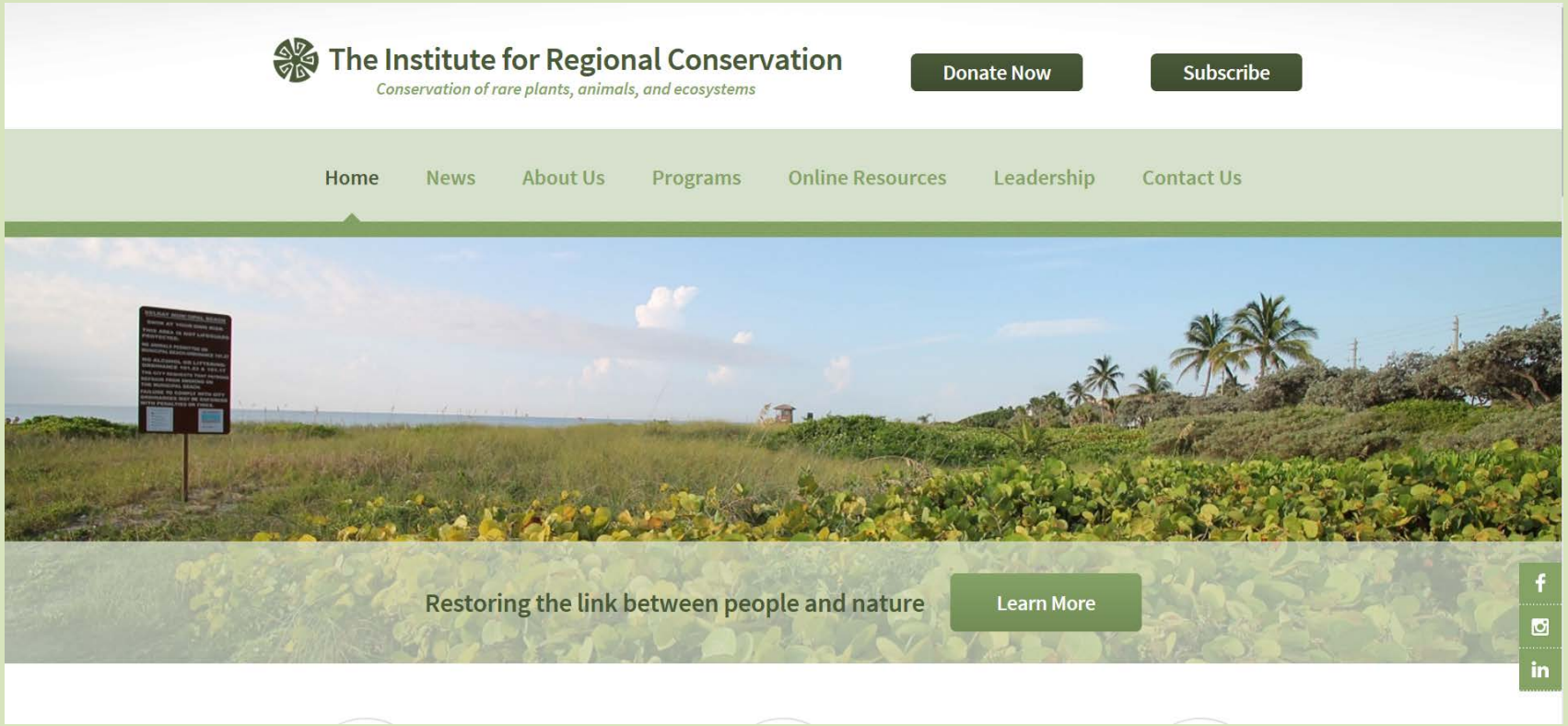
The Promise (and some perils) of Ecological Restoration

Florida Native Plant Society
May 18, 2018

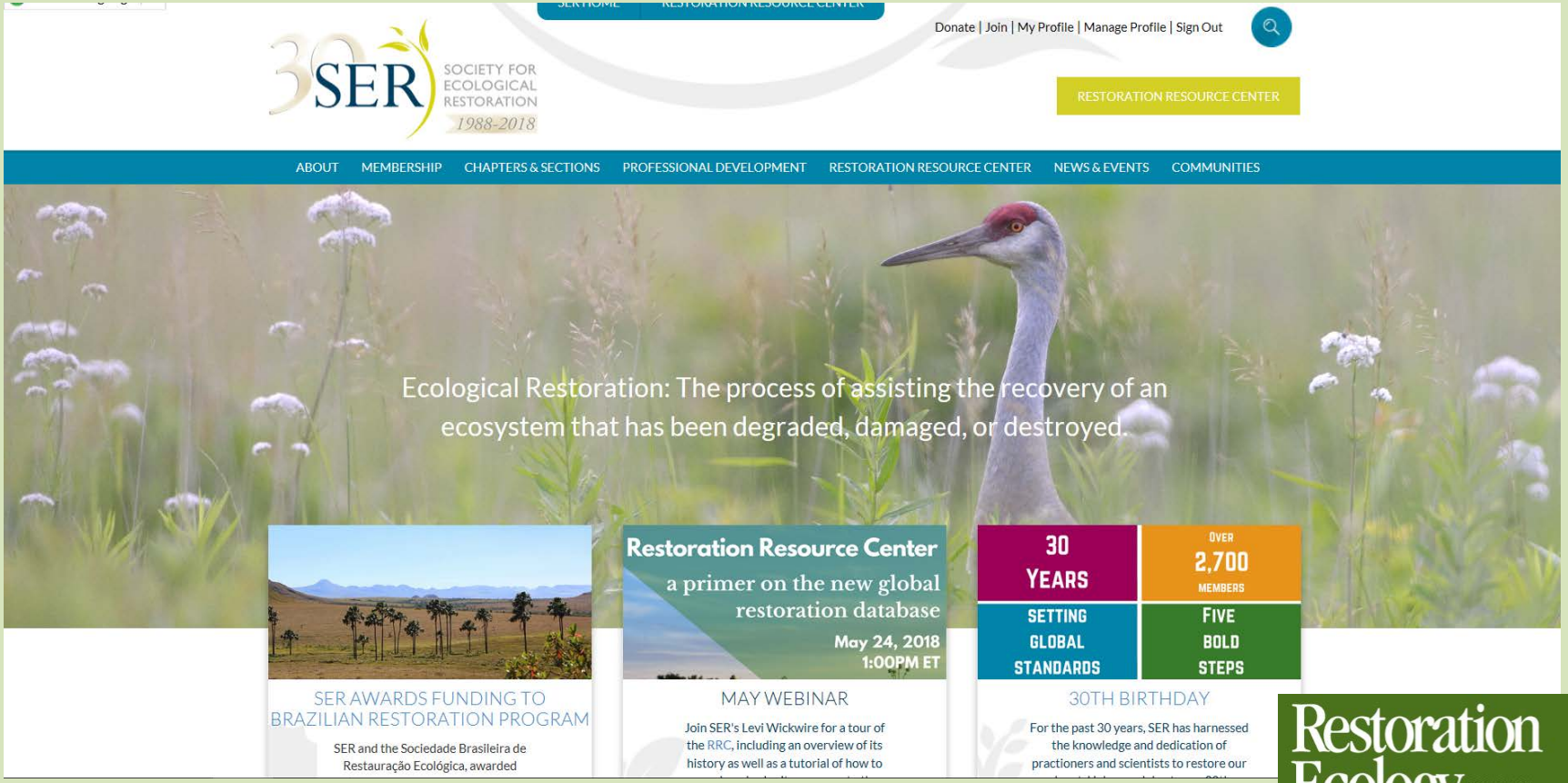
SER SOCIETY FOR ECOLOGICAL RESTORATION

George D. Gann
www.regionalconservation.org
www.ser.org

Introduction

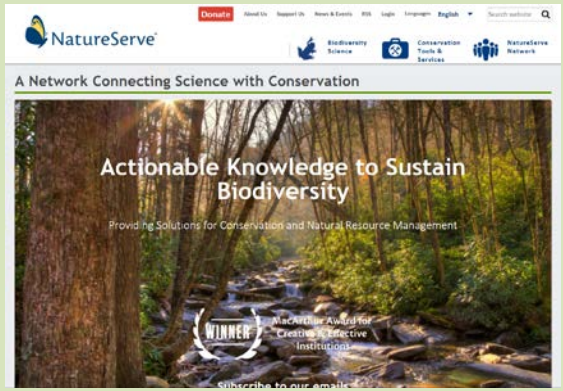


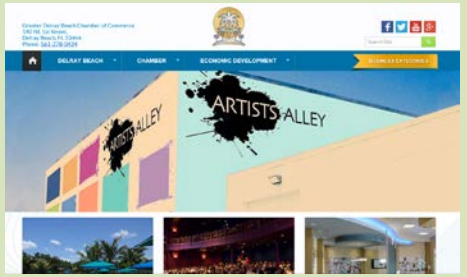
Rather than focusing on charismatic animals or plants with narrow global ranges, IRC seeks to protect, restore and manage all biodiversity on a regional basis, and to **prevent regional extinctions of rare plants, animals and ecosystems**. All conservation is ultimately local.



SER advances the science, practice and policy of ecological restoration to sustain biodiversity, improve resilience in a changing climate, and **re-establish an ecologically healthy relationship between nature and culture**. All conservation is also global.

Collaborate, Collaborate, Collaborate!





My Objective is to accomplish just 3 things

- **Explore** what is happening around the world with global restoration initiatives and current thinking about ecological restoration.

- **Review** what we know about degradation and restoration in Florida and bring the conversation back to the conference theme: **Renewal.**

- Have a **conversation** and share ideas today and morning forward.

Page 4, Spring 1987, PALMETTO

Restoration: a Global Perspective

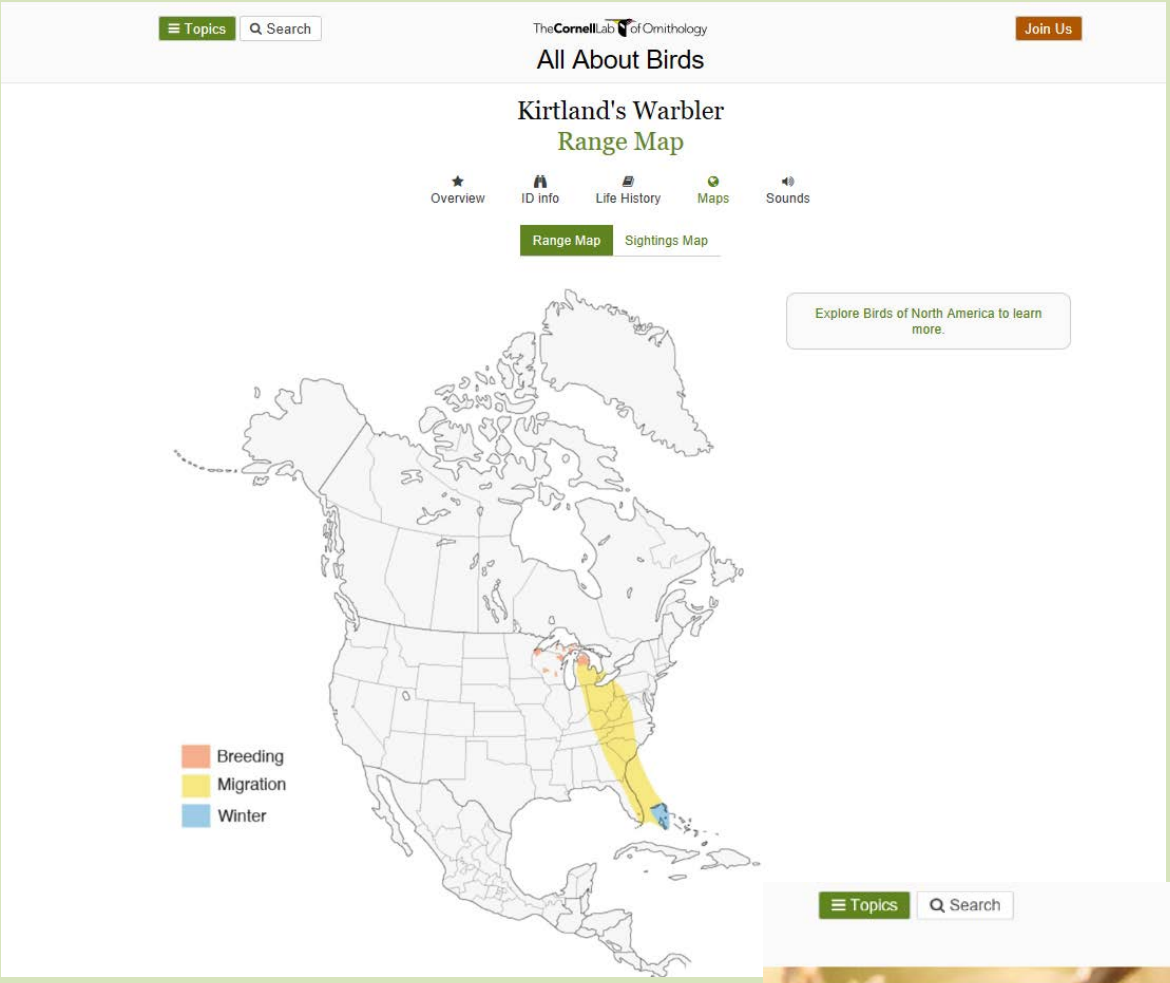
31 Years Ago

"Particularly hazardous to Florida is the potential for a **global climate change** related to tropical deforestation and the excess burning of fossil fuels. A slight **rise in sea level** could destroy many of our native plant communities…"

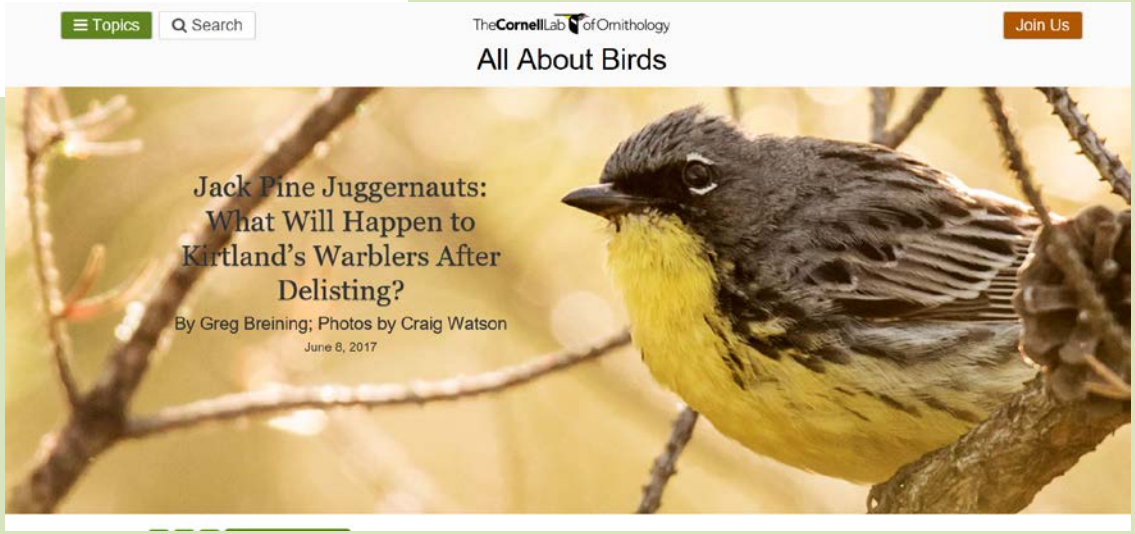
"In the United States, and particularly in Florida, preservation has been the basis of the native plant movement. More recently, **restoration** as a conservation alternative has received some attention, although it is certainly not accepted by all."

"By concentrating on **sustainable development**, rather than preservation, as a goal international conservation movements seem to be moving ahead in terms of meeting the environmental needs of the future."

George 1985

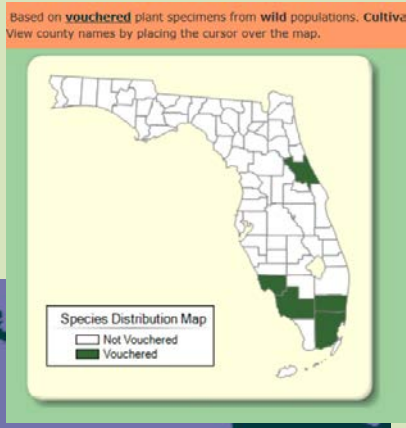


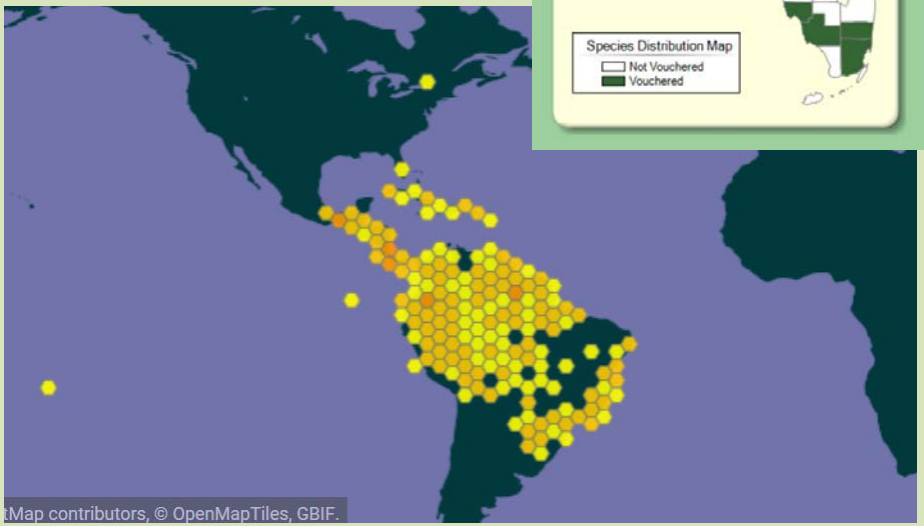
International species require international protection and management



Asplenium serratum L.

Bird's-nest fern, wild birdnest fern





Iguassu Falls, Brazil

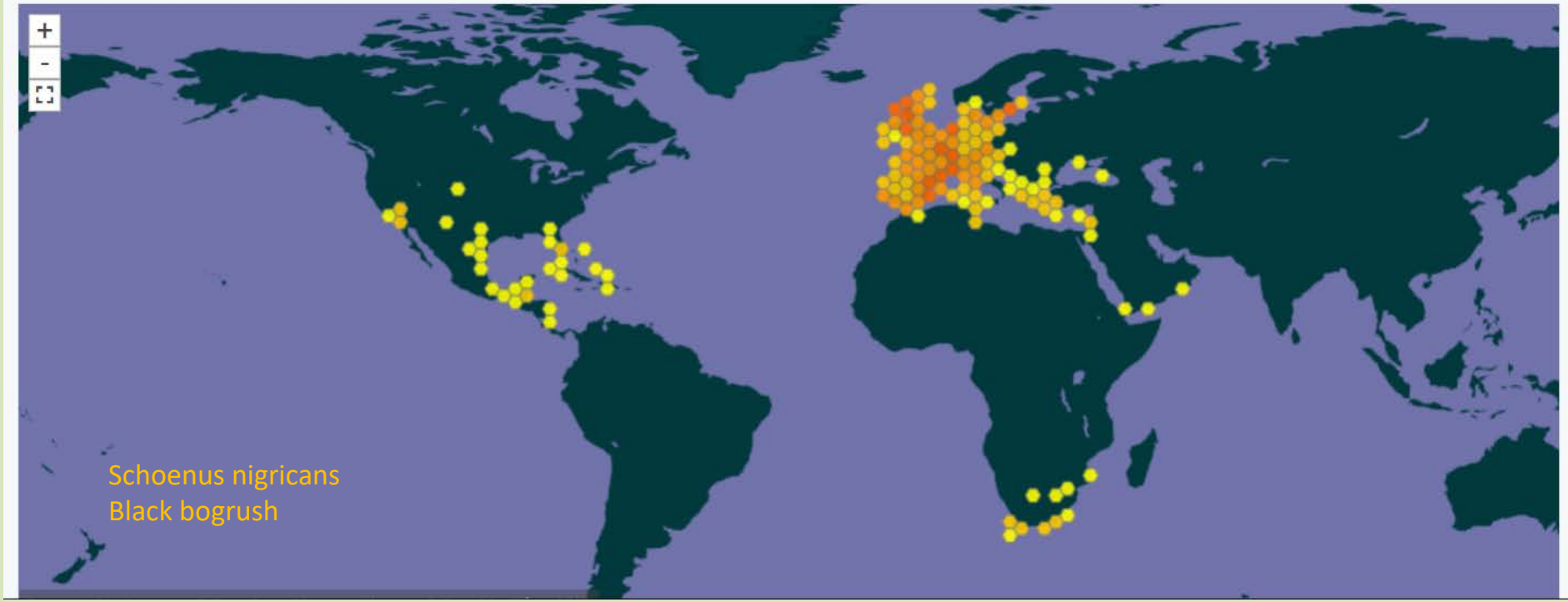
Fakahatchee Strand, Florida

1,311 OCCURRENCE RECORDS WITH IMAGES



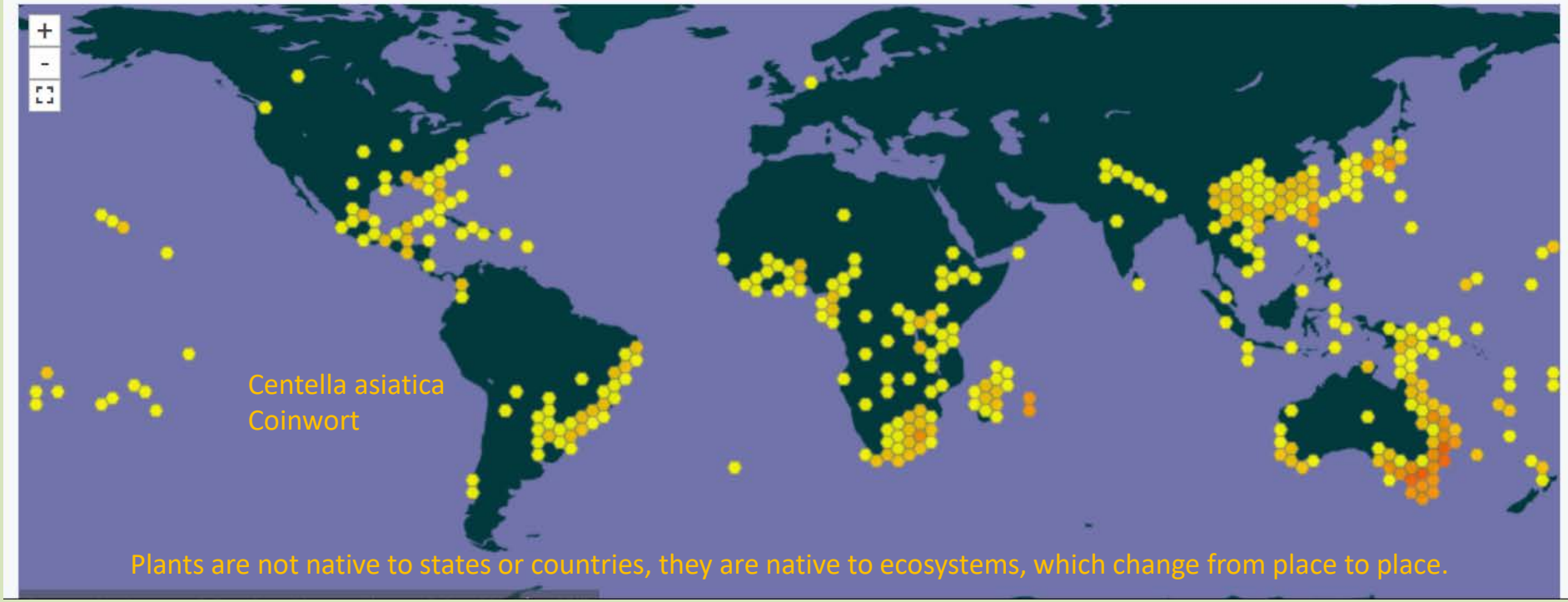



22,294 GEOREFERENCED RECORDS



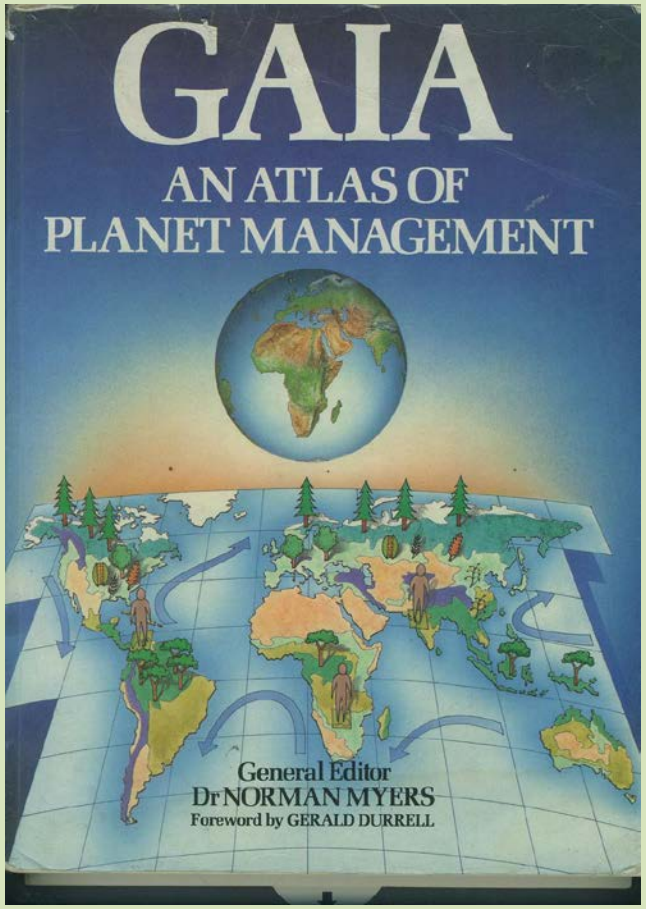
1,300 OCCURRENCE RECORDS WITH IMAGES

9,348 GEOREFERENCED RECORDS

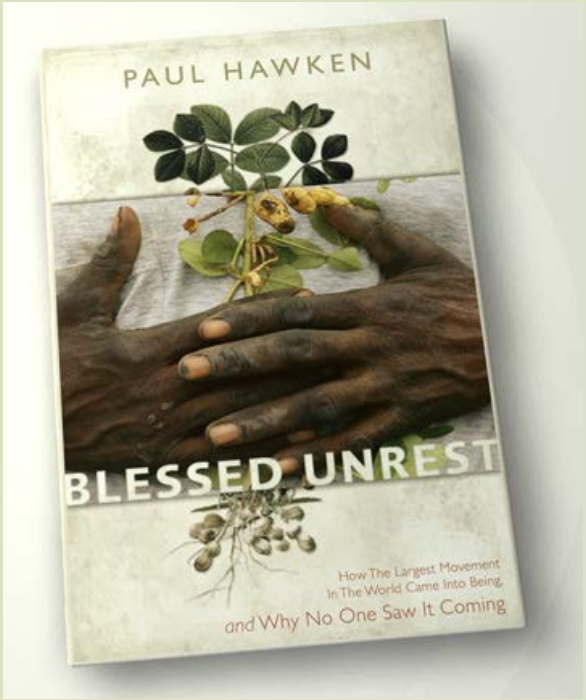


Plants are not native to states or countries, they are native to ecosystems, which change from place to place.

Ecological Restoration and Repair Around the World



In 1984 **Norman Myers** estimated that there were 12,130 international non-profit groups (INGOS) worldwide, mostly dealing with environmental and social issues.



Paul Hawken 2007: estimated that there were more than 1,000,000 non-profit groups and community organizations dedicated to the “environmental and social justice movement”.

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Restoration Resource Center

NEW POLICY BRIEF

The potential of natural regeneration as a cost-effective, nature-based tool for restoration is often overlooked. This information brief outlines specific recommendations for policy changes to make natural regeneration an

SER INT'L STANDARDS

SER's International Standards for the Practice of Ecological Restoration provide a framework for guiding the development and implementation of ecological restoration projects in any ecosystem, anywhere in the world.

FEATURED ARTICLE

From the March issue of SER's peer-reviewed journal, Restoration Ecology.
Much of the practice of restoration is conducted by businesses—contractors, consultants,

Projects

BRAZIL: RESTORATION OF THE ATLANTIC FOREST (MATA ATLÂNTICA)

Instituto Terra is a non-profit organization founded in 1999 by Lélia Deluiz Wanick Salgado and the renowned photographer Sebastião Ribeiro Salgado. It is located at the Bulcão Farm in Aimorés, Minas Gerais, and it covers an...

Read more

INDIA: MANGROVE RESTORATION IN PALK BAY, TAMIL NADU

The MANGREEN project intends to be a model for the community-based ecological restoration of mangroves through the application of scientific knowledge along with socio-economic development. In September 2005, the project was...

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AUSTRALIA: RETURNING THE BOTANICAL RICHNESS OF THE JARRAH FOREST IN RESTORED BAUXITE MINES IN WESTERN AUSTRALIA

Alcoa World Alumina Australia operates two bauxite mines at Willowdale and Huntly in the Darling Range of southwestern Australia, 80 - 140 kilometers south of Perth. The mine pits range in size from one hectare to tens of...

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ERA
ecological restoration alliance of botanic gardens

Ecological Restoration Alliance
of Botanic Gardens

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Projects and sites

New York Botanical Garden, The

The Thain Family Forest Program

The Thain Family Forest is a 20 ha old growth, urban forest in the heart of the New York Botanical Garden and is the largest remnant of forest that once covered much of New York City. In 2008, the garden created a comprehensive program of research, education, and ecological restoration.

Read more

Morton Arboretum, The

Maintenance and restoration of natural areas and woodland habitats in Northern Illinois

The Morton Arboretum is the site of numerous restoration projects. This includes the restoration of a 40 hectare tallgrass prairie and savanna and 280 hectares of oak woodland.

Read more

Botanic Garden Meise

Rescuing critically endangered species in Belgium

Botanic Garden Meise is restoring semi-natural grassland habitats in Southern Belgium.

Read more

Chicago Botanic Garden

Restoring McDonald Woods

Chicago Botanic Garden is restoring a remnant oak woodland within the grounds of the garden.

Read more

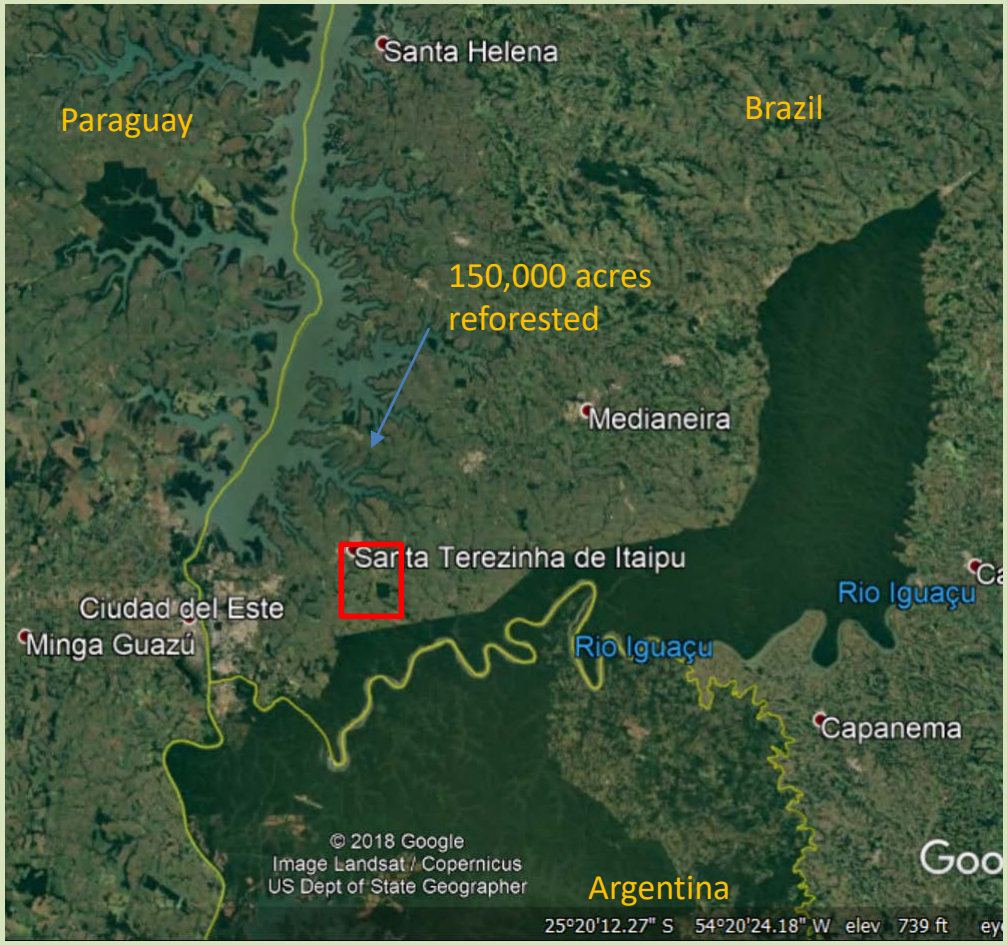
Jardín Botánico Francisco Javier Clavijero

Cloud Forest Restoration Project in Xalapa, Veracruz, Mexico

Native plant garden & nursery of
J. Carlos Trejo-Torres, Merida, Mexico

Santa Maria Ecological Corridor, Parana, Brazil

Headwaters of Itaipu Hydroelectric Dam (14 GW)



INTERNATIONAL NETWORK FOR SEED-BASED RESTORATION

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December 29, 2017

GRASSLAND RESTORATION IN THE WHITE CARPATHIAN MOUNTAINS

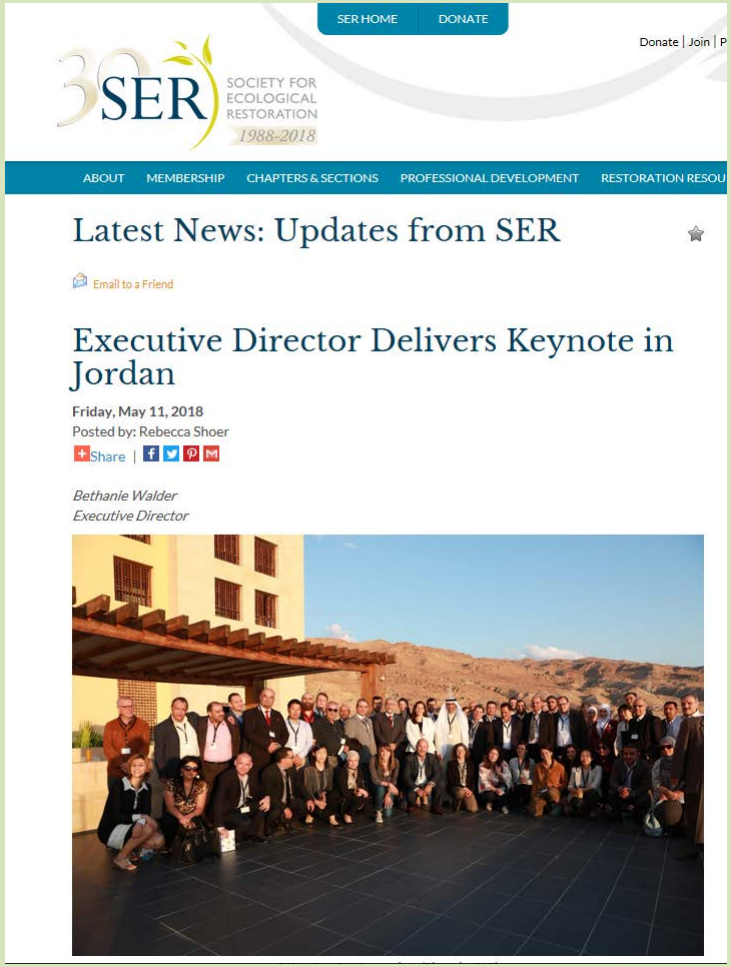
Restoration of Semi-natural (cultural) ecosystems

Fig. 2. Grassland restored with a regional seed mixture in the bufferzone of Certoryje National Nature Reserve. (I. Jongepierová)

Fig. 3. Brush harvesting. (I. Jongepierová)

Rewilding is based on the reintroduction of grazing animals such as **wisent** (European bison), **European elk** (known in America as moose), **tarpan** (the original wild horse), **aurochs** (the original wild ox), **European beaver** and the omnivorous **wild boar**, together with **red deer** and **roe deer**, including modern analogs of now extinct species.

The Middle East and North Africa



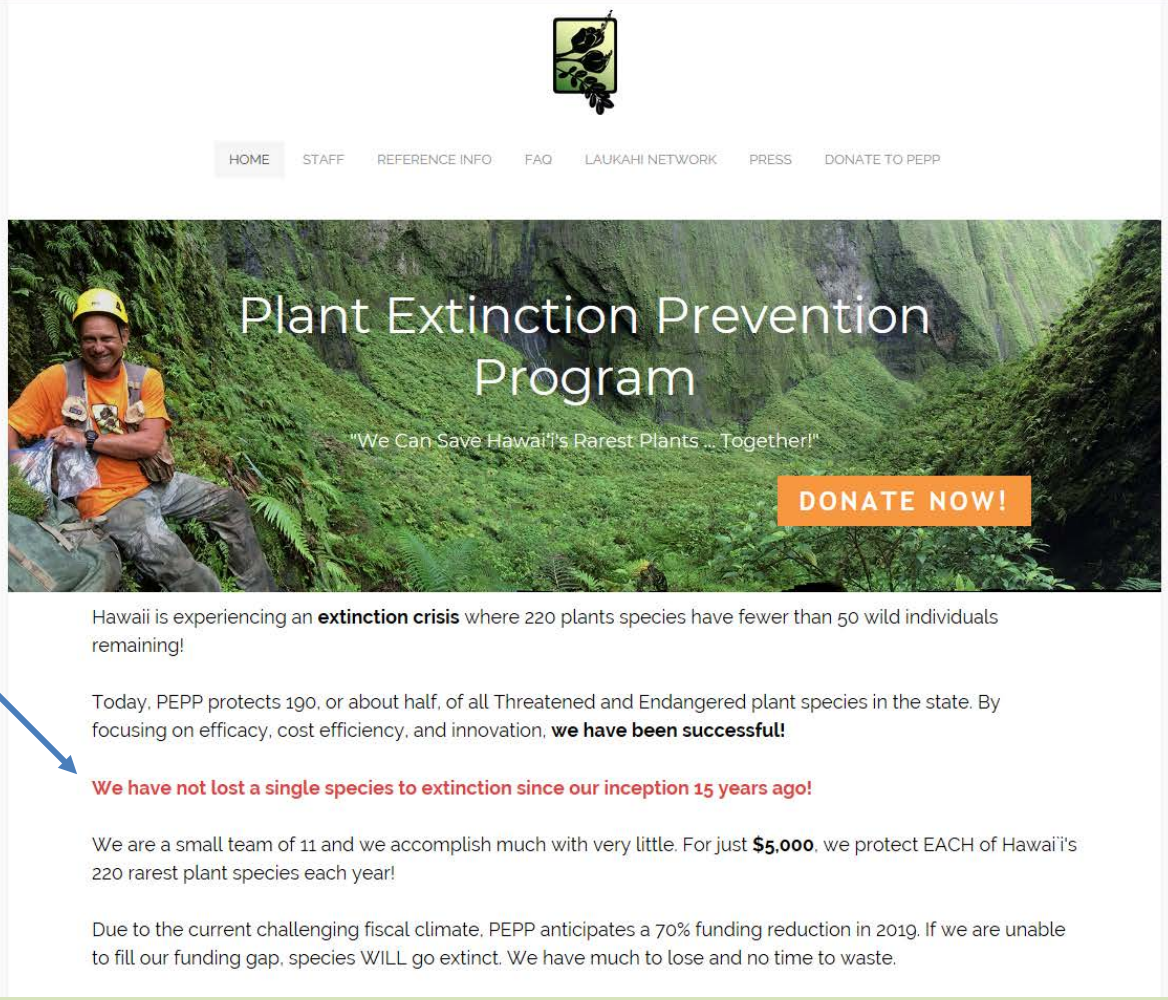
Native plant nursery at SEED project.

Ecosystem Services Partnership's first Middle East & North Africa (MENA) regional meeting in Dead Sea, Jordan

Dr. Sabah Saifan (left) explains the structure of a native seed and how that structure helps it succeed in nature during a visit to a community restoration project in Irbid province. A local family is funding this restoration project to help improve environmental conditions for the community.

Focus on crop wild relatives, community engagement and women, delivery of ecosystems services.

Using termites to restore soils leading to larger restoration gains



Hawaii

Focusing on protecting and restoring species with fewer than 50 remaining individuals

Korean Peninsula

Previous reunification efforts in Korean Peninsula and WTO restrictions led to **wetland mitigation and restoration** efforts in South Korea

EcoWatch

Artist's rendition of the Beijing New Airport Terminal building. *Methanoia via Zaha Hadid Architects*

What Does China's 'Ecological Civilization' Mean for Humanity's Future?

The China Factor

2015

ARTICLE

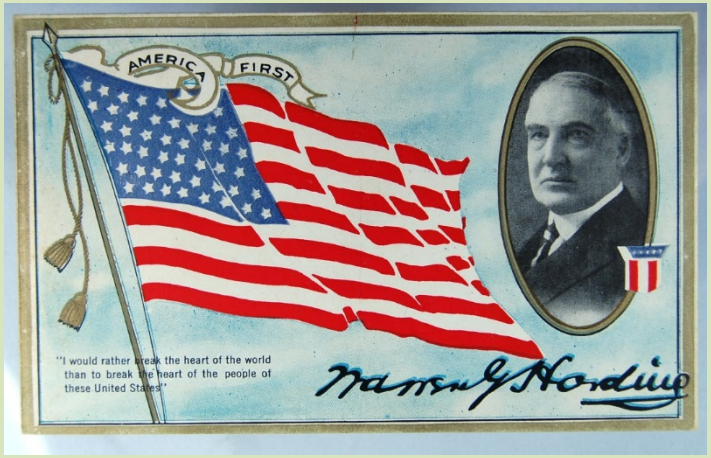
Received 29 Jan 2016 | Accepted 26 Jul 2016 | Published 6 Sep 2016

DOI: 10.1038/ncomms12717 OPEN

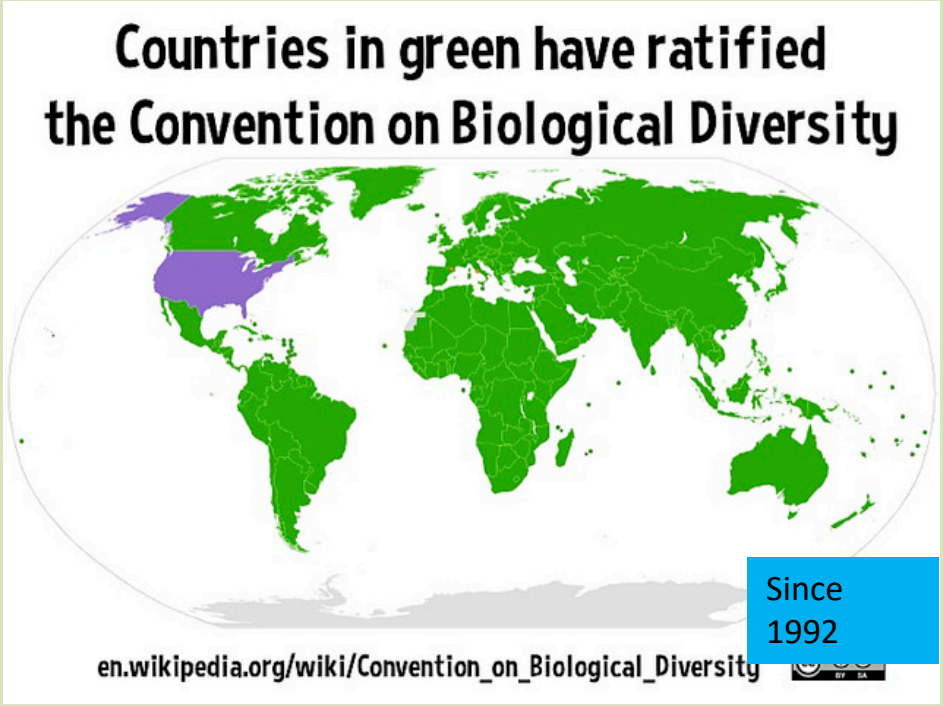
Opportunities for biodiversity gains under the world's largest reforestation programme

Fangyuan Hua[1], Xiaoyang Wang[2,3], Xinlei Zheng[4], Brendan Fisher[5], Lin Wang[2], Jianguo Zhu[2], Ya Tang[4], Douglas W. Yu[2,6] & David S. Wilcove[1,7]

Global “Restoration” Policy and Initiatives



Warren Harding 1921-1923

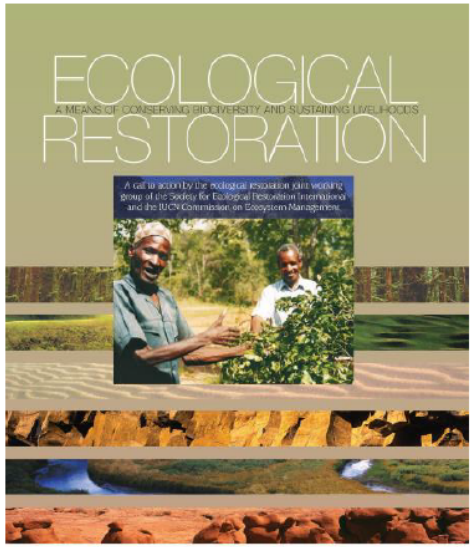


American nationalism and isolationism is not new

Ecological Restoration – a means of conserving biodiversity and sustaining livelihoods

A call to action by the ecological restoration joint working group of SER International and the IUCN Commission on Ecosystem Management

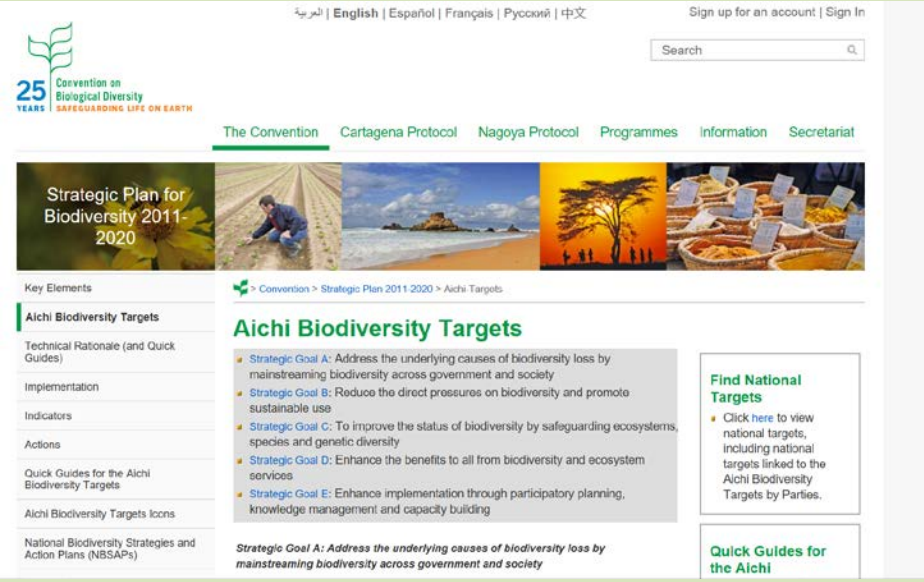
George D. Gann & David Lamb, editors



Introduction

Many of the world's ecosystems have undergone significant degradation with negative impacts on biological diversity and peoples' livelihoods. There is now a growing realisation that we will not be able to conserve the earth's biological diversity through the protection of critical areas alone. This paper explains what is meant by the term "ecological restoration" and outlines how it can provide enhanced biodiversity outcomes as well as improve human well-being in degraded landscapes. In this way ecological restoration becomes a fundamental element of ecosystem management, although until recently, its potential has not always been fully

2006



New Convention on Biological Diversity Aichi Targets Adopted October, 2010

Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services

Target 14
By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

Target 15
By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

Convention on Biological Diversity

Distr.
GENERAL

CBD/COP/DEC/XIII/5
10 December 2016

ORIGINAL: ENGLISH

CONFERENCE OF THE PARTIES TO THE
CONVENTION ON BIOLOGICAL DIVERSITY
Thirteenth meeting
Cancun, Mexico, 4-17 December 2016
Agenda item 10

DECISION ADOPTED BY THE CONFERENCE OF THE PARTIES TO THE CONVENTION ON BIOLOGICAL DIVERSITY

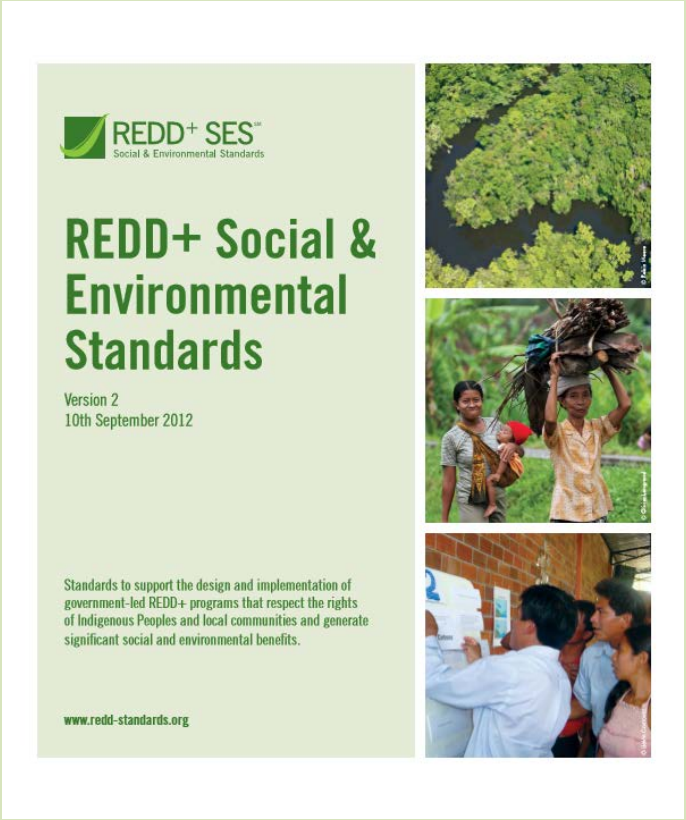
XIII/5. Ecosystem restoration: short-term action plan

The Conference of the Parties,

Recalling Article 8(f) and decisions XI/16 and XII/19,

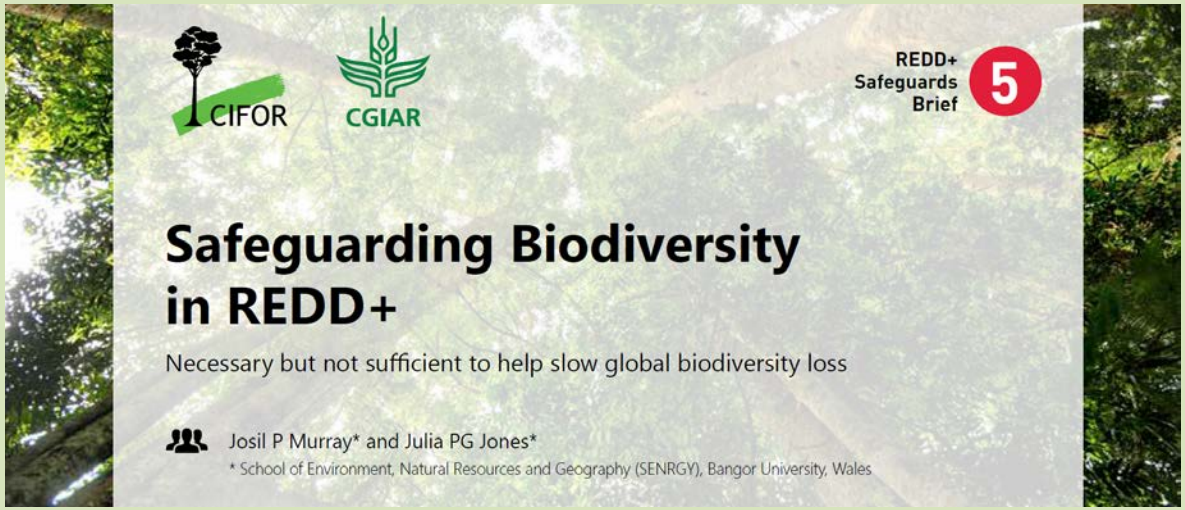
Aware that Parties have identified ecosystem restoration needs in their national biodiversity strategies and action plans and in other national, regional and global strategies and/or plans, and that a number of ecosystem restoration activities are under way with support from various organizations and Governments, and *noting* that many degraded ecosystems are still in need of restoration,

REDD = reduce emissions from deforestation and forest degradation. At the Climate Change Conference in Cancun, Mexico in November/December 2010, UNFCCC COP 16 formally included REDD+ into the international climate regime.



REDD includes activities that **reduce emissions** from deforestation and forest degradation. REDD+ **contributes to conservation** and the **sustainable management** of forests and **enhancement of forest carbon stocks.** Both have the potential to deliver significant social and environmental benefits, but many have also highlighted **serious risks for Indigenous Peoples, local communities, and biodiversity**.

In reality, the restoration component has lagged behind, in part because the demand in the carbon markets is not strong enough.



BONN CHALLENGE

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2011

The Challenge

A global effort

The Bonn Challenge is a global effort to bring 150 million hectares of the world's deforested and degraded land into restoration by 2020, and 350 million hectares by 2030.

It was launched in 2011 by the Government of Germany and IUCN, and later endorsed and extended by the New York Declaration on Forests at the 2014 UN Climate Summit.

Underlying the Bonn Challenge is the forest landscape restoration (FLR) approach, which aims to restore ecological integrity at the same time as improving human well-being through multifunctional landscapes.

The restoration of 150 million hectares of degraded and deforested lands in biomes around the world – in line with the FLR approach – will create approximately USD 84 billion per year in net benefits that could bring direct additional income opportunities for rural communities. About 90 per cent of this value is potentially tradable, meaning that it encompasses market-related benefits. Achieving the 350 million hectare goal will generate about USD170 billion per year in net benefits from watershed protection, improved crop yields and forest products, and could sequester up to 1.7 gigatonnes of carbon dioxide equivalent annually.

The history of the Challenge

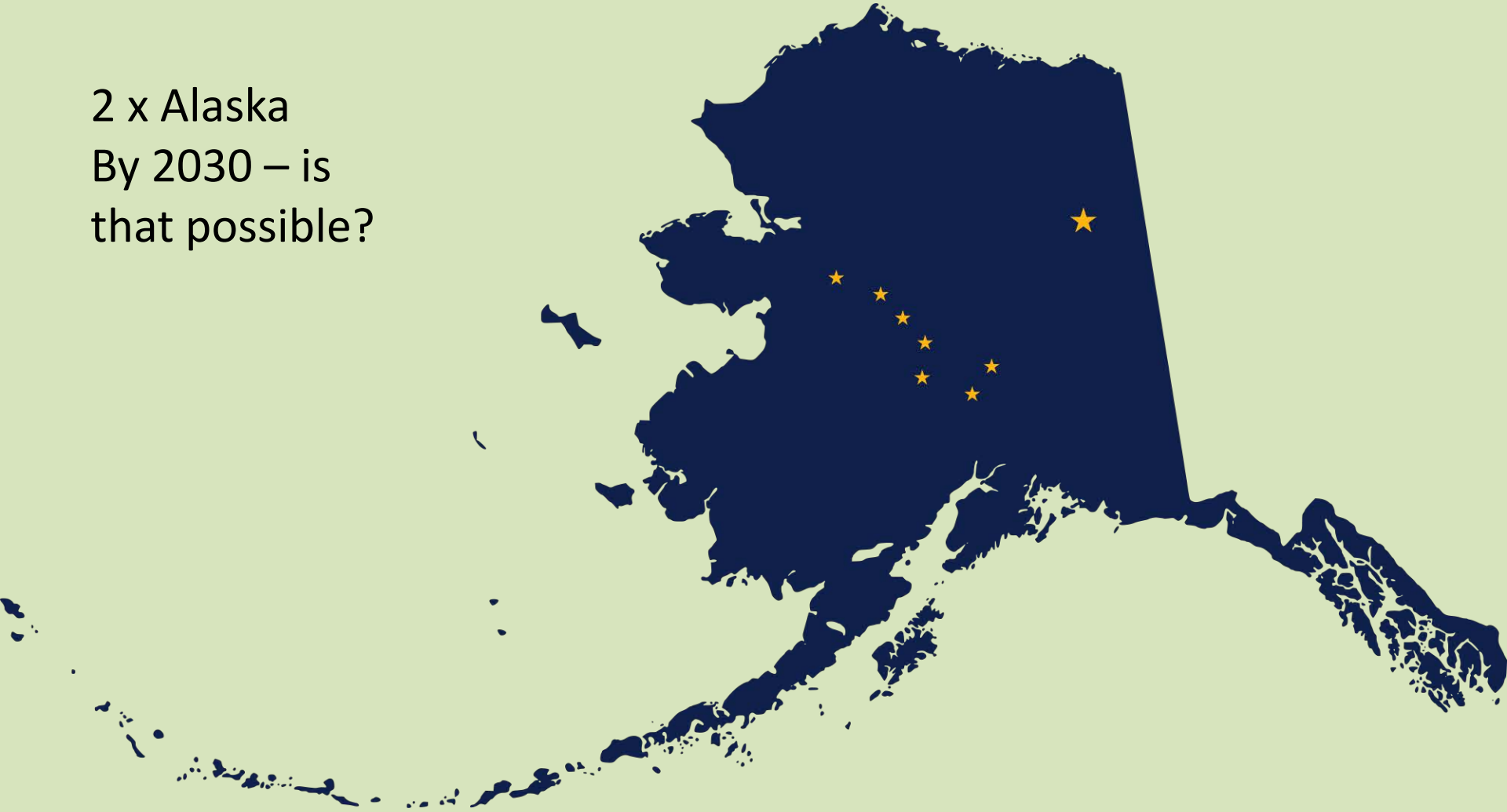
The GPFLR

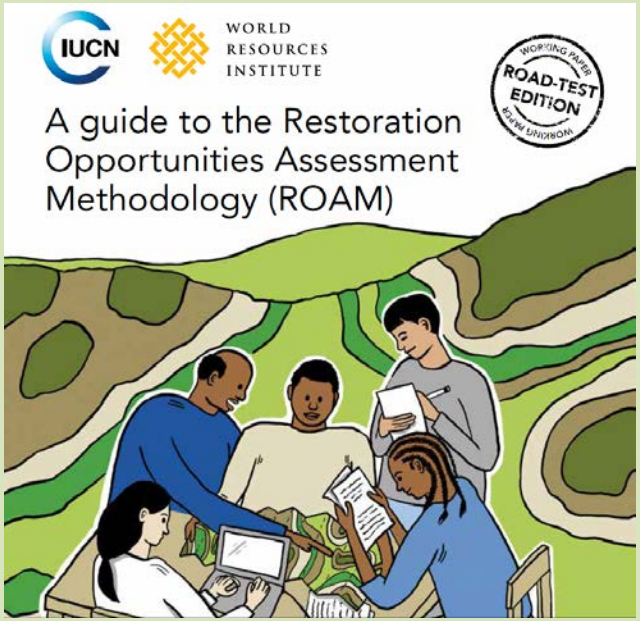
Champions and initiatives

Learning programs on restoration

370 million acres by 2020
865 million acres by 2030

2 x Alaska
By 2030 – is
that possible?





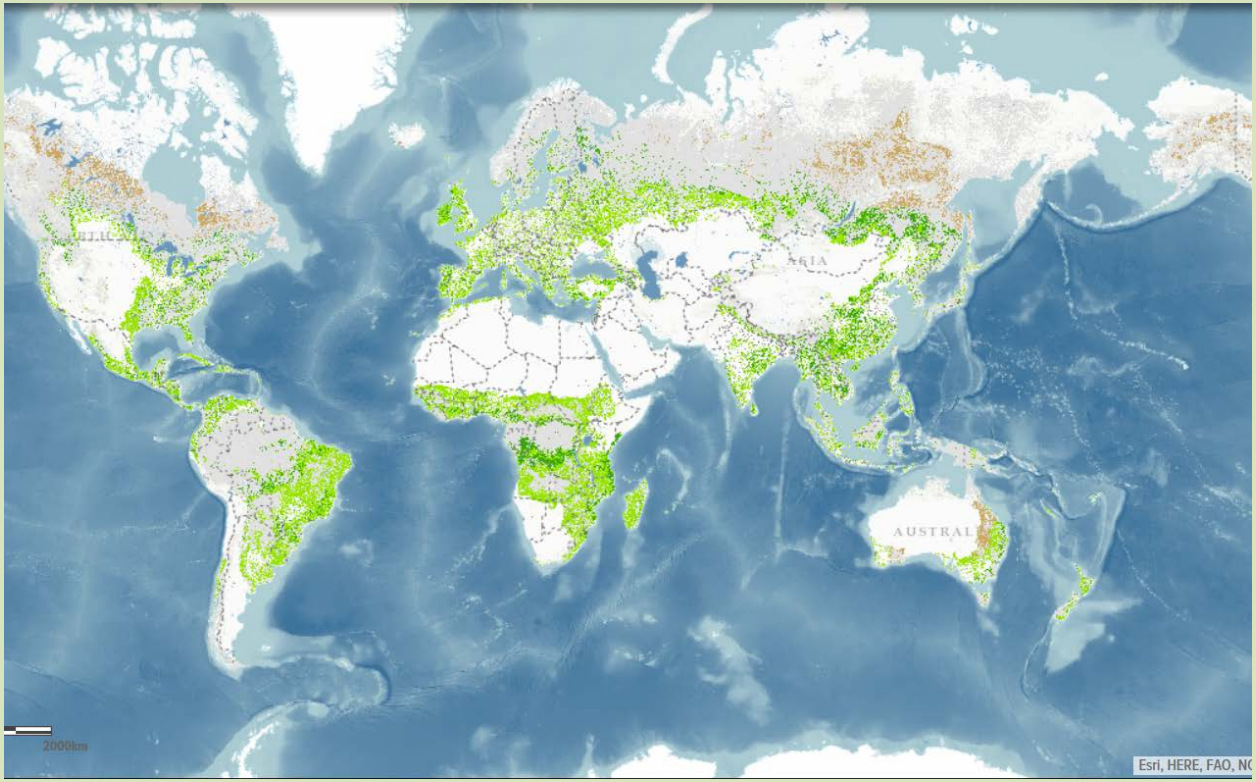


Image: Wikipedia

September 2015

United Nations Convention to Combat Desertification

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New land degradation neutrality goal to accelerate global restoration efforts

2015-2030

By Dennis Garrity in Blog on November 30, 2015

The global community has set forth a new goal to tackle the scourge of land degradation and desertification. It could be real breakthrough.

The United Nations Convention to Combat Desertification (UNCCD) had a 'breakthrough moment' after two weeks of discussions and negotiations in Ankara, Turkey in October. The 195 parties to the Convention agreed to a global deal that set a new environmental target: Achieving "land degradation neutrality" by 2030, and thus maintaining the world's stock of healthy, productive land at a stable level.

Currently, 12 million hectares of land is being degraded annually via deforestation and forest degradation, the degradation and loss of agricultural land, and rampant infrastructural development. But the new deal at Ankara commits the UN's members, albeit on a voluntary basis, to restore or rehabilitate at least that much land area every year, which at least will keep things from getting worse. If that goal can be achieved by 2030, then the global community can look toward an even more ambitious target to gradually enable a major net increase in healthy land in future decades.

RECENT POSTS

Frontiers in alley cropping: Transformative solutions for temperate agriculture

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Bonn Challenge delegates: Commit globally, act locally on landscape restoration

Sustainable development goals progress

New report approved in March, due out June, 2018

Options for Land Restoration

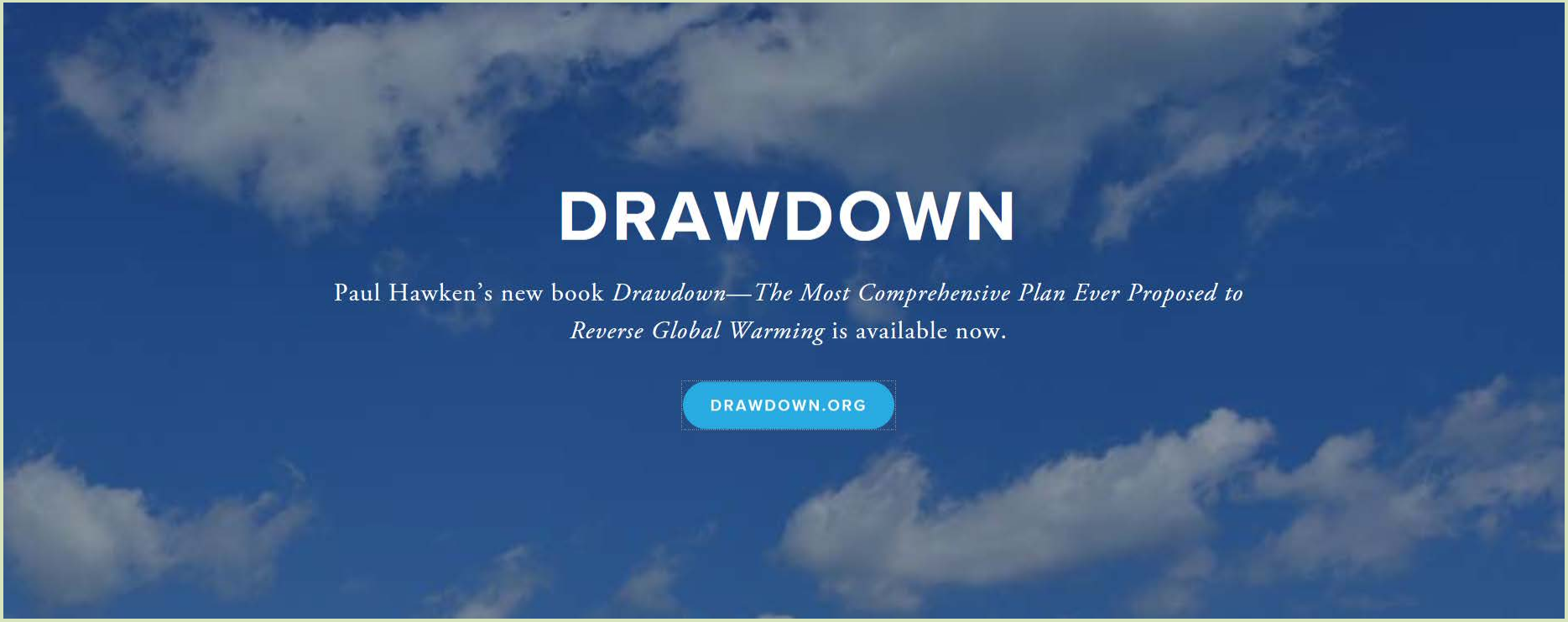
- The report notes that successful **examples of land restoration are found in every ecosystem**, and that many well-tested practices and techniques, both traditional and modern, can avoid or reverse degradation.
- In **croplands**, for instance, some of these include reducing soil loss and improving soil health, the use of salt tolerant crops, conservation agriculture and integrated crop, livestock and forestry systems.
- In **rangelands** with traditional grazing, maintenance of appropriate fire regimes, and the reinstatement or development of local livestock management practices and institutions have proven effective.
- Successful responses in **wetlands** have included control over pollution sources, managing the wetlands as part of the landscape, and reflooding wetlands damaged by draining.
- In **urban areas**, urban spatial planning, **replanting with native species**, the development of **'green infrastructure'** such as parks and riverways, remediation of contaminated and sealed soils (e.g. under asphalt), wastewater treatment and river channel restoration are identified as

"There has never been a better time to **invest in land restoration**."

"Restoring degraded land has the potential to become **big business**."

"Some entrepreneurs are betting that a **huge new business opportunity** for natural carbon capture and sequestration will emerge as more governments charge a fee for emissions that drive climate change."

Something Good or Business as Usual in Different Packaging?



Paul Hawken is Back (2017)

DRAWDOWN

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ELECTRICITY GENERATION

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Rooftop solar is spreading as its cost falls, driven by incentives to accelerate growth, economies of scale in manufacturing, and advances in photovoltaic technology.

RANKING BY 2050 #10

WOMEN AND GIRLS

EDUCATING GIRLS

Education lays a foundation for vibrant lives for girls and women, their families, and their communities. It also avoids emissions by curbing population growth.

RANKING BY 2050 #6

LAND USE

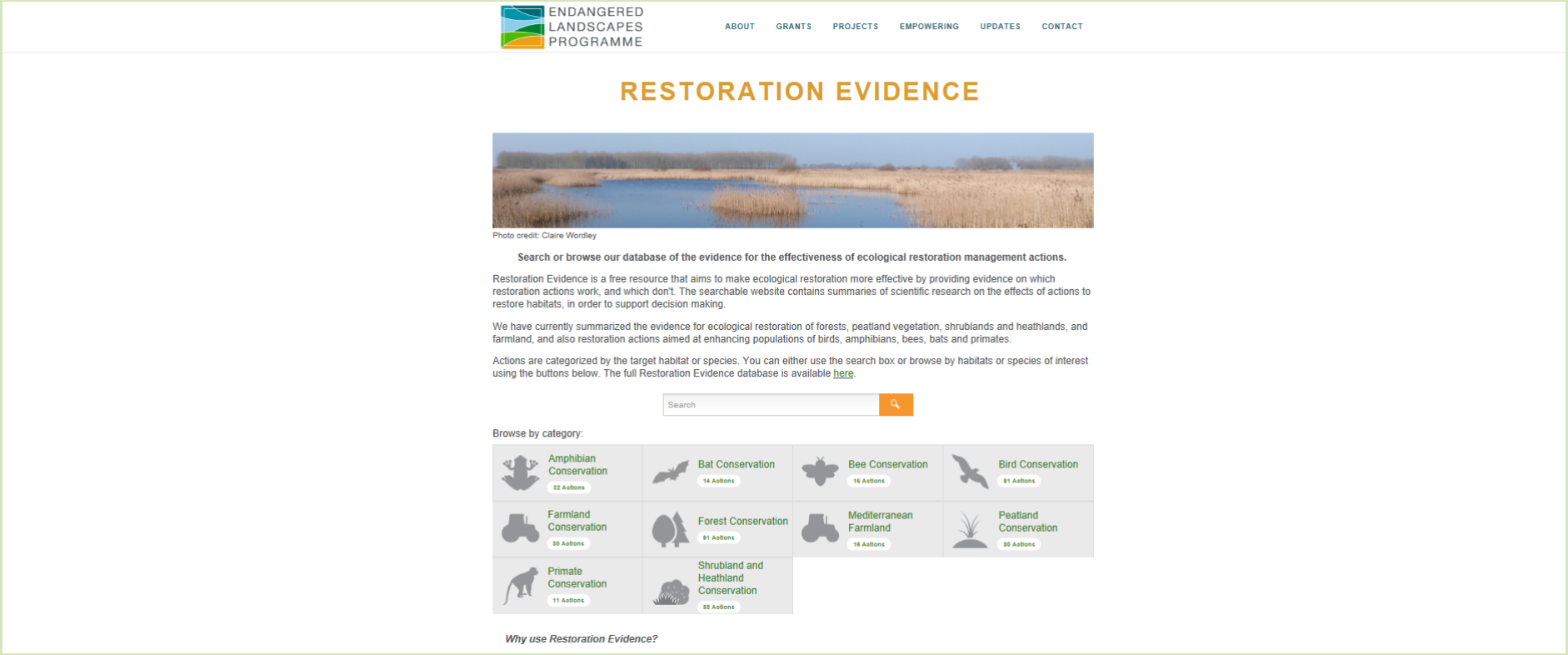
AFFORESTATION

Afforestation—creating forests where there were none before—creates a carbon sink, drawing in and holding on to carbon and distributing it into the soil.

RANKING BY 2050 #15

BROWSE ALL SOLUTIONS

Great ideas! But afforestation can be a problem.



And more are coming out of the woodwork…

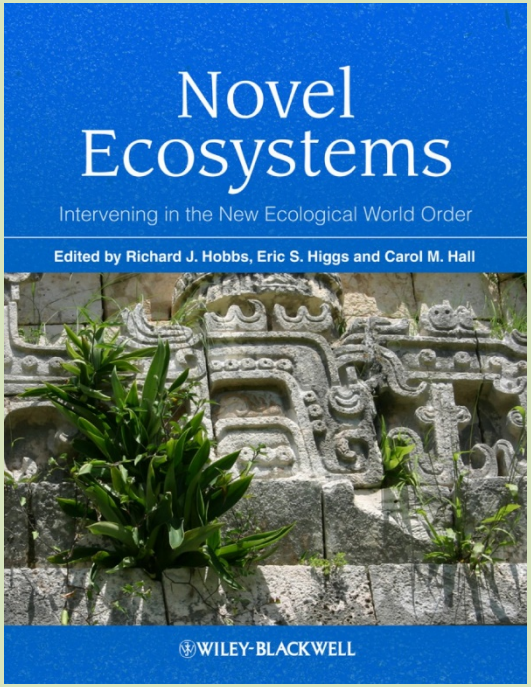
Should Some Species Be Allowed to Die Out?

As the list of endangered animals worldwide grows longer, society may soon be faced with an impossible decision: which ones to take off life support.

By JENNIFER KAHN MARCH 13, 2018

New York Times Magazine

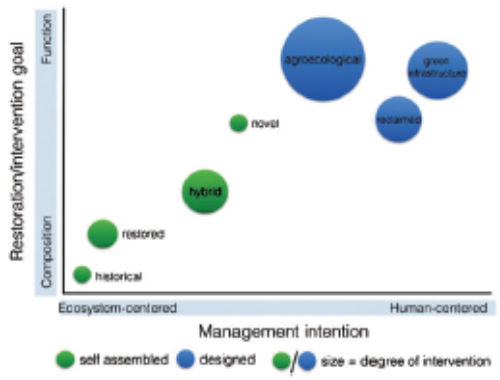
Some suggest there are not enough resources to do what we are trying to doing now – like prevent extinction – so we should concentrate on “priority” species and ecosystems.



Higgs 2017, Restoration Ecology

Table 1. A variety of ecosystems are divided initially into two groups: self-assembled and designed. Novel ecosystems are categorized as self-assembled. Features pertaining to restoration/intervention and management characterize these ecosystems. In each case, the characterization is open to debate and counterexamples can be easily presented. For example, restored ecosystems are usually managed for ecological integrity but there are also many examples where sustained cultural practices (harvesting, burning) are prominent or project manifest distinctly cultural values (e.g. aesthetic features in the case of many urban restoration projects). Historicity refers to the significance of historical ecosystem composition and processes.

Type of Ecosystem		*Restoration/ Intervention Goal*	*Degree of Intervention*	*Ongoing Management*	*Historicity*	*Management Intention*
Self-assembled	Historical	Composition	None-negligible	None-low	Strong	Ecosystem-centered
	Restored	Composition first	Low	Low	Strong	Ecosystem-centered
	Hybrid	Composition and function	Low-moderate	Low-moderate	Moderate-strong	Ecosystem-centered
	Novel	Function first	Low	Low	Low-moderate	Ecosystem-centered
Designed	Reclaimed	Function	Moderate-heavy	Variable, low	Low	Human-centered
	Green infrastructure	Function	Heavy	Variable-heavy	Low, moderate	Human-centered
	Agroecological	Function	Variable, intensive	Variable, moderate	Variable, low	Human-centered



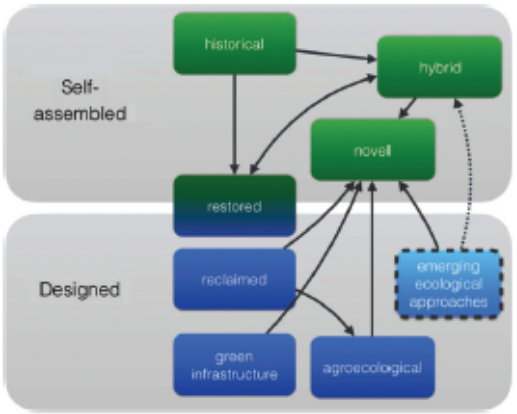


Figure 1. Ecosystem types arranged by restoration/intervention goals and management intention, and based on categorization provide in Table 1.

Emergence of Novel Ecosystems concept, but lack of agreement about what it means exactly, especially in a practical sense.

Now, this is Novel!

So what is Ecological Restoration, Really?

Ecological Restoration

is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed (SER 2004)

(= ecosystem restoration)

Photo 3

Milltown Dam removal on the Clark Fork River in Montana, USA. The dam trapped 6.6 million cubic yards of mining-contaminated sediment in a 540 acre reservoir (photo 1). This multi-year project rerouted the river, removed the contaminated sediment (photo 1), removed the Milltown Dam (photo 2 - first breach of temporary coffer dam to drain reservoir/remove full dam) and ultimately restored the river channel (photo 3) and the natural confluence of the Clark Fork and Blackfoot Rivers.

INTERNATIONAL STANDARDS FOR THE PRACTICE OF ECOLOGICAL RESTORATION – INCLUDING PRINCIPLES AND KEY CONCEPTS

FIRST EDITION: December 2016

Tein McDonald, George D. Gann, Justin Jonson, Kingsley W. Dixon

SER SOCIETY FOR ECOLOGICAL RESTORATION

George Gann (Global Restoration Ambassador, Society for Ecological Restoration, USA)

Tein McDonald (Board member, Society for Ecological Restoration Australasia, Australia)

Global Launch, 12 December 2016
Convention on Biological Diversity,
COP 13 Cancun, Mexico

UN BIODIVERSITY CONFERENCE
COP13-COPMOP8-COPMOP2
CANCUN, MEXICO 2016
MAINSTREAMING BIODIVERSITY FOR WELL-BEING

Is all restoration ecological restoration?

What is the minimum standard for a project to be called an ecological restoration project?

Section II - Six Key Concepts Underpinning Best Practice

KEY CONCEPT 1.

Ecological restoration practice is based on an **appropriate local native reference ecosystem**, **taking environmental change into account**

Recovery Wheel

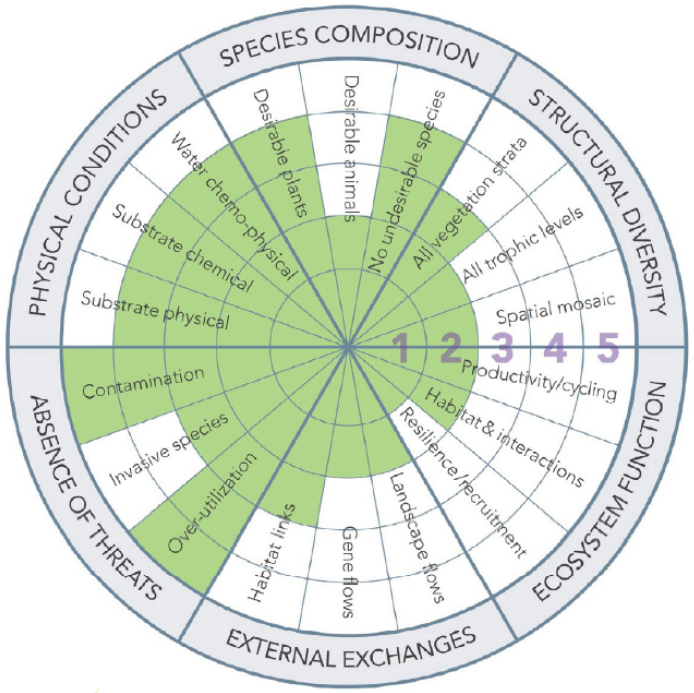


Figure 2. Progress evaluation 'recovery wheel' depicting a hypothetical 1-year old reconstruction project on its way to a 4-star condition. This template allows a manager to illustrate the degree to which the ecosystem under treatment is recovering over time. A practitioner with a high level of familiarity with the goals, objectives and site specific indicators set for the project and the recovery levels achieved to date can shade the segments for each sub-attribute after formal or informal evaluation. (Blank templates for the diagram and its accompanying proforma are available in Appendix 2.) Note: Sub-attribute labels can be adjusted or more added to better represent a particular ecosystem.

Hypothetical project on track toward 4-star recovery

KEY CONCEPT 5.

Successful restoration draws on **all relevant knowledge**

KEY CONCEPT 6.

Early genuine and active **engagement with all stakeholders** underpins long term restoration success.

Full recovery may take a long time

- Look beyond individual projects, technology.
- Look for opportunities and adopt a policy of continuous improvement.

Initial restorative activities such as single-species revegetation projects can be transformed over time into diverse 4-star to 5-star restoration projects. Left, Bethany Beach, Delaware, USA, ©ER&M/Biohabitats. Right, Delray Beach, Florida, USA ©George D. Gann.

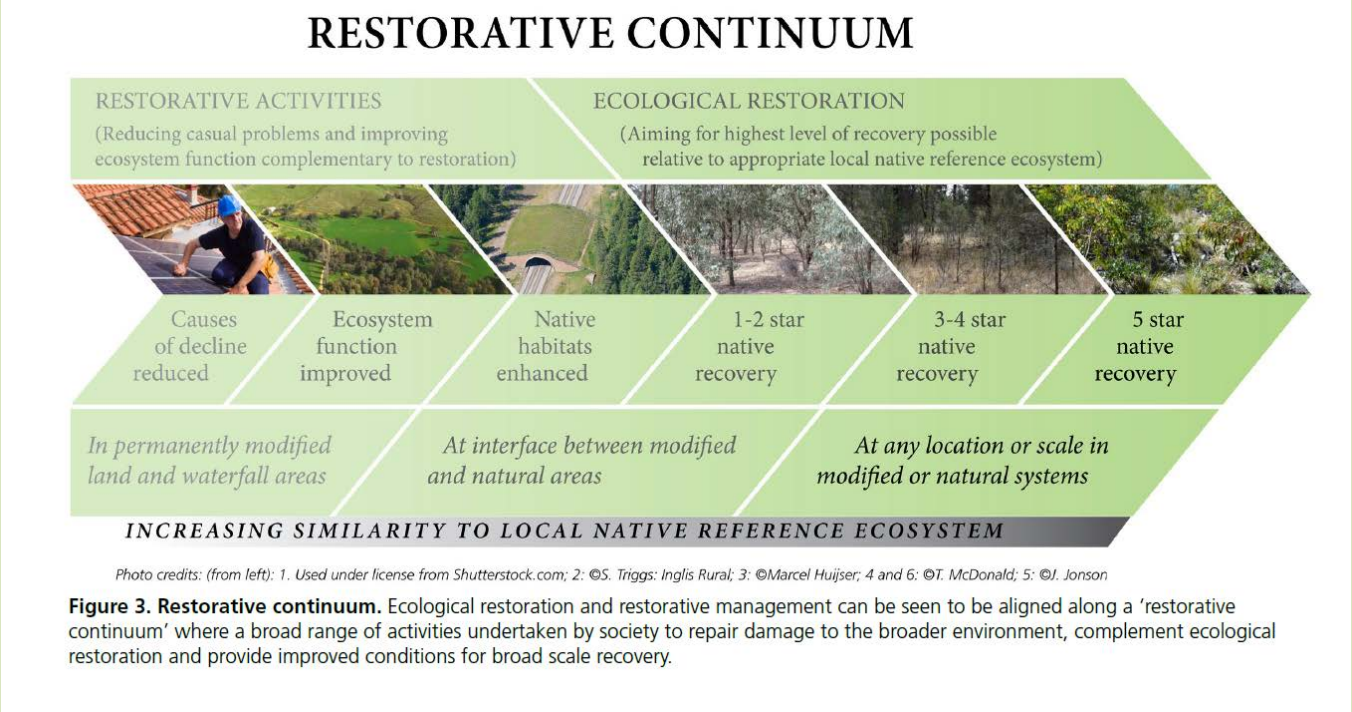


Photo credits: (from left): 1. Used under license from Shutterstock.com; 2: ©S. Triggs: Inglis Rural; 3: ©Marcel Huijser; 4 and 6: ©T. McDonald; 5: ©J. Jonson

Figure 3. Restorative continuum. Ecological restoration and restorative management can be seen to be aligned along a 'restorative continuum' where a broad range of activities undertaken by society to repair damage to the broader environment, complement ecological restoration and provide improved conditions for broad scale recovery.

All restorative activities matter, no matter how small. But some activities many not be restorative at all (e.g., some mitigation, afforestation of native savanna).

Restoration Ecology
THE JOURNAL OF THE SOCIETY FOR ECOLOGICAL RESTORATION

STRATEGIC ISSUES ARTICLE

On principles and standards in ecological restoration

Eric Higgs[1,2], Jim Harris[3], Stephen Murphy[4], Keith Bowers[5], Richard Hobbs[6], Willis Jenkins[7], Jeremy Kidwell[8], Nikita Lopoukhine[9], Bethany Sollereder[10], Katherine Suding[11], Allen Thompson[12], Steven Whisenant[13]

The Society for Ecological Restoration (SER) has long debated how to define best practices. We argue that a principles-first approach offers more flexibility for restoration practitioners than a standards-based approach, is consistent with the developmental stage of restoration, and functions more effectively at a global level. However, the solution is not as simple as arguing that one approach to professional practice is sufficient. Principles and standards can and do operate effectively together, but only if they are coordinated in a transparent and systematic way. Effective professional guidance results when standards anchored by principles function in a way that is contextual and evolving. Without that clear relation to principles, the tendency to promote performance standards may lead to a narrowing of restoration practice and reduction in the potential to resolve very difficult and diverse ecological and environmental challenges. We offer recommendations on how the evolving project of restoration policy by SER and other agencies and organizations can remain open and flexible.

Key words: codes of ethics, principles, professional practice, scope of restoration, standards

Implications for Practice

- A flexible, open approach to restoration practice is required to address a rapid scaling up of restoration investment, climate change, human needs, scientific uncertainties, and locally appropriate innovations in practice.
- A principles-first approach exemplified in the Society for Ecological Restoration's "Code of ethics" and "Ecological restoration in protected areas" offers flexible and adaptable models for professional practice in a wider variety of settings.
- An approach to professional practice based on performance standards may limit innovation and the reach of ecological restoration.
- Principles and standards can operate effectively together, but only if carefully coordinated and, generally, principles

truly a remarkable time for the often urgent tasks of helping recover damaged, degraded, or destroyed communities, ecosystems, and landscapes.

The Society for Ecological Restoration (SER) has introduced a succession of policies to guide practice. From discussions in the 1980s and 1990s about the definition of restoration through the *SER International Primer on Ecological Restoration* (SER 2004) and subsequent guidance including the *Code of ethics* (SER 2012), the joint World Commission on Protected

Author contributions: All contributors wrote and edited the article.

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But not everyone is happy.

What a surprise!

International Standards is a Living Document

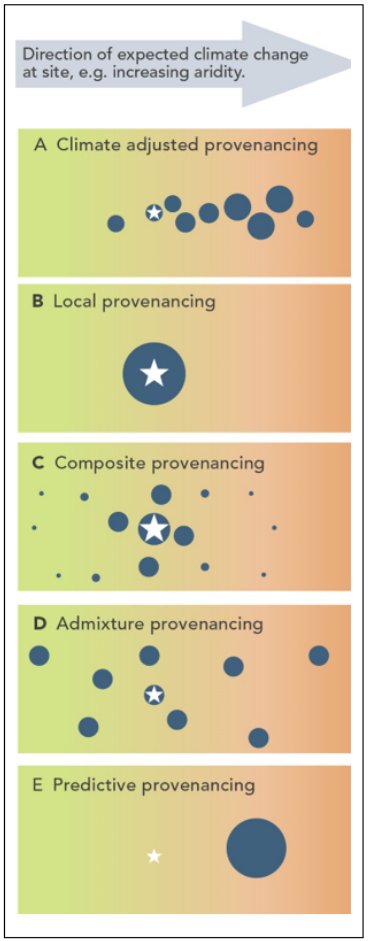
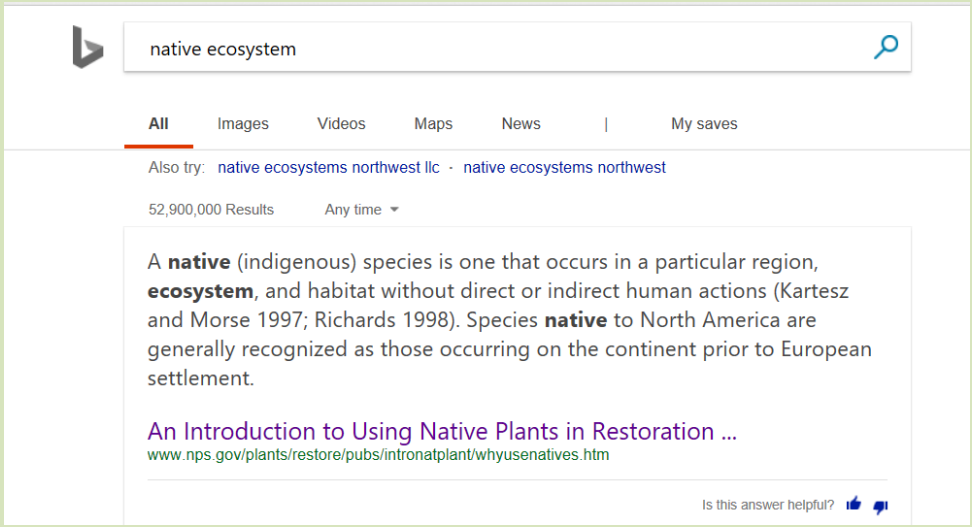


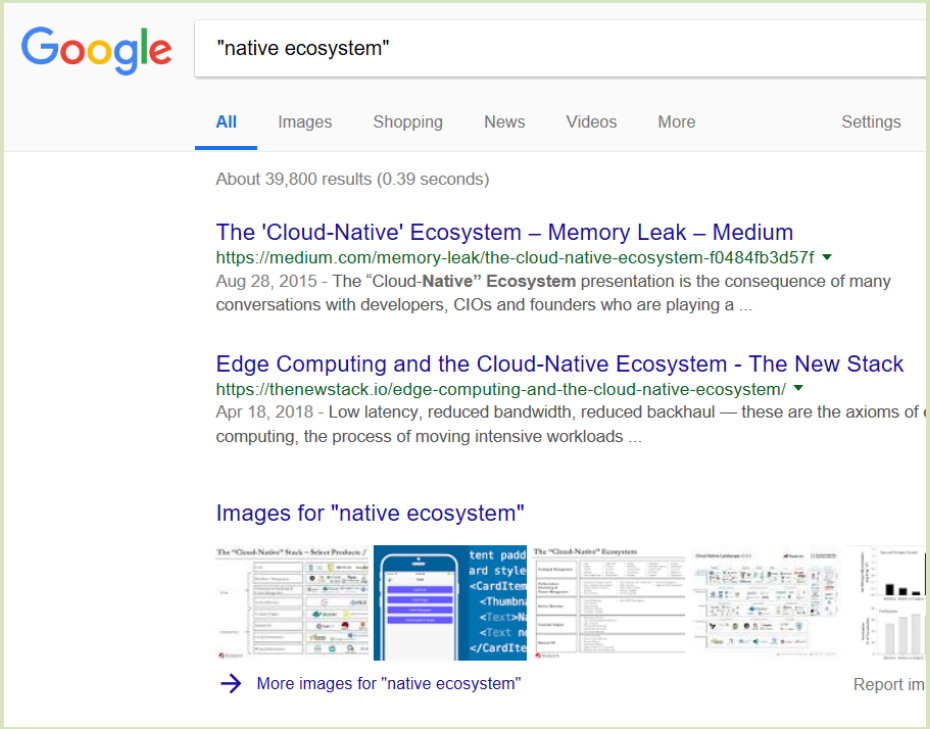
Figure 5. Provenancing strategies for revegetation, (Reproduced here from Prober et al 2015) The star indicates the site to be revegetated, and the circles represent native populations used as germplasm sources. The size of the circles indicates the relative quantities of germplasm included from each population for use at the revegetation site. In the case of the climate-adjusted provenancing the relative quantities of the germplasm from the various populations will depend upon factors such as genetic risks, and the rate and reliability of climate change projections. For simplicity this represents the major direction of climate change in a single dimension (e.g., aridity, to combine influences of increasing temperature and decreasing rainfall), but multiple dimensions could be considered as required.

First revision due out November 2018

We are:

1. improving the **restorative continuum** with respect to the ecosystem-landscape nexus;
2. clarifying that **restoration targets** must allow for temporal change – an inherent property of all ecosystems;
3. strengthening the discussion of **cultural-social elements** including traditional cultural ecosystems and semi-natural ecosystems; and,
4. Considering **provenance issues –** note that this pertains within species (‘assisted migration’ is largely not accepted).





Some Open Questions

- What is a native plant (or animal) in the age of change?
- What is a native ecosystem?
- What is the role of people in native ecosystems, past and present?

Ecological Restoration has become widespread and adopted by organizations at all scales across the globe along with many other related activities

The Promise. Ecological Restoration can:

- protect and recover biodiversity (ecosystems, species, genes)
- increase the delivery of ecosystem services, including climate change mitigation and adaptation
- help "re-establish an ecologically healthy relationship between nature and culture"

Some of the Perils:

- Using restoration as an excuse for destruction
- Promising more than we can deliver
- Not planning for change (e.g., lack of adaptive management)
- Creating perverse subsidies leading to collateral damage
- Conflating Ecological Restoration with other things, some good, some bad
- Not recognizing that small contributions matter
- Getting obsessed with our own projects and losing site of the big picture
- Ignoring stakeholders and failing to build constituencies of support
- Not being creative enough, not accepting new ideas and techniques

And What About Florida?

Trichocentrum undulatum, 1916

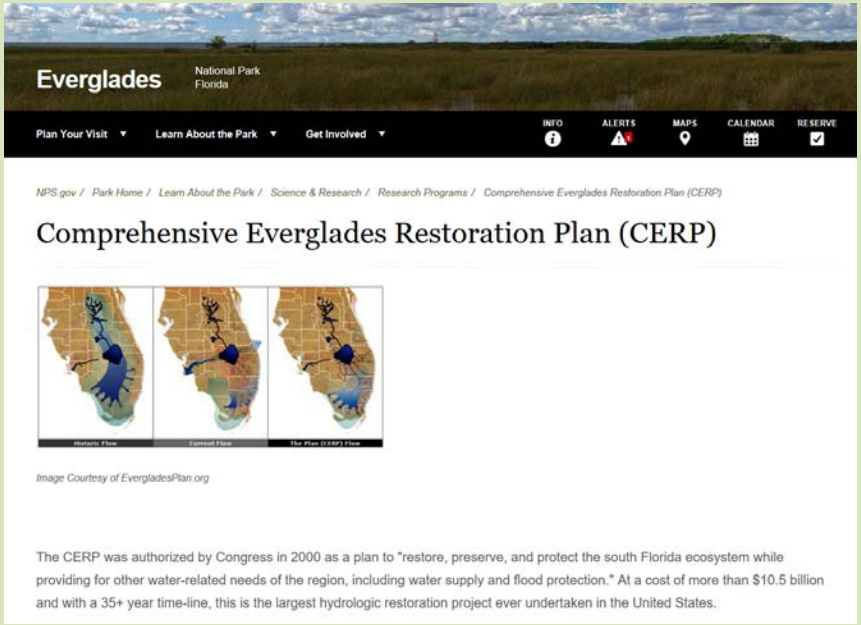
Our Issues (to name a few)

- Habitat destruction
- Collecting and poaching
- Destruction of natural hydrology
- Urbanization and fragmentation
- Coastal erosion
- Invasive species
- Fire suppression
- Loss of pollinators and dispersers
- Sea level rise
- Extreme weather
- Climate change
- Ignorance
- Apathy
- Greed

Our Solutions (in part)

- We document the extinction of species and the destruction of ecosystems, the depletion of rare species and the degradation of habitats
- We acquire protected areas and write management plans
- We fence, collect, grow, plant, chop, burn, spray, weed, bulldoze, rip, tear, water, augment, reintroduce and garden
- We learn, study, collate, disseminate and experiment
- We develop tools and new technologies
- We educate, volunteer, advocate and protest
- We hope and plan for a better future

We Restore
Degraded Ecosystems,
Small and Large

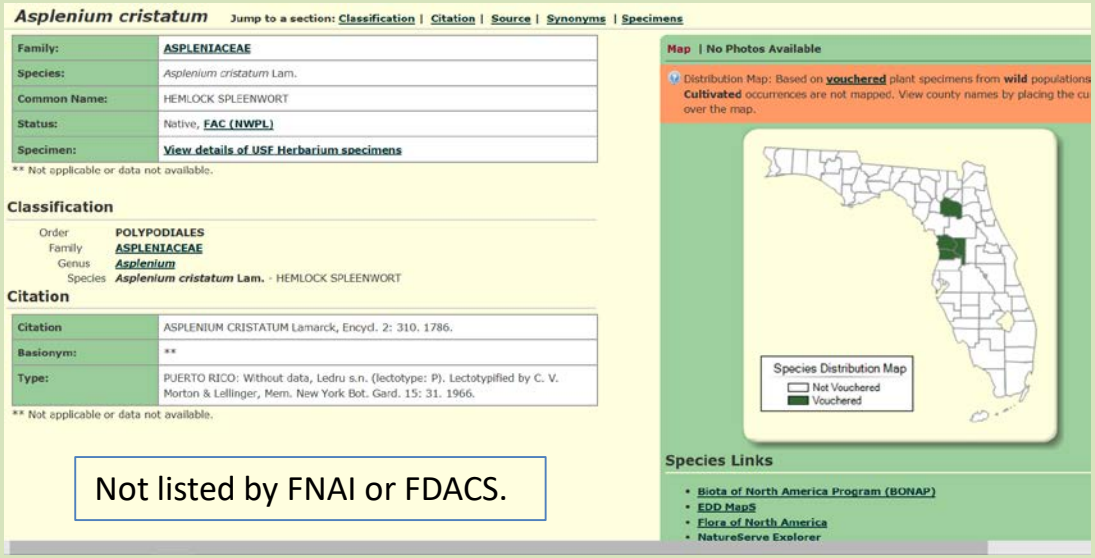


Some Things We Should Consider


Carica papaya

Humility is important. What we know today may not be what we understand tomorrow.

We understand so much, but we still have basic work to do.



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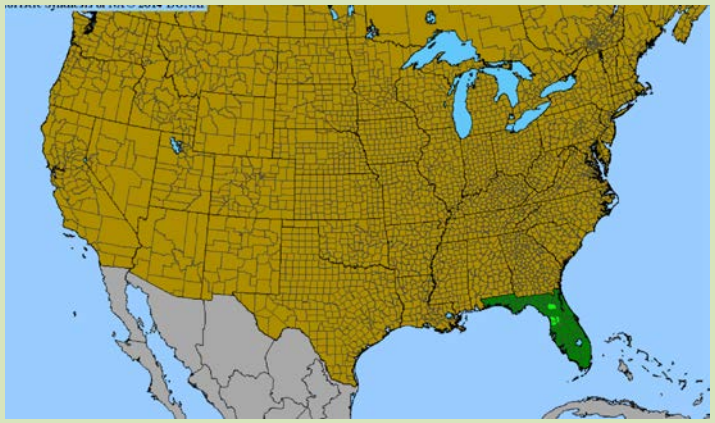

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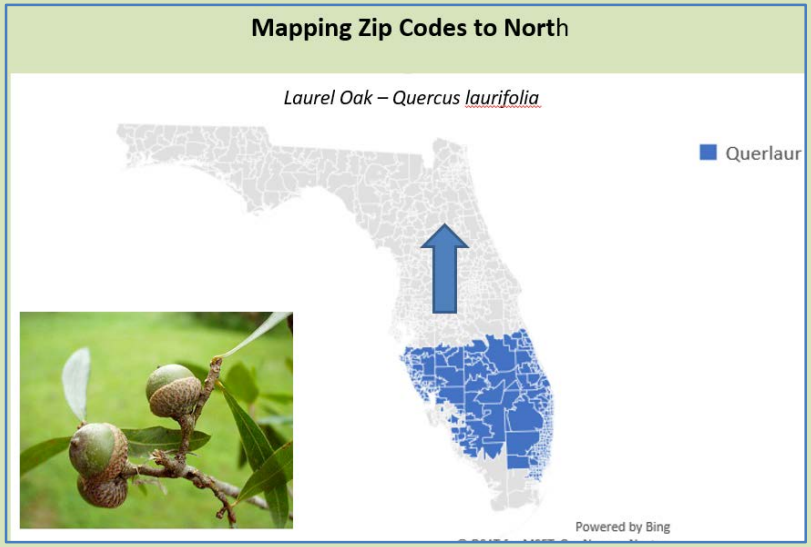
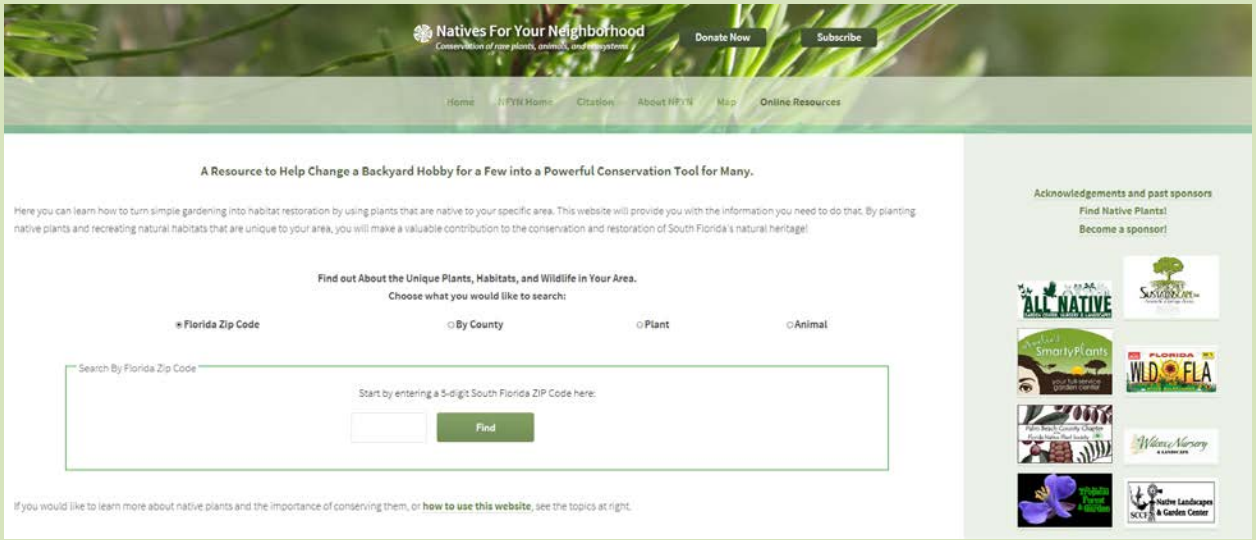
Identify Opportunities

Use Available Tools
(and make them better!)

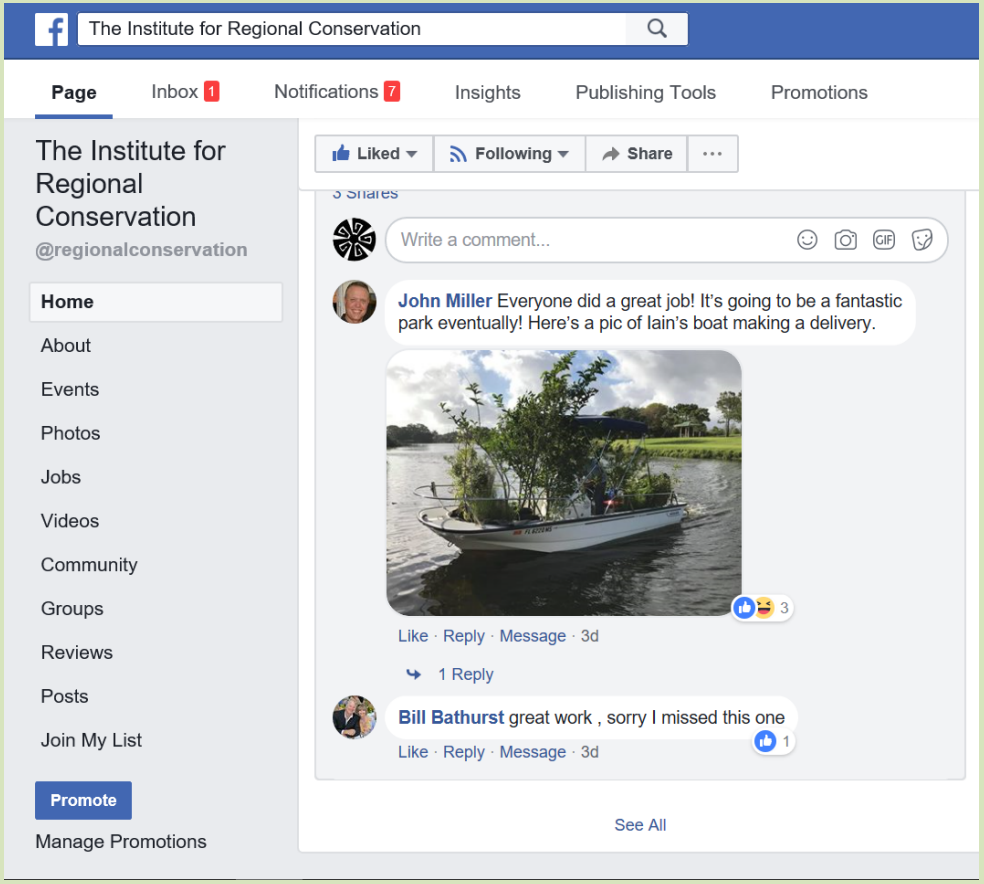


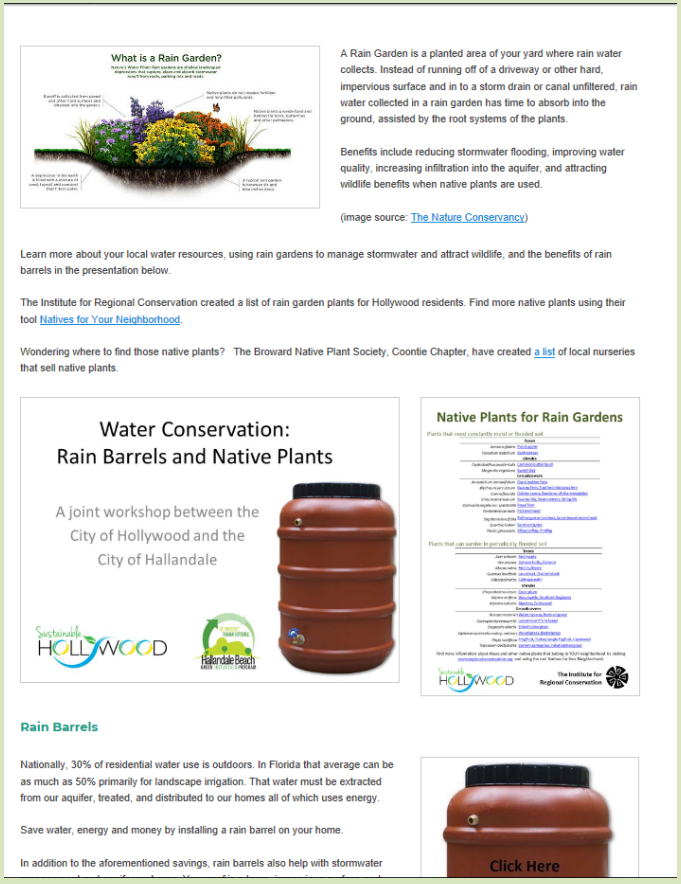


How Does It Work?

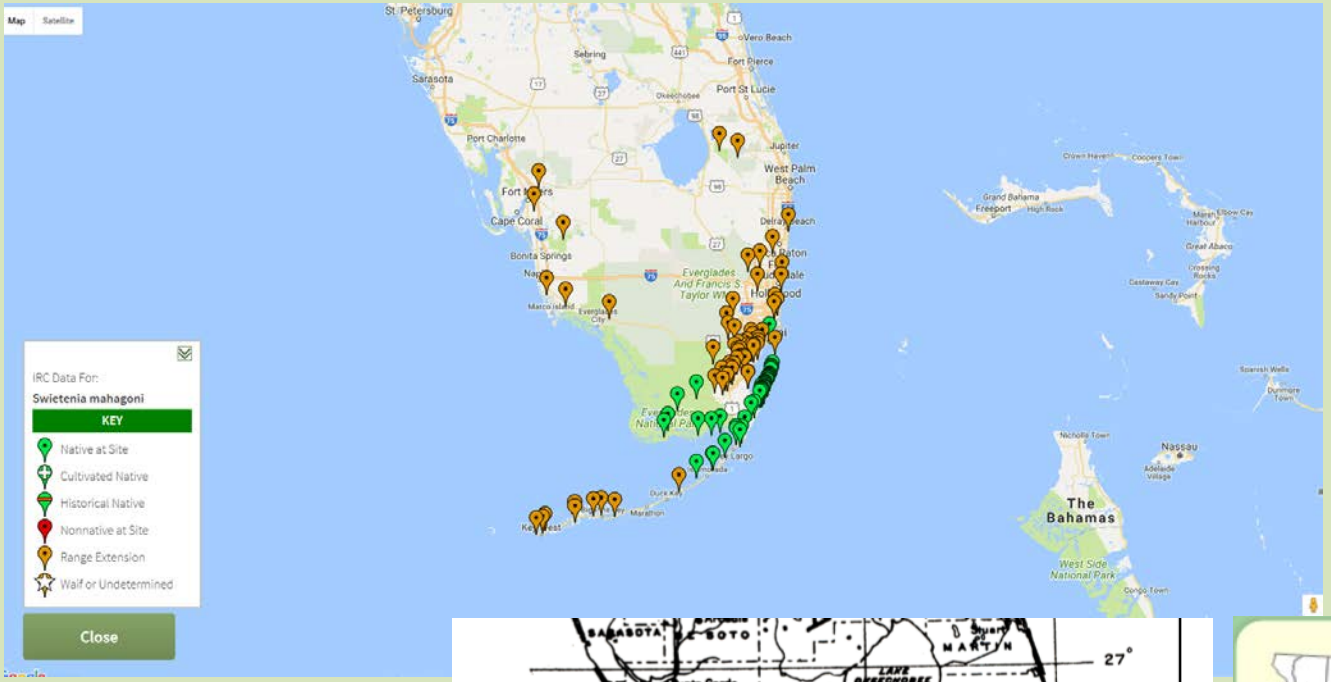
- County Lists – Ecological generalist with broad ranges (95% rule)
- ZIP Code Lists – Ecological generalists + generalists within local habitats
- Habitat Lists – Generalists + habitat specialists within historical range within ZIP Code

Be Creative and Have Fun

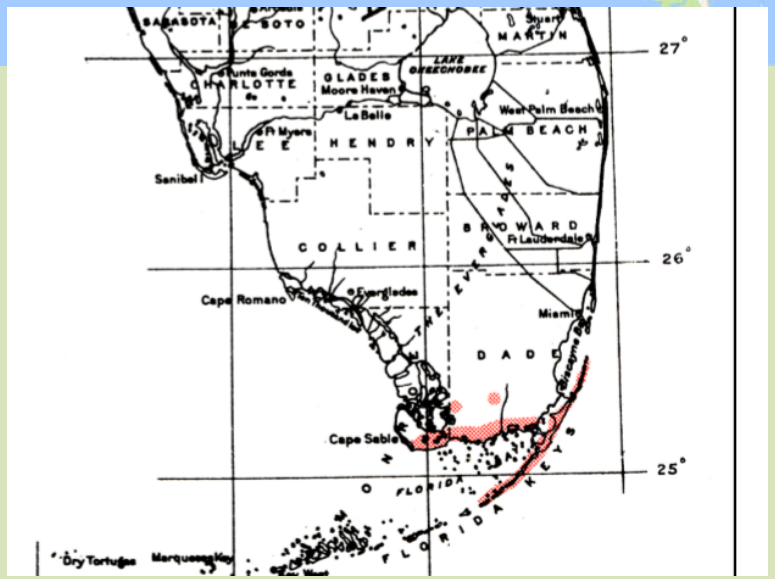


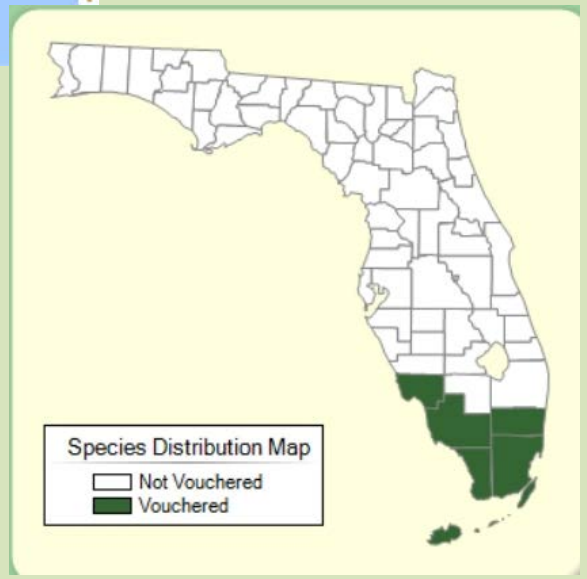


Be Thoughtful

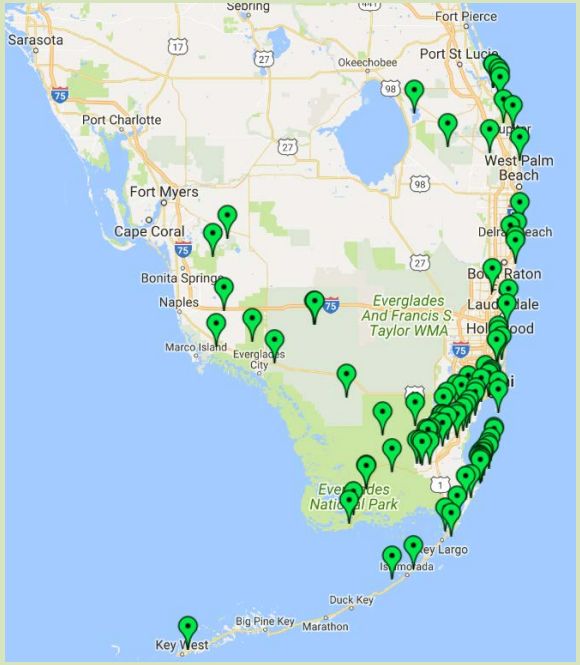


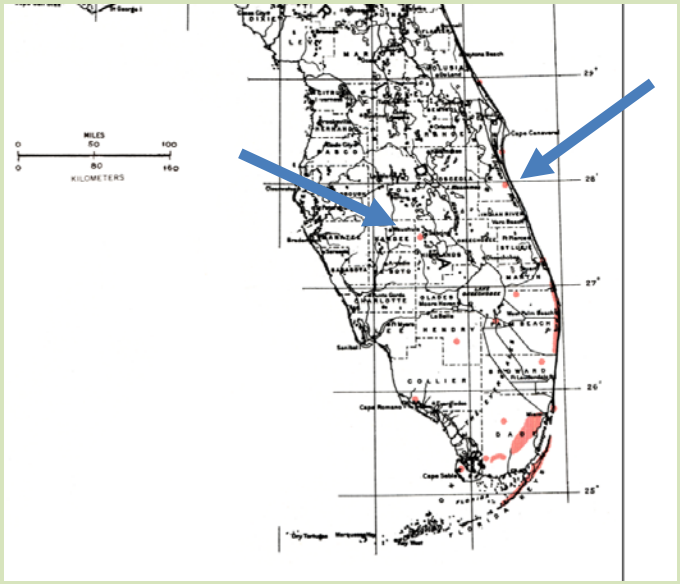
West Indian Mahogany
Swietenia mahagoni

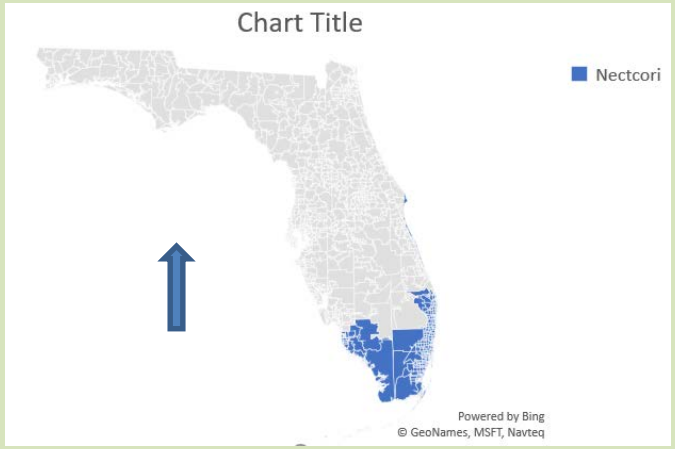




Plan for Change (e.g., Climate Change and Sea Level Rise)





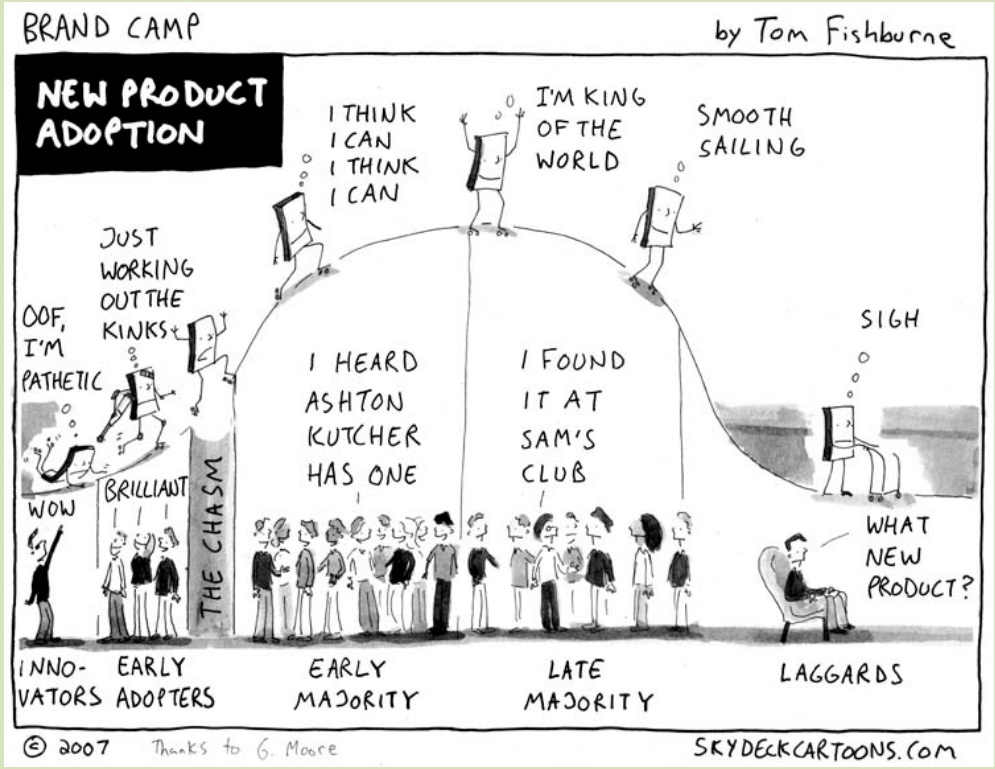


Lancewood – *Nectandra coriacea*

Celebrate Success!

Delray Beach c. 1980,
Delray Beach 2016

Play the Long Game



Thanks!
(and happy Endangered Species Day)