd Matt Grabau hasn't tabulated all the results yet, early returns show members have a strong interest in on-the-ground restoration techniques, the evaluation of functioning ecosystems and ecosystem restoration. Not surprisingly, the biggest challenges are funding, monitoring and implementation.

LERS is looking forward to introducing itself to the attendees at SER2017 in Brazil. For those not able to attend the world conference, LERS will continue its partnership with NCER as co-chair of the 2018 conference in New Orleans and plans on developing a presence on Facebook and LinkedIn.

Upcoming Conferences & Events

SER2017 World Conference on Ecological Restoration

Linking Science and Practice for a Better World
August 27-September 1 – Iguassu Falls, Brazil

The 7th SER World Conference on Ecological Restoration will take place in Iguassu Falls, Brazil from August 27-September 1, 2017. The abstracts deadline is about to close, so get your abstract in as soon as possible! Our keynote speakers are finalized and will address a diversity of topics, including water resources and ocean issues, scaling up to meet international restoration commitments, innovative approaches to restoration, and more. Stay tuned to our Facebook page for short video interviews with several of our keynote speakers. We received excellent submissions for symposia, workshops and abstracts and the conference promises to have something for everyone working in ecological restoration. We also have nearly 20 field trips planned during the third day of the conference, when we will move from the lecture hall to the field. In addition, we have pre- and post- conference field trips and training sessions. If you haven't submitted yet, send in your abstract now! Registration should be open by the time you receive this issue of *SERNews*. August is an excellent time of the year to visit Brazil – we can't wait to see you there!

SER-MA Conference: Invasive Biology: Paths to Conservation & Restoration Success

August 1-2 - Juniata College, Huntingdon, Pennsylvania, USA

The Society for Ecological Restoration, Mid-Atlantic Chapter is partnering with the Mid-Atlantic Invasive Plant Council to host its 2017 conference, Invasive Biology: Paths to Conservation & Restoration Success. The keynote speaker is Dr. Douglas W. Tallamy, Professor of Entomology and Wildlife Ecology, University of Delaware; author of Bringing Nature Home and The Living Landscape. The call for abstracts closes Monday, June 12th.

TXSER Annual Conference

November 10-12 – University of North Texas, Denton, Texas, USA

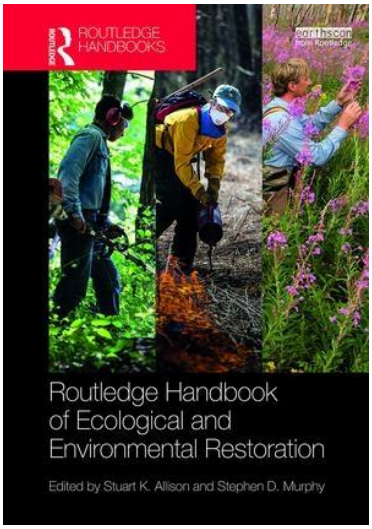
TXSER's 2017 Annual Conference is coming home to North Texas, where TXSER was originally founded. The conference will be held November 10-12 on the campus of the University of North Texas in Denton. Conference planning is underway and we will update you as plans evolve. Meanwhile, mark your calendars and plan on joining fellow TXSER members and friends in November in North Texas.

SERWC 2018: Restoration for Resilience

February 13-17, 2018 - Simon Fraser University, Burnaby, British Columbia, Canada

Hosted by Society for Ecological Restoration – Western Canada, in partnership with the joint Ecological Restoration program of British Columbia Institute of Technology and Simon Fraser University. Resilience is a hot and challenging topic in scientific and social aspects of restoration and reclamation, resource management, and community planning. We are excited about this learning, networking, and trade show event for researchers and students, resource industries, government regulators and managers, consulting practitioners, Indigenous peoples, and community-based organizations.

New Publication

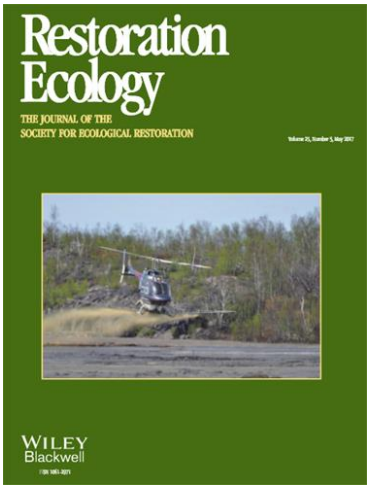


Routledge Handbook of Ecological and Environmental Restoration

Edited by Stuart Allison and Stephen D. Murphy

This newly published handbook – edited by Restoration Ecology Editor-in-Chief, Stephen Murphy, and SER Secretary, Stuart Allison – brings together an internationally respected group of experts to describe current practices and new directions in the field of restoration. The handbook consists of four parts, beginning with a background on environmental and ecological restoration. Part II moves into a systematic review of restoration in ecosystem types around the world. Part III offers a detailed examination of management and policy issues, while Part IV looks to the future of restoration. This handbook is an excellent resource on all of the components necessary to successfully practice good ecological restoration.

Restoration Ecology: Editor's Picks



The May 2017 issue of *Restoration Ecology* (Vol. 25, Issue 3) is available online. Featured below are some Editor's Picks courtesy of Editor-in-Chief and Managing Editor of *Restoration Ecology*, Stephen Murphy and Valter Amaral.

Remember, SER members can subscribe to Restoration Ecology for a special rate of just $85. You can purchase a subscription in our online store or subscribe when you renew your membership.

Variant restoration trajectories for wetland plant communities on a channelized floodplain

Louis A. Toth

The Setbacks and Surprises section in Restoration Ecology features articles that don't shy away from documenting the unexpected issues and results often encountered during restoration research, and how researchers adaptively adjust to these surprises. This Setbacks and Surprises paper by Louis Toth is a great example of what we can learn from the unexpected. The Kissimmee River restoration program was designed like many river restoration projects – it was assumed that if you dechannelize and restore the hydrology, the ecosystem will recover. That did not happen here. As Dr. Toth explains, the restoration was hindered due to "deep flood pulse disturbances, establishment of invasive wetland grasses, and mineralized soil characteristics of the drained floodplain."

Low-cost grass restoration using erosion barriers in a degraded African rangeland

David W. Kimiti, Corinna Riginos, Jayne Belnap

Many rangelands in sub-Saharan Africa are degraded, which jeopardizes the well-being and food security of associated human populations, as well as the regions' unique wildlife and biodiversity. Restoring marsh and shrub vegetation is thought to be instrumental to reverse ecological degradation, and the socio-economic constraints of the region require cost-effective tools and strategies. This study tests several low-cost erosion barriers in Kenya, and shows encouraging results: the authors observed that high (> 60%) rates of vegetation recovery are possible - especially if barriers are placed adjacent to pre-existing vegetation remnants - in as little as 3 years after deployment.

Optimizing seed mixture diversity and seeding rates for grassland restoration

Stephanie Barr, Jayne L. Jonas, Mark W. Paschke

Revegetation by seeding often follows generalized guidelines on seeding rates and seed mix diversity, which often lack supporting research. This study presents a novel approach to determine the optimal combination of seed mix diversity and seeding rate for restoration of grasslands. The researchers used disturbed semiarid grassland sites in Colorado, US to test their approach. Typical

measurements of restoration success for semiarid grasslands (the approach allows for adjustment of evaluation variables) were evaluated: biomass and diversity of seeded, volunteer native, noxious, and non-native species, and the density of seeded species. Overall, this study demonstrated that increasing seed mix diversity and seeding rates above current common practices resulted in greater restoration success at their sites.