

Indigenous Engagement in Pennsylvania

and the role of cultural restoration
within the context of ecological restoration

Laurel Etter Longenecker
RiverStewards Collaborative

Alyssa Hannigan
LandStudies

PA Aquatic Resource
Restoration Conference 2026



RIVER STEWARDS
COLLABORATIVE



LandStudies
a DAVEY company



Restoring land without restoring relationship is an empty exercise. It is relationship that will endure and relationship that will sustain the restored land.

Robin Wall Kimmerer, Braiding Sweetgrass¹

Positionality & Transparency

We recognize that Pennsylvania currently has no federally-recognized Indigenous tribes or nations, which creates challenges for individuals with Indigenous heritage in claiming legitimacy, and for researchers in identifying who holds authority to speak for the land.

Pennsylvania's Indigenous history is complex. It includes the forced removal of Native peoples from their homelands, as well as the relocation of individuals from many nations into the state, notably through institutions like the Carlisle Indian Industrial School. Many of their descendants continue to live across the state today.

We do not see it as our role to determine whose stories or lived experiences are valid. Instead, we believe it is essential to engage with both historical and contemporary Indigenous voices connected to this land and water.

To that end, we have engaged – and will continue to engage – with a range of voices, including local Indigenous community members and organizations, cultural and ecological heritage leaders, Indigenous allies, and federally recognized tribes with ancestral ties to the project area. These collaborations are central to shaping our process, informing our understanding, and guiding the project's evolution and outcomes.

Defining Restoration

Restoration (Federal Geographic Data Committee²)

Restoration is the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded wetland.

Restoration (Society for Ecological Restoration³)

Contributes to protecting biodiversity; improving human health and wellbeing; increasing food and water security; delivering goods, services, and economic prosperity; and supporting climate change mitigation, resilience, and adaptation.

Eight Principles Underpinning Ecological Restoration



1 ENGAGES
STAKEHOLDERS

2 DRAWS ON
MANY TYPES
OF KNOWLEDGE



3 IS INFORMED BY
NATIVE
REFERENCE
ECOSYSTEMS,
WHILE CONSIDERING
ENVIRONMENTAL CHANGE

4 SUPPORTS
ECOSYSTEM
RECOVERY
PROCESSES



5 IS ASSESSED AGAINST
CLEAR GOALS
AND OBJECTIVES
USING MEASURABLE
INDICATORS

6

SEEKS THE
HIGHEST
LEVEL OF
RECOVERY
POSSIBLE



8 IS PART OF A
CONTINUUM
OF RESTORATIVE
ACTIVITIES

7

GAINS
CUMULATIVE
VALUE
WHEN APPLIED
AT LARGE SCALES



PRINCIPLE 1

ENGAGES STAKEHOLDERS

Ecological restoration projects recognize and acknowledge the interests and contributions of diverse stakeholders, particularly local stakeholders, and actively seek their direct involvement to provide mutual benefits to both nature and society.



PRINCIPLE 2

DRAWS ON MANY TYPES OF KNOWLEDGE

The practice of ecological restoration benefits from a combination of acquired practitioner knowledge, Traditional Ecological Knowledge, Local Ecological Knowledge, and scientific discovery.



PRINCIPLE 3

IS INFORMED BY NATIVE REFERENCE ECOSYSTEMS, WHILE CONSIDERING ENVIRONMENTAL CHANGE

The use of reference models enhances the potential for native species and communities to recover and continue to reassemble, adapt, and evolve.



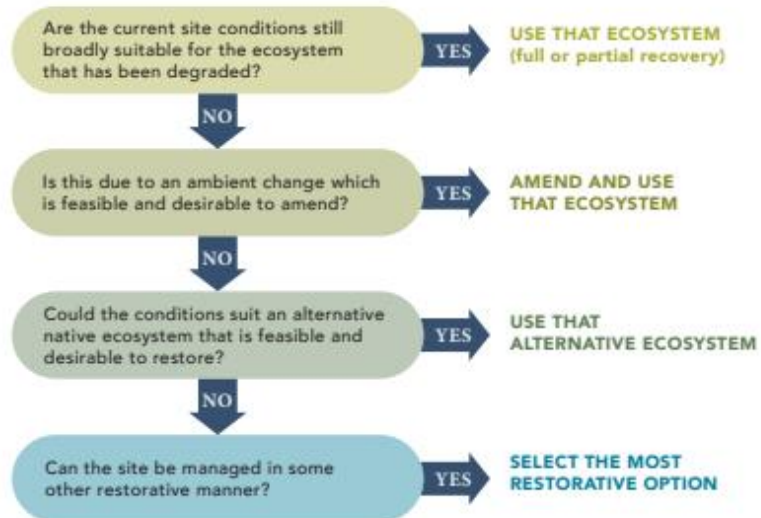
PRINCIPLE 4

SUPPORTS ECOSYSTEM RECOVERY PROCESSES

Practitioners enhance the natural recovery carried out by plants and animals in interaction with each other and their shared environment.



Example of a Social Benefits Wheel to assist in tracking the degree to which an ecological restoration project or program is attaining its social development targets and goals. See Principle 1.



This Decision Tree can assist selection of appropriate native reference ecosystems for restoration projects. See Principle 3.

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Are the current site conditions still broadly suitable for the ecosystem that has been degraded?

YES

USE THAT ECOSYSTEM
(full or partial recovery)

NO

Is this due to an ambient change which is feasible and desirable to amend?

YES

AMEND AND USE
THAT ECOSYSTEM

NO

Could the conditions suit an alternative native ecosystem that is feasible and desirable to restore?

YES

USE THAT
ALTERNATIVE ECOSYSTEM

NO

Can the site be managed in some other restorative manner?

YES

SELECT THE MOST
RESTORATIVE OPTION

This Decision Tree can assist selection of appropriate native reference ecosystems for restoration projects. See Principle 3.

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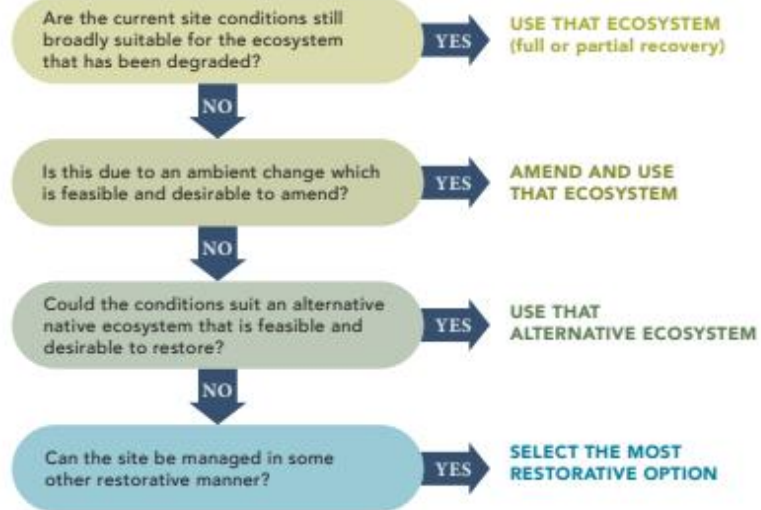
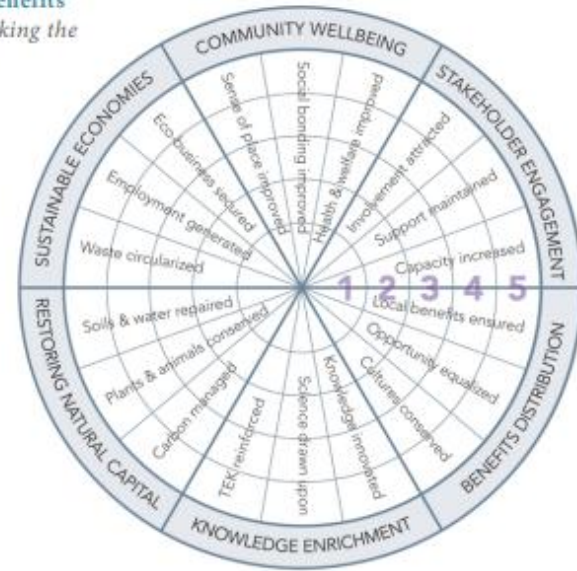
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PRINCIPLE 5

IS ASSESSED AGAINST CLEAR GOALS AND OBJECTIVES, USING MEASURABLE INDICATORS



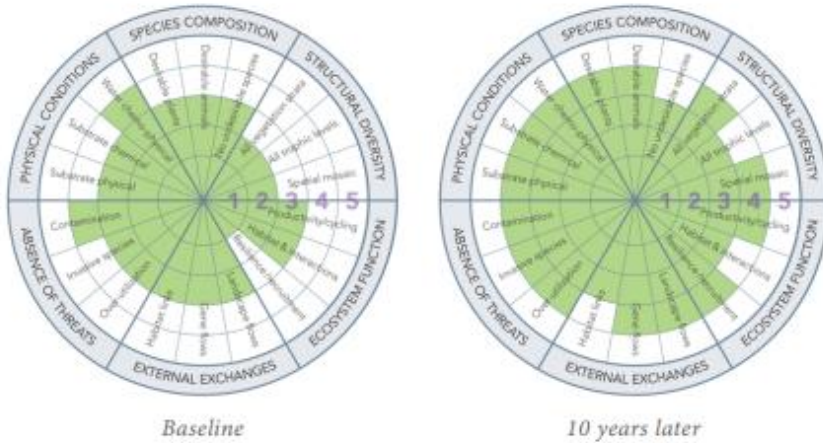
In the planning phase of restoration projects, the project vision, targets, goals, and objectives are clearly identified, along with specific indicators used to measure progress.

PRINCIPLE 6

SEEKS THE HIGHEST LEVEL OF ECOSYSTEM RECOVERY POSSIBLE



Ecological restoration aims for the highest practicable level of recovery appropriate to the circumstances.



The **Ecological Recovery Wheel** is part of the Standards' five-star system for designing and implementing restoration, and for assessing progress as compared to a reference model. See Principle 6.

PRINCIPLE 7

GAINS CUMULATIVE VALUE WHEN APPLIED AT LARGE SCALES



Ecological restoration projects can have beneficial outcomes regardless of their spatial scale. However, many ecosystem processes operate at larger spatial scales, such as the watershed or basin level, and scaling-up restoration actions is required to address some ecological and global sustainability needs.

PRINCIPLE 8

IS PART OF A CONTINUUM OF RESTORATIVE ACTIVITIES



Ecological restoration is one of many strategies that can, to varying degrees, contribute to biodiversity conservation, increase carbon sequestration and the delivery of other vital ecosystem services, improve human health, wellbeing, and livelihoods, and enhance positive human connections with nature.

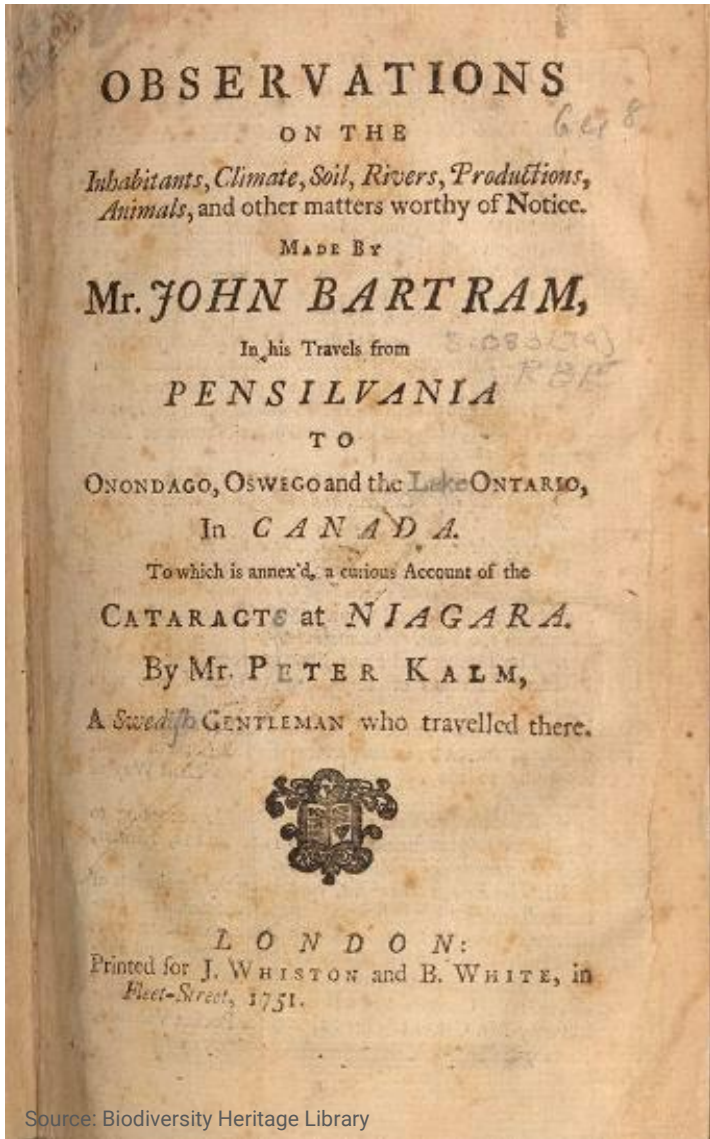


The **Restorative Continuum** illustrates how the implementation of restorative activities at all levels can optimize broadscale ecological and social outcomes. See Principle 8.

Biocultural Restoration (SUNY ESF⁴)

The science and practice of restoring not only ecosystems, but also human and cultural relationships to place, such that cultures are strengthened and revitalized alongside the lands with which they are inextricably linked.

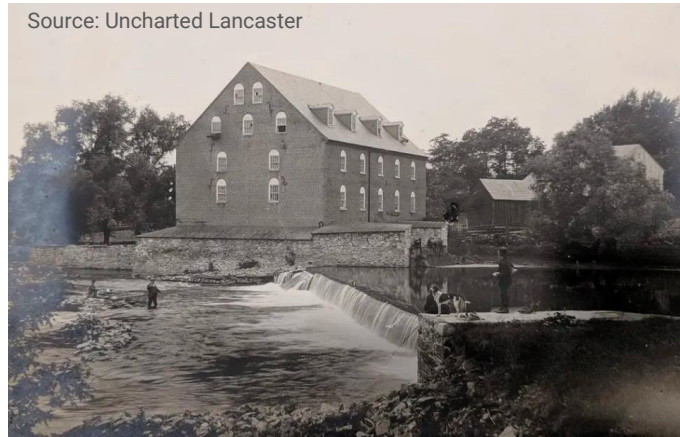
So what?



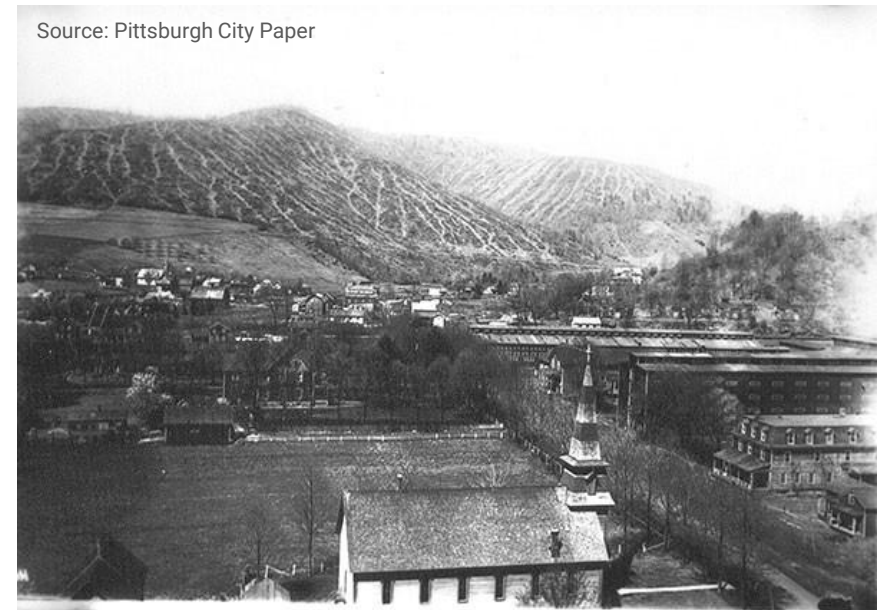
Source: Biodiversity Heritage Library



(Parsons et al. 2021)



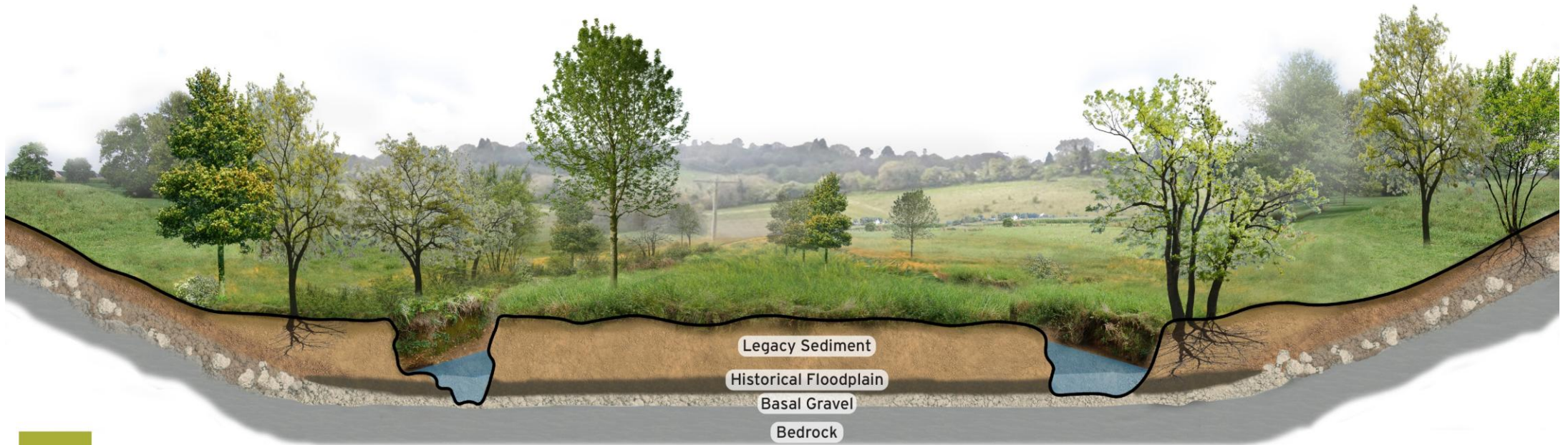
Source: Uncharted Lancaster



Source: Pittsburgh City Paper

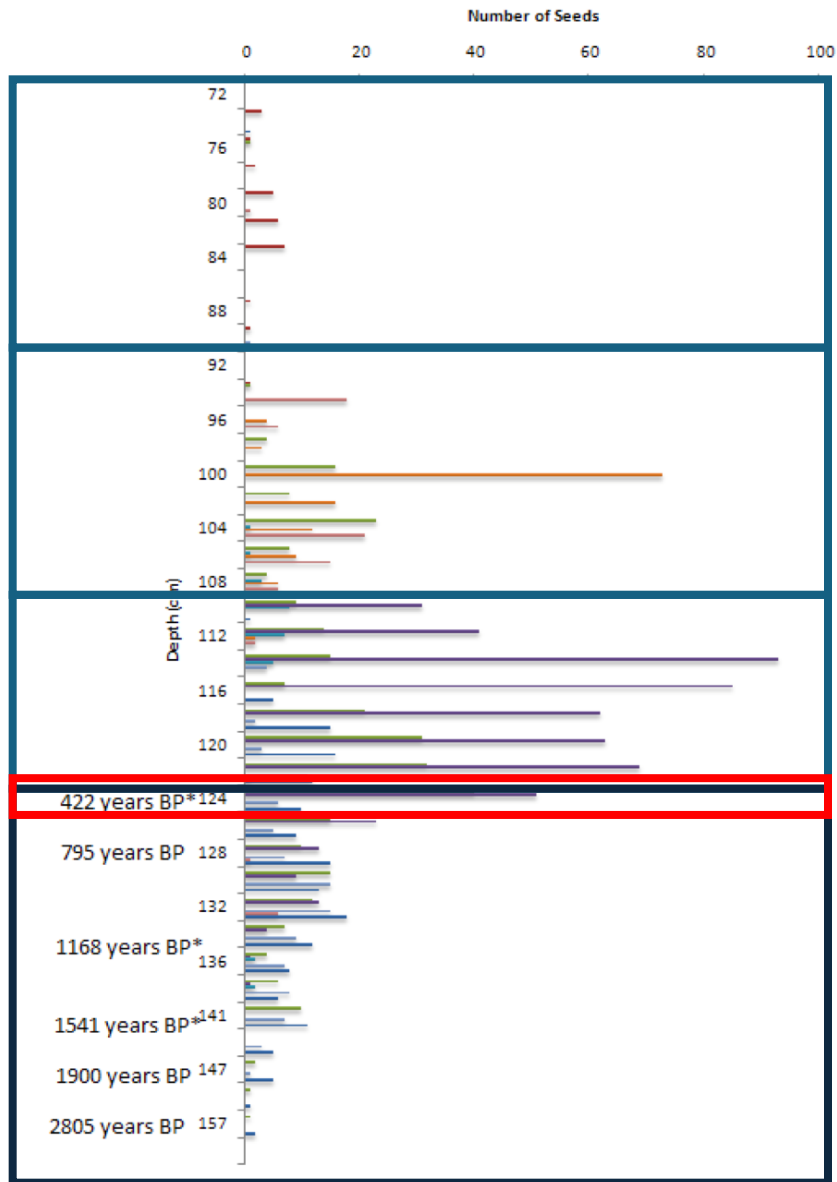


Source: Pennsylvania Lumber Museum



Typical Floodplain Cross Section - Existing Condition

Present condition impaired by legacy sediment caused by human induced watershed changes (such as widespread land clearing and dam construction)



- *Alisma plantago-aquatica* - shallow pond

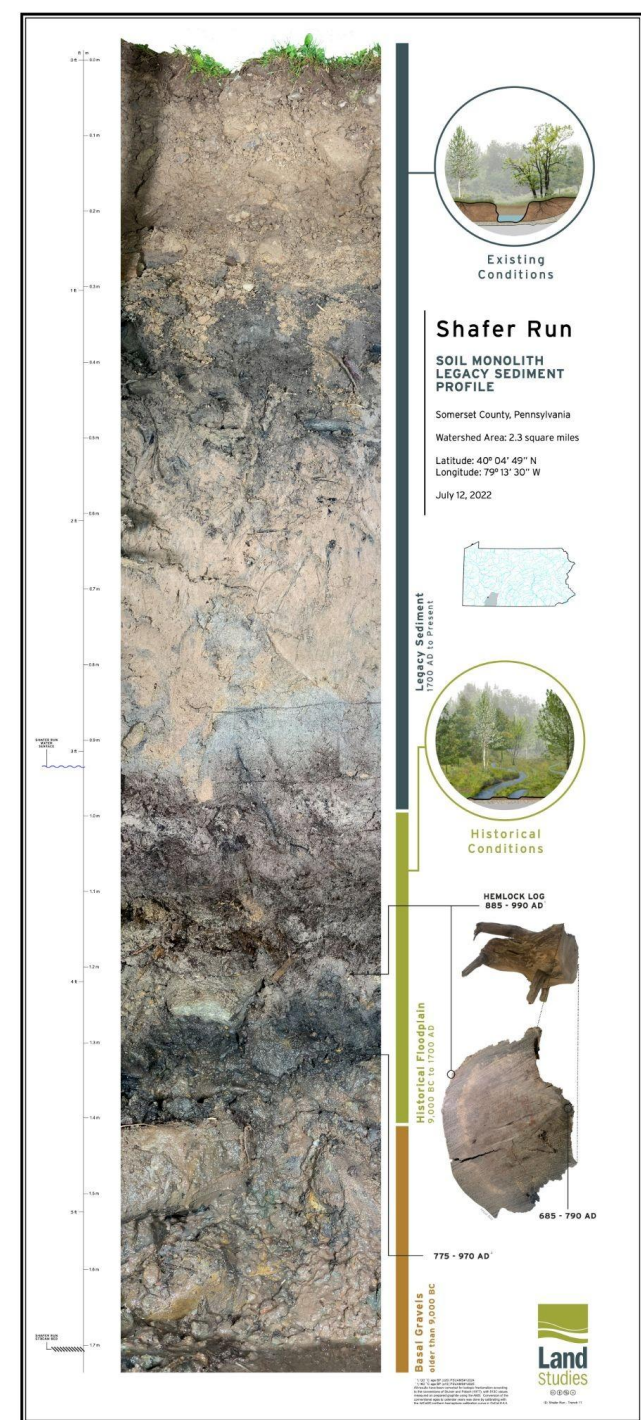
- *Eleocharis obtusa* - mudflat/
edge of muddy pond

- *Alisma plantago*
- *Carex stipata*
- *Carex hystericina*
- *Carex sp.*
- *Eleocharis obtusa*
- *Liriodendron tulipifera*
- *Glyceria striata*
- *Carex Prasina*

- *Carex hystericina* - prefers disturbance

- European settlement - 121.5-125 cm

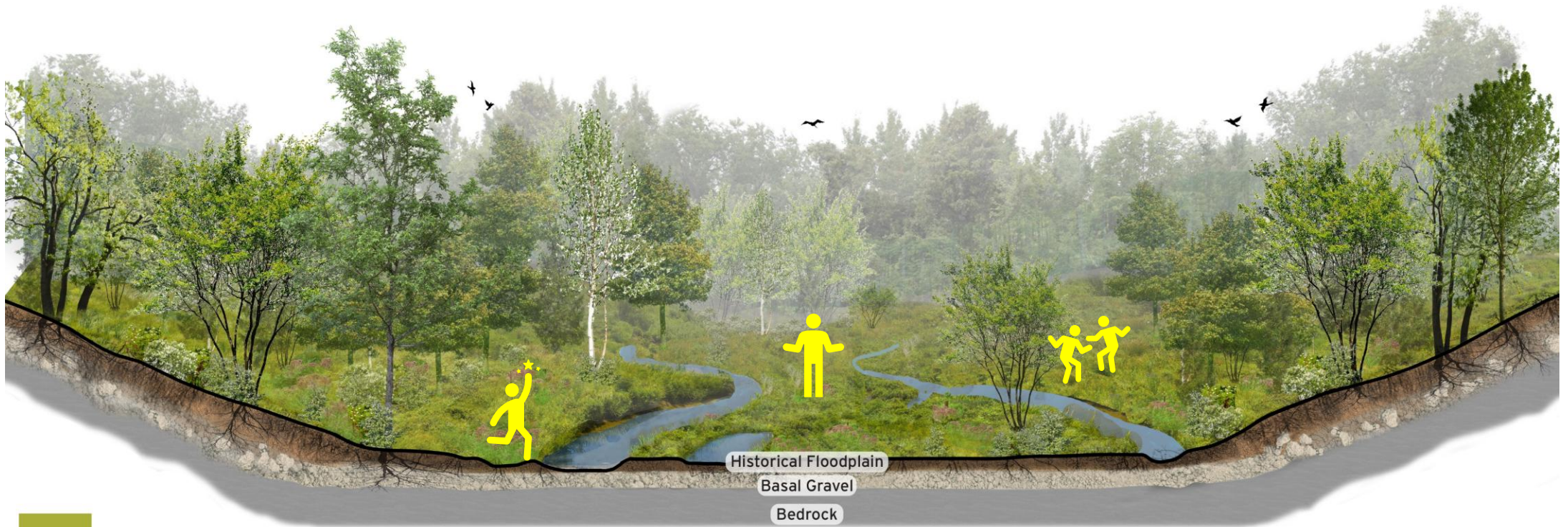
- Sedge-dominant wet meadow
- Increased biodiversity leading up to
European settlement





Typical Floodplain Cross Section - Restored Condition

Stable condition prior to major human influences



Typical Floodplain Cross Section - Restored Condition

Stable condition prior to major human influences

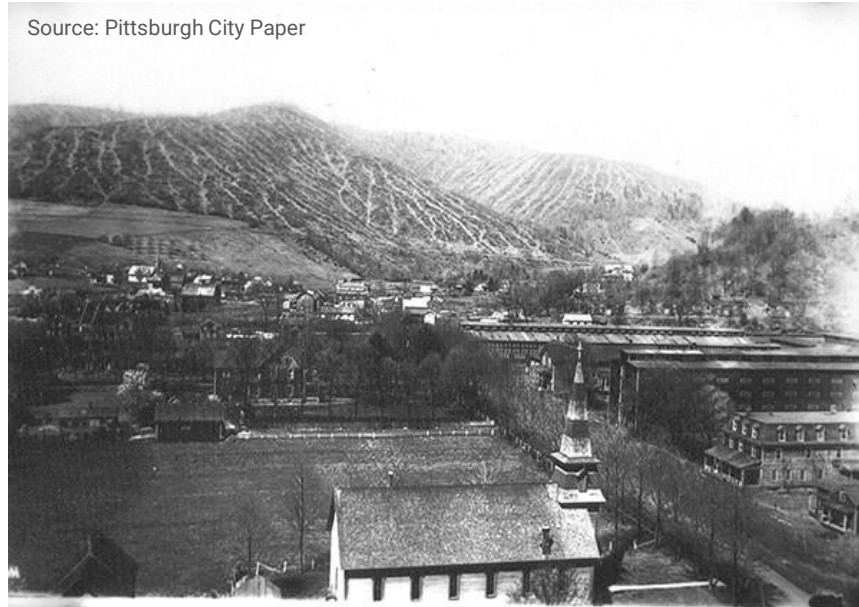


Carex sp. (sedge) rhizome harvesting by Alliance for California Traditional Arts in April 2010. Source: <https://actaonline.org/digging-sedge/>

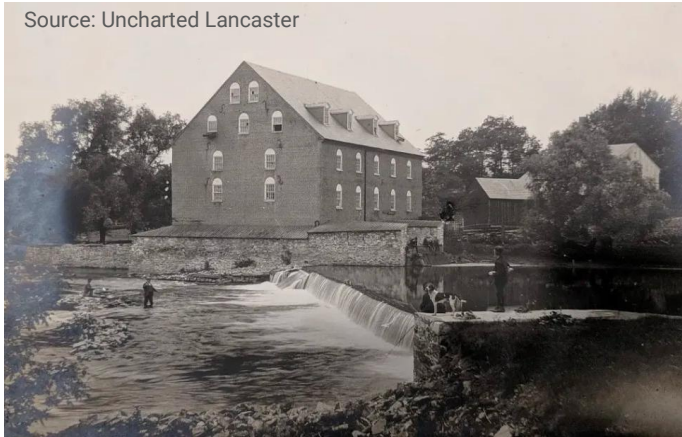
(Parsons et al. 2021)



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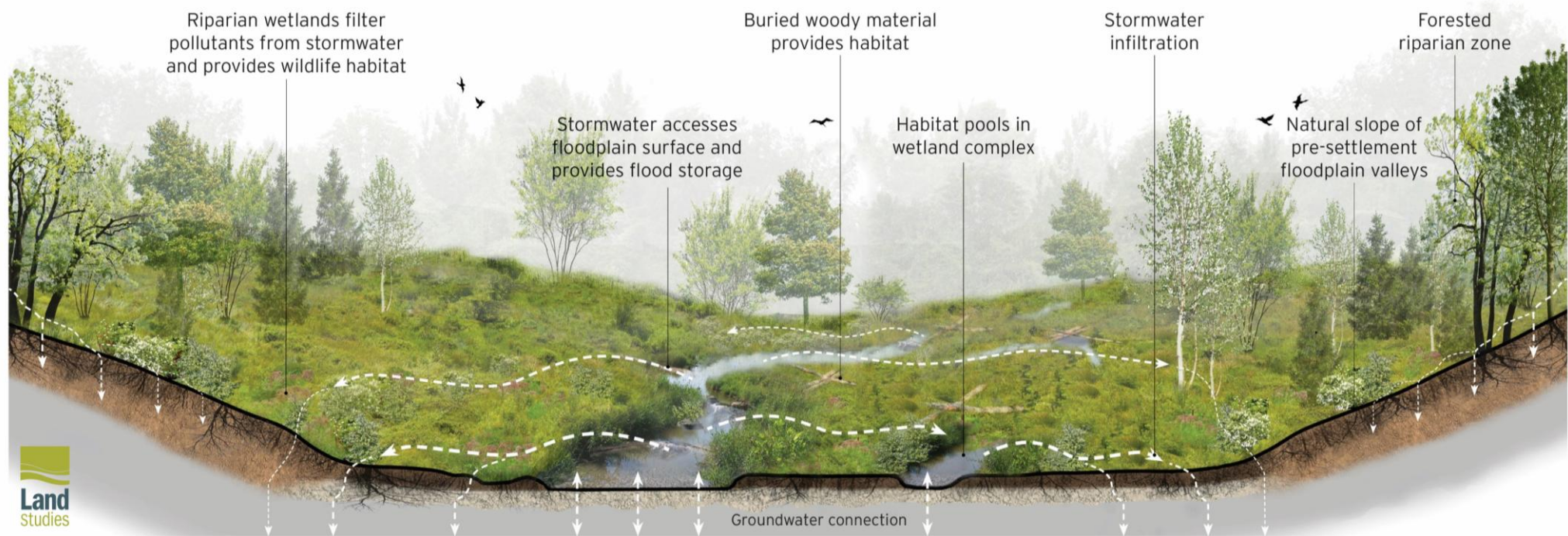


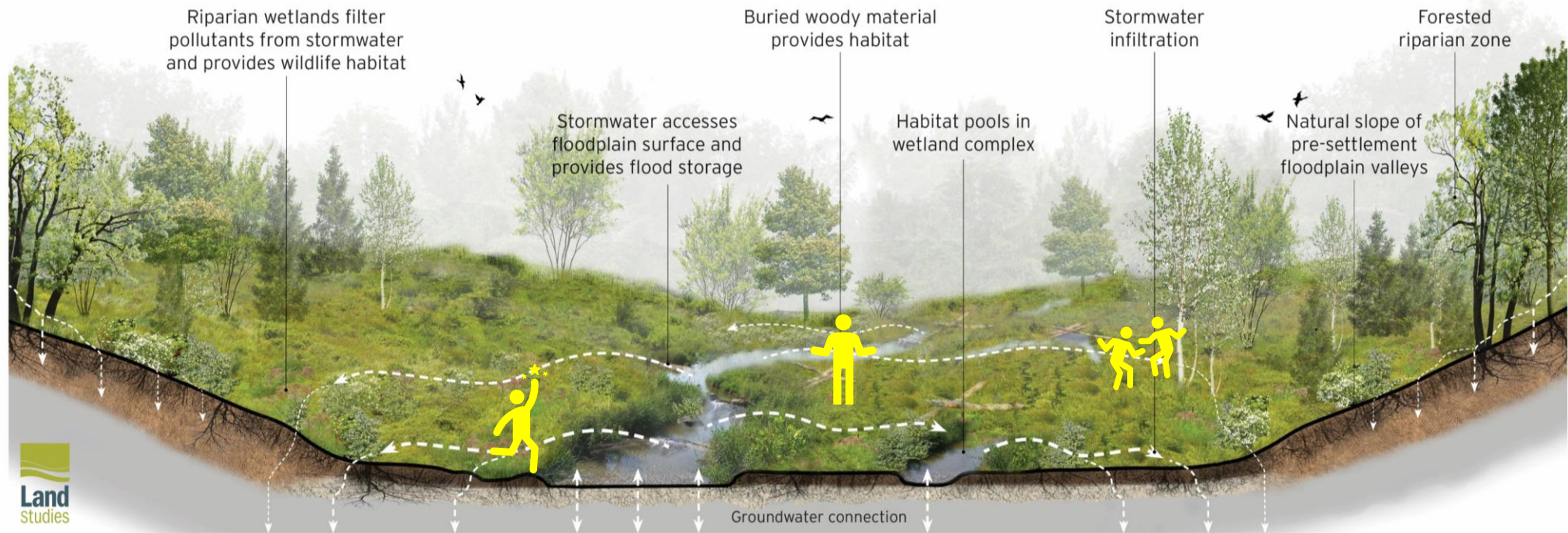
Source: Pennsylvania Lumber Museum





Painting by Carol Oldenburg, for the Pennsylvania Historical Museum Commission in 1970





Towards just and transformative social–ecological restoration

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Check for updates

Adrian Martin¹, Neil Dawson^{1,2}, Iokíne Rodríguez¹, Rajanya Bose³ & Isabel Cotton⁴

In the face of the climate and biodiversity crisis, global targets for the restoration of degraded lands have become ever more ambitious and urgent. Here we explain the case for placing justice at the heart of restoration practice. Although this is increasingly accepted, there is an unfortunate tendency to address justice in superficial ways, through tokenistic forms of participation and benefit sharing. We address this problem by classifying the different levels at which justice can be addressed and elaborating the level that restoration practice should aspire to if it is to be just and transformative.

Around the world, almost all kinds of ecosystem have been degraded and converted, eroding both the biological and cultural foundations of human well-being. It is estimated that the well-being of 3.2 billion people has already been adversely affected by land degradation and there are growing concerns for the future food security of all¹. This crisis has driven calls for wide-scale ecological restoration, often as part of biodiversity and climate policy. The United Nations' Decade on Restoration for 2021–2030 pledges to restore one billion hectares of degraded land² and the Kunming–Montreal Global Biodiversity Framework sets a target for 30% of all degraded land to be under restoration by 2030³.

Although the scale and urgency of global restoration agendas are well founded, success will depend on how implementation programmes are designed and whether ecological targets are aligned with local social, economic and cultural ones⁴. We are concerned that progress made in gaining global commitments, securing funding and developing ecological know-how has not been matched by progress in how to meaningfully incorporate social justice into restoration practice. Too often this leads to a superficial consideration of justice, creating unjust interactions and outcomes that impede the effective restoration and protection of both nature and human well-being⁵.

There has been considerable research aimed at understanding the impacts of conservation on Indigenous peoples and local communities (IPLCs)⁶ and the interdependencies within social–ecological, or biocultural, systems that shape the fairness and effectiveness of conservation⁷. Impacts can include displacement, loss of livelihoods, disruption to local institutions and governance, and disrespect for

local knowledge and values¹⁰. We are now starting to see evidence of similar impacts arising from restoration itself^{11,12}, making it clear that this sector now requires similar attention to justice as the wider conservation sector.

Approach

In this Perspective, we develop a typology of justice considerations for restoration practice. We argue for a high level of ambition for justice, presenting a new framework for restoration justice that goes well beyond the Society for Ecological Restoration's call for fully participatory restoration projects that are co-designed with local stakeholders and incorporate local knowledge and cultural values⁸. We commend the reach of this important initiative, but we propose the need for a set of even more fundamental justice concerns (relationships, knowledge systems and structural foundations), to avoid such calls being interpreted in superficial ways. As Shelton et al.¹⁴ conclude, the restoration sector exhibits a shift in discourse without accompanying depth in change to practice. We see this manifested in substantial differences between how just restoration is conceived by different actors: agencies designing and implementing large-scale restoration initiatives tend to consider justice in terms of more instrumental practices, such as benefit sharing, alternative livelihoods and consultation exercises, whereas Indigenous scholars and civil society organizations tend to also highlight more systemic causes of injustice linked to ecosystem and cultural degradation. Indeed, we observe a chasm in understanding, in which practitioners are accused of failing to address deeper, systemic drivers of injustice,

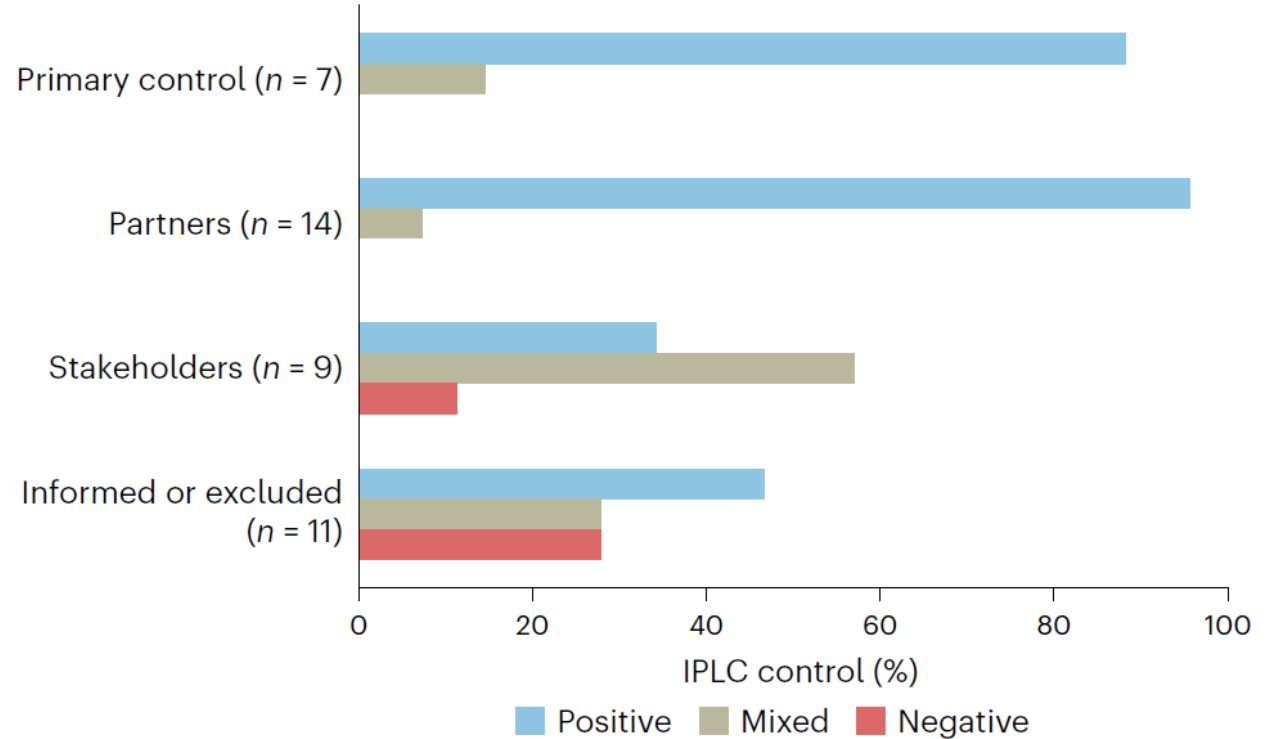


Fig. 1 | Ecological outcomes of restoration interventions with different levels of community control. Blue, green and red represent positive, mixed and negative outcomes (n = 41). Data from ref. 18.

¹School of Global Development, University of East Anglia, Norwich, UK. ²IUCN Commission on Environmental, Economic and Social Policy, Gland, Switzerland. ³School of Geography and Planning, University of Sheffield, Sheffield, UK. ⁴School of Society and Environment, Queen Mary University of London, London, UK. ✉e-mail: Adrian.martin@uea.ac.uk

“Integrating local and Indigenous knowledge, and empowering marginalized groups significantly strengthens governance and leads to more sustainable restoration outcomes.”⁵

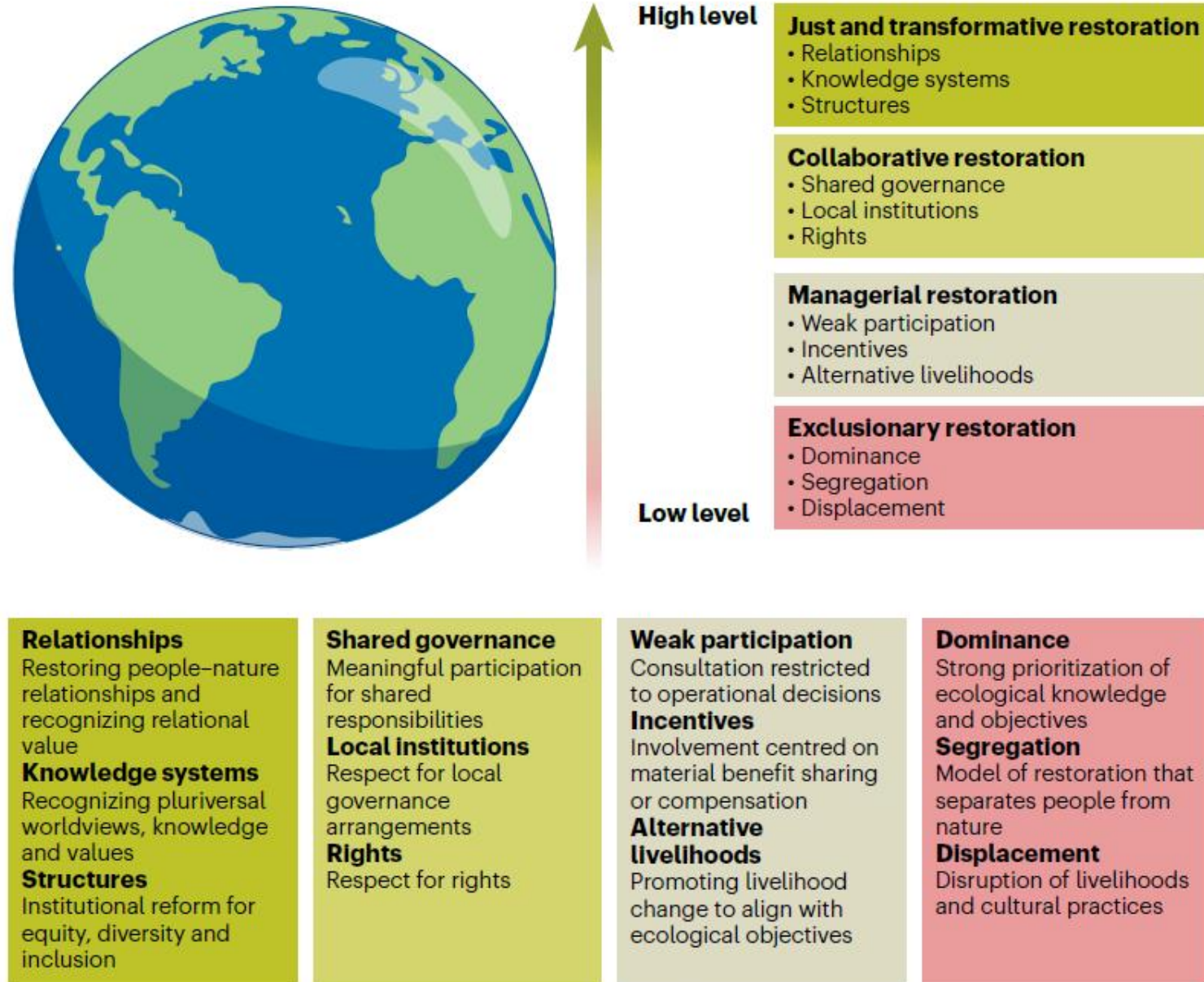
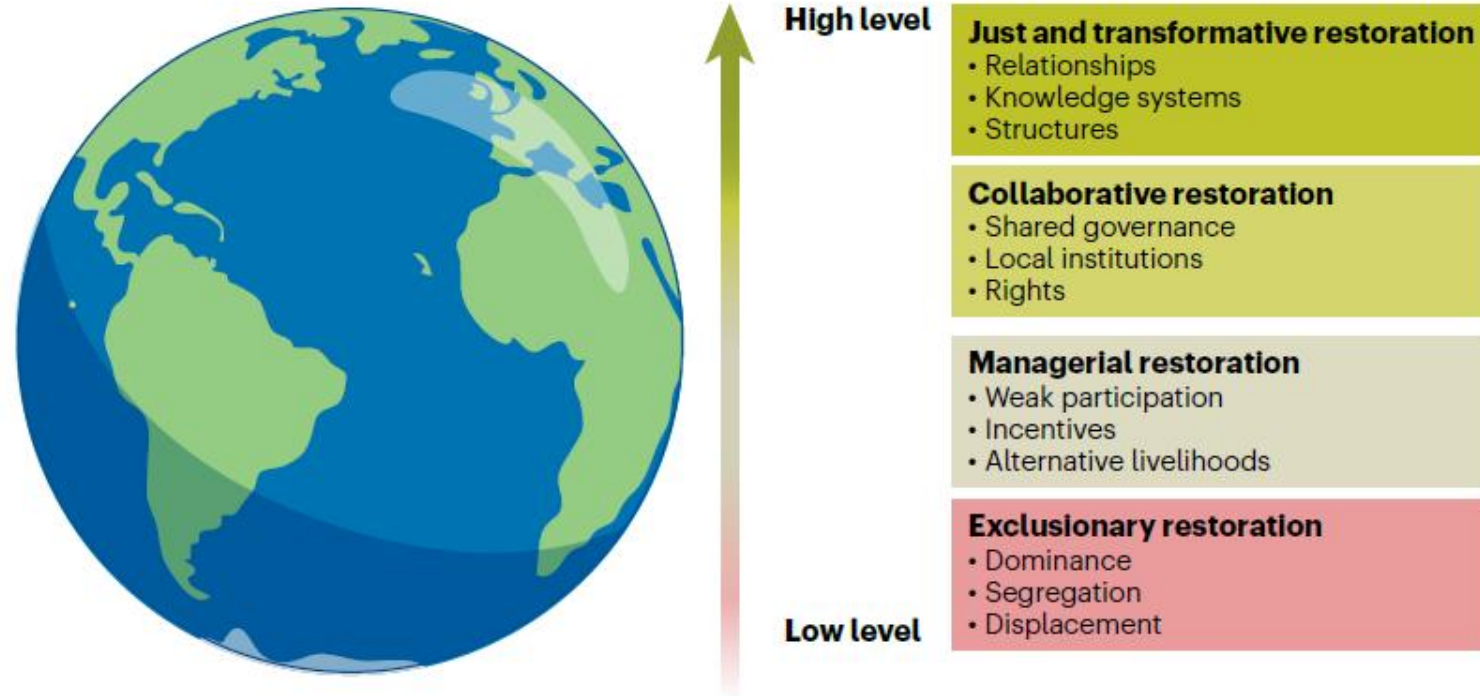


Fig. 2 | Levels of justice required for transformative restoration. Typology of the approaches for integrating social justice concerns into restoration practice. The approaches are listed from high- to low-level integration.



Relationships
Restoring people–nature relationships and recognizing relational value

Knowledge systems
Recognizing pluriversal worldviews, knowledge and values

Structures
Institutional reform for equity, diversity and inclusion

Shared governance
Meaningful participation for shared responsibilities

Local institutions
Respect for local governance arrangements

Rights
Respect for rights

Weak participation
Consultation restricted to operational decisions

Incentives
Involvement centred on material benefit sharing or compensation

Alternative livelihoods
Promoting livelihood change to align with ecological objectives

Dominance
Strong prioritization of ecological knowledge and objectives

Segregation
Model of restoration that separates people from nature

Displacement
Disruption of livelihoods and cultural practices



Fig. 2 | Levels of justice required for transformative restoration. Typology of the approaches for integrating social justice concerns into restoration practice. The approaches are listed from high- to low-level integration.

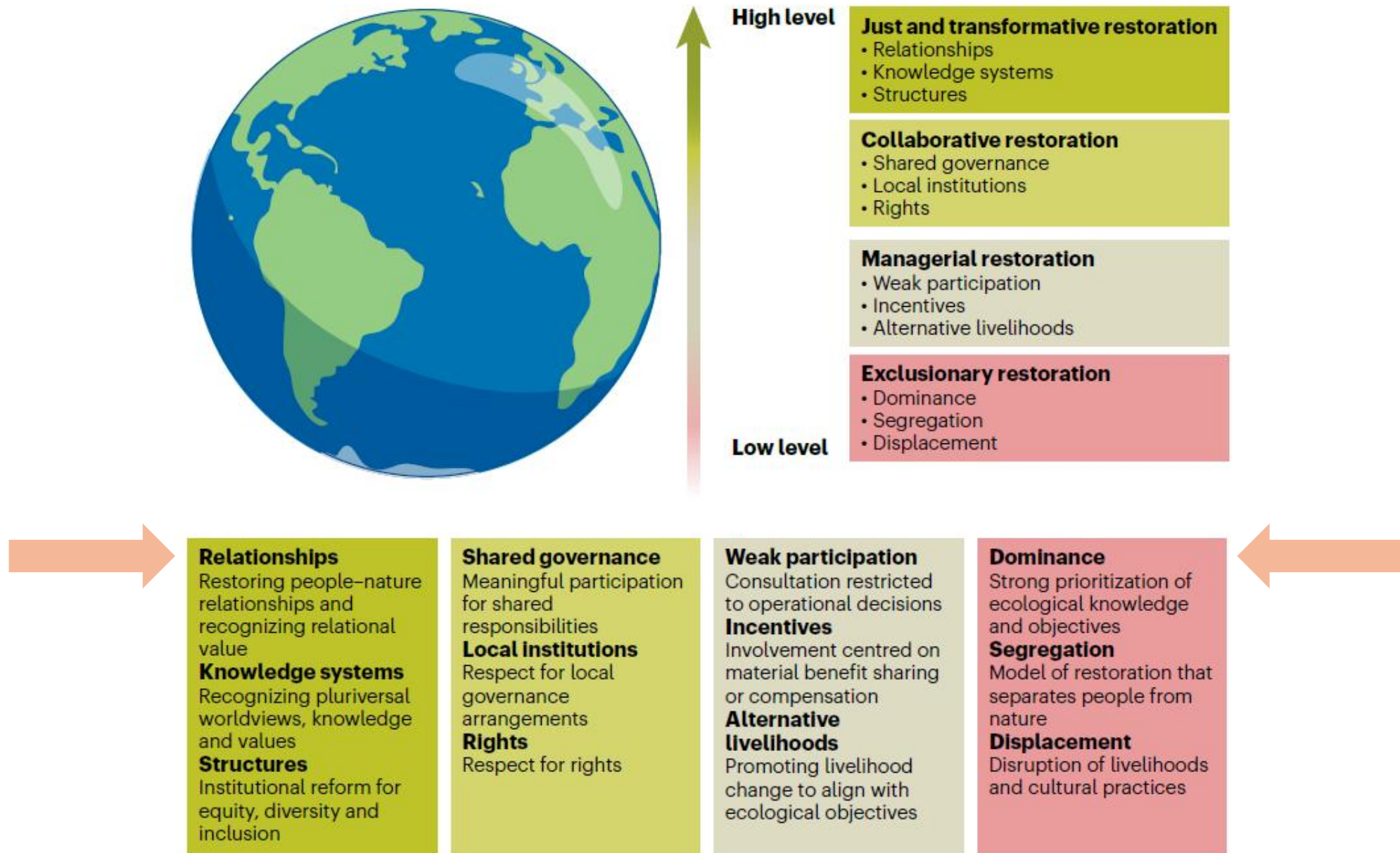
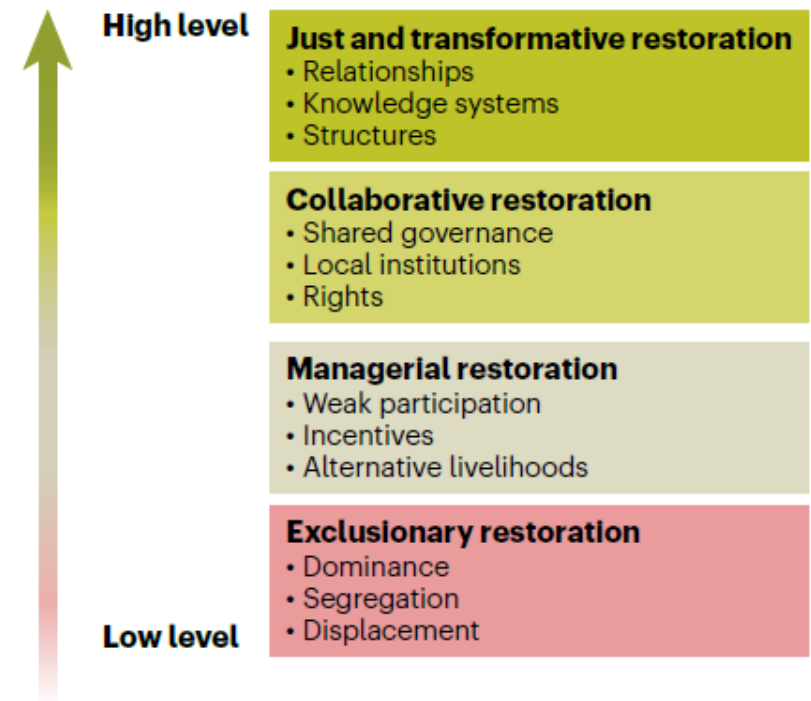


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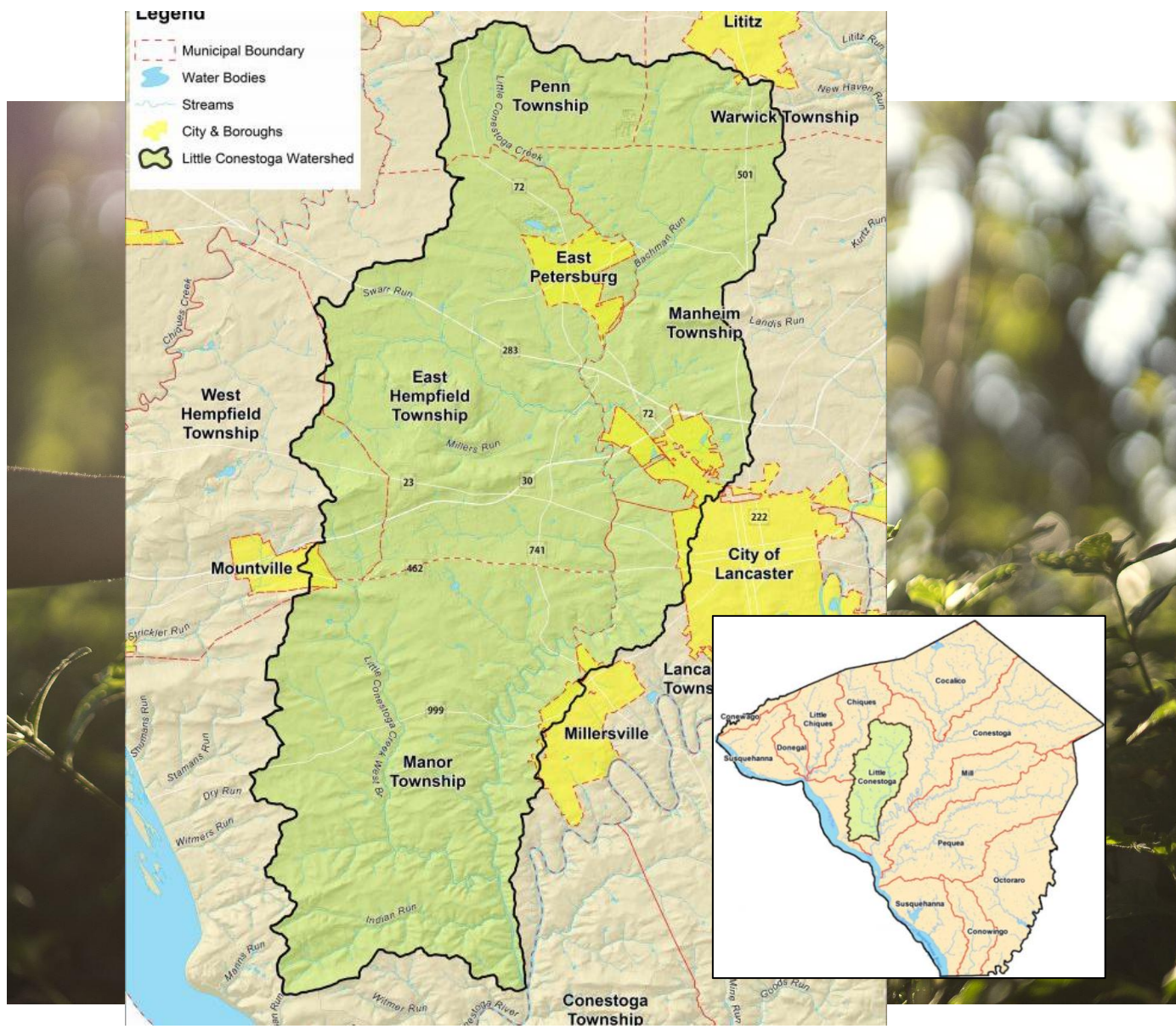
Restoration (Federal Geographic Data Committee²)

Restoration is the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to former or degraded wetlands.

What does it look like to move towards just and transformative restoration?



Practice



What does a *cultural-ecological* relationship mean?



Indigenous Heritage Initiative: Reconnecting Land & Culture

Community-informed framework to learn about past and present cultural-ecological relationships within the Little Conestoga Creek Watershed.

RiverStewards Collaborative

February 19, 2026

[StoryMap link](#)

Process

Surveys

Interviews

Literature Reviews

Focus Groups

University Partnership & Student Research

“
*The past shouldn't be seen as a utopia, or idealized and
romanticized through uncritical nostalgic.*

Stephanie Sexton, Student Researcher at Franklin & Marshall College, April 2025




**INDIGENOUS KNOWLEDGE
IS NOT A METAPHOR OR
WELLNESS TOOL.**



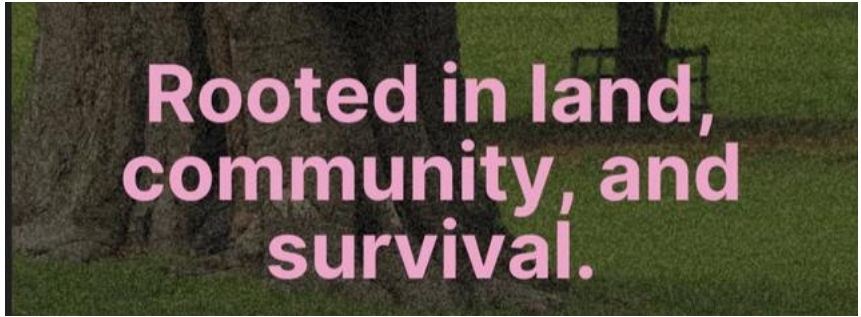
**ROMANTICIZATION
OF INDIGENOUS
KNOWLEDGE IS
NOT RESPECT.**



**It is science,
governance, and
lived practice.**



**Respect requires
consent, citation,
reciprocity, and
accountability.**



**Rooted in land,
community, and
survival.**

Stakeholders

- **Conestoga-Susquehannock Tribe**
Still here, still seeking recognition.
- **Circle Legacy Center**
Dedicated to supporting and empowering the First Nations Peoples of the Americas. Mainly focused on educational and cultural events in Pennsylvania.
- **Blue Rock Heritage Center**
To promote and conserve the history of the Lower Susquehanna River Valley through education, preservation, and restoration.



Blue Rock Heritage Center

- Benton Webber – Lancaster Township Engineer
 - ¹ **Blue Rock Heritage Center** – Charlie Douts, President & Debbie Saylor, Curator
 - Christine Brubaker
 - ¹ **Circle Legacy Center** – MaryAnn Robins; Focus Group Members: Christine Brubaker, Wendy Flandershall, Cheryl Germer, Joann McLaughlin, Alice MyersHall, Barry Kauffman, Jessica McPherson
 - Chapter 28 Lower Susquehanna Archaeological Society, Debbie Saylor, Chairperson
 - ¹ **Conestoga-Susquehannock Tribe** — Andrea Legion, Michael Mantooth & Tiffany Johnson
 - ² Delaware Nation – Katelyn Lucas
 - ² Delaware Tribe – Jeremy Johnson
 - Dr. Ka-ow-dthu-ee (KawaiKa-Laguna name) & Dr. Sippun (Inupiaq name), Mandy Cheromiah, Ph.D. (KawaiKa-Laguna Pueblo), Center for the Futures of Native Peoples
 - Edward W. Wilson, Ph.D.
 - Emily Landis, Steinman Foundation
 - Franklin & Marshall College, Reckoning with Lancaster Initiative – Dr. Eric Hirsh, Associate Professor of Environmental Studies & Dr. Mary Ann Levine, Professor of Anthropology; Student Researchers: Jamie (Abigail) Gavigan & Stephanie Sexton
 - Victoria Valentine
 - LandStudies – Justin Spangler
 - National Wildlife Federation, Artemis Initiative – Annita Lucchesi
 - Indian Steps Museum – Debbie Saylor, Curator
 - Kurt Carr, former Senior Curator of Archaeology at the State Museum of Pennsylvania and retired Head of Archaeology at the PA State Historic Preservation Office and PA Archaeological Council
 - Malinda Harnish
 - Mark Clatterbuck, Ph.D.
 - Mennonite Life, 1719 Museum – Jean Kilheffer Hess & Heather Strahin
 - Millersville University – Dr. Marlene Arnold & Dr. Tanya Kevorkian
 - PA DCNR – Jack Hill, April Frantz & Angie Jaillet-Wentling
 - South Mountain Partnership – Katie Hess & Julia Chain
 - Susquehanna National Heritage Area – Hope Byers, Sophia Vayansky, Amber Freeman & Allison Sholz
- ¹ Stakeholder organization
- ² Chose not to participate

“

There is evidence [of a cultural-ecological relationship] if you know where and how to look, but so many of us do not have that knowledge taught to us.

Anonymous Survey Respondent, March 2024

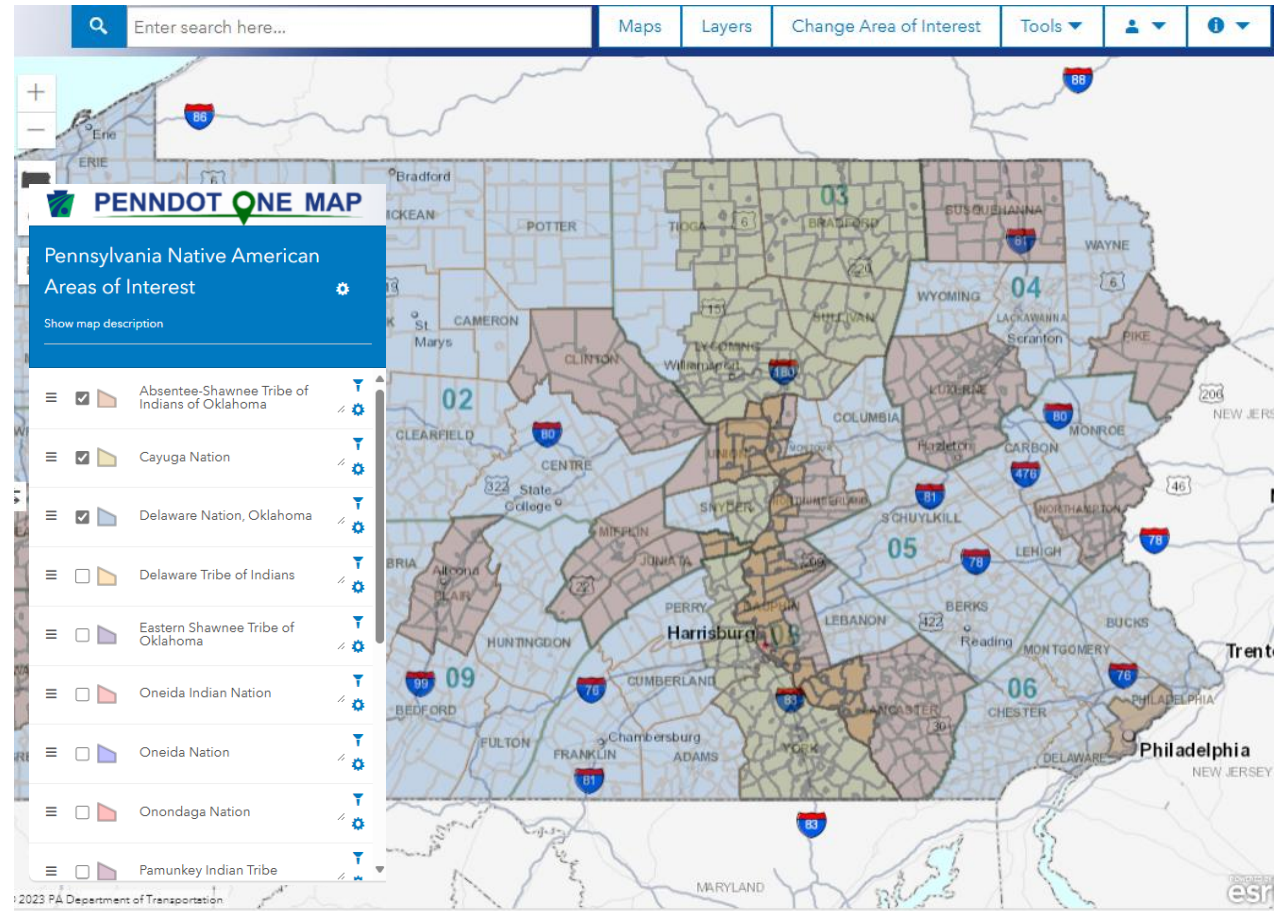
Challenges

Challenges

- Complexity
- Lack of recognition
- Lack of written documentation
- Lack of representation
- Capacity
- Biases

Federally Recognized Tribes and Nations

- Absentee-Shawnee Tribe of Indians of Oklahoma
- Cayuga Nation
- Delaware Nation, Oklahoma
- Delaware Tribe of Indians
- Eastern Shawnee Tribe of Oklahoma
- Pamunkey Indian Tribe
- Saint Regis Mohawk Tribe
- Seneca-Cayuga Nation
- Shawnee Tribe



Our History



Seeking recognition
since 1845

Action



“
How can we challenge conservation organizations to go beyond conserving and/or restoring land to preserve the stories, traditions, and voices that flourished on these lands for generations... to ensure that these legacies endure and grow stronger into the future?

Example question asked during focus group engagement.



RECOGNITION
AND
ACKNOWLEDGEMENT



DUE DILIGENCE



MAKE SPACE,
LISTEN, LEARN /
REBUILD TRUST



SHARE RESOURCES
/ CO-STEWARD



PROMOTE NATIVE
VOICES



EDUCATE

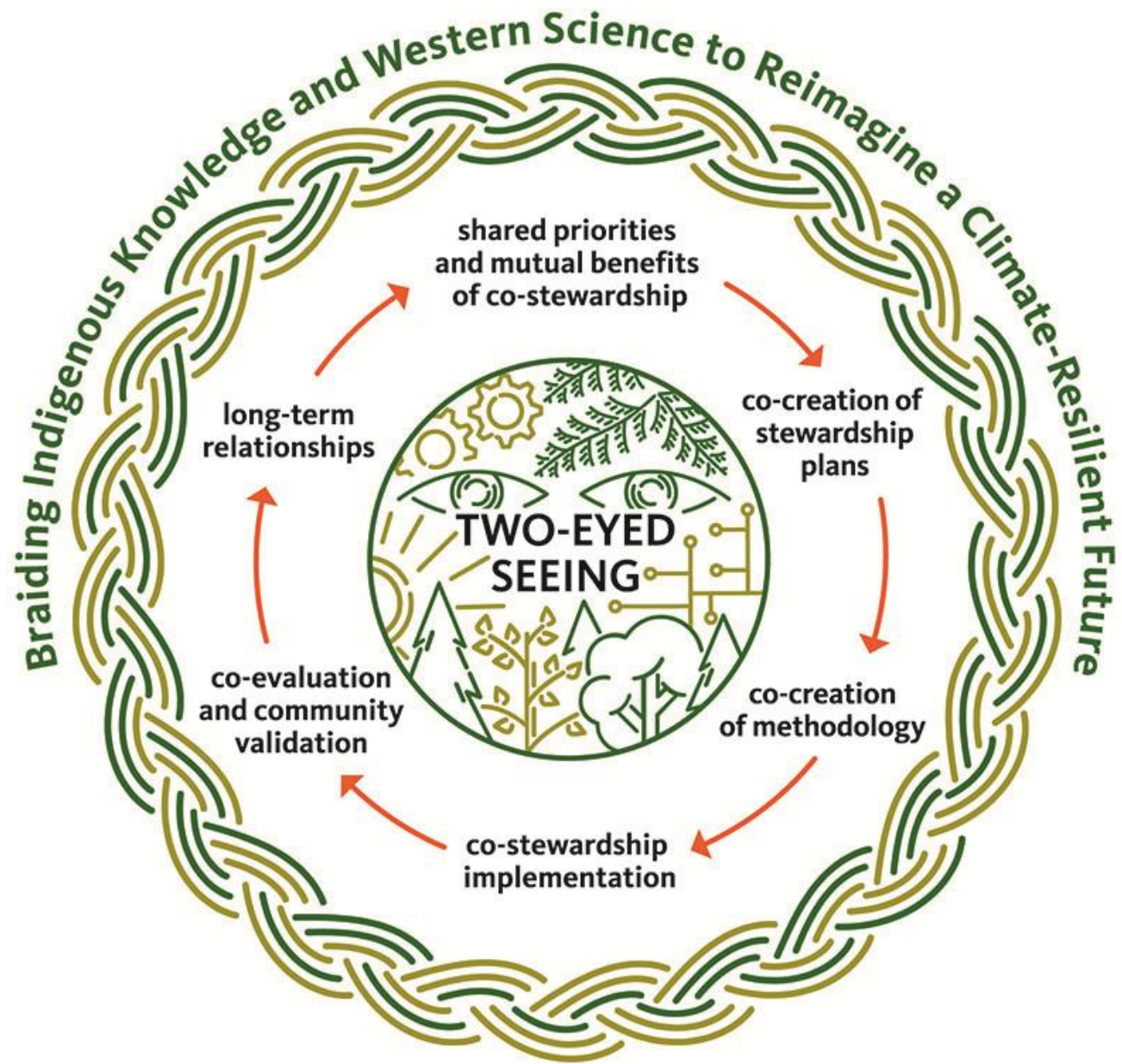
Two-Eyed Seeing (aka Convergent Science⁷)

Conservation professionals
represent the
"science + engineering"

head and hands

Indigenous community
members represent the cultural
relationship to the ecosystem

soul





RECOGNITION
AND
ACKNOWLEDGEMENT

- Recognize tribal sovereignty
 - Whose land is it?*
 - Who benefits from conservation or restoration?*
- Acknowledge past and present tribes
- Use Indigenous names



RECOGNITION
AND
ACKNOWLEDGEMENT

PUTTING IT INTO PRACTICE

Identify past and present Indigenous communities connected to the land

Incorporate Indigenous history and culture into narratives, websites, reports, etc.



DUE DILIGENCE

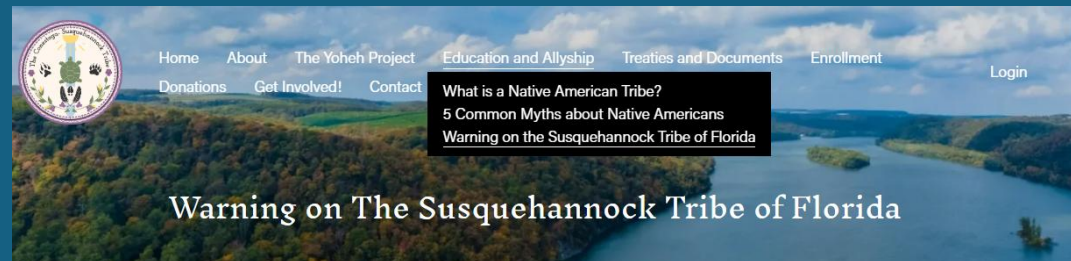
- Learn about Indigenous history and tribal affairs
- Do your research
- Make informed decisions



DUE DILIGENCE

PUTTING IT INTO PRACTICE

Develop policies to ensure due diligence is performed when providing opportunities for Indigenous communities (i.e., confirm tribal enrollment)





EDUCATE

- Add educational signage
- Provide community education
- Develop educational programming for schools and universities
- Communicate the value of the land and the stories it holds



EDUCATE

PUTTING IT INTO PRACTICE

Avoid cultural appropriation

Build relationships

Self-education

Address invisibility



PROMOTE NATIVE
VOICES

- Integrate storytelling meaningfully
- Invite Indigenous community members to share their cultural history and stories during events
- Offer internships or educational opportunities for enrolled tribal members



PROMOTE NATIVE
VOICES

PUTTING IT INTO PRACTICE

Engage in hands-on experiences

Provide mutual on-site learning opportunities



The knowledge is sleeping.

*Corlee Thomas-Hill, Eastern Band of Cherokee Indians (EBCI),
Tribal Liaison for Southeastern Grasslands Institute Tribal Program*



MAKE SPACE,
LISTEN, LEARN /
REBUILD TRUST

- Provide more diverse representation
- Designate a seat at the table
- Provide equal status in decision-making
- Be inclusive and aware
- Listen and be patient



MAKE SPACE,
LISTEN, LEARN /
REBUILD TRUST

PUTTING IT INTO PRACTICE

Implement an Indigenous Advisory Committee

Increase buffer time in projects

Develop a shared Code of Ethics

Sign a Memorandum of Understanding



SHARE RESOURCES
/ CO-STEWARD

- Provide resources for tribes and organizations
- Partner with Indigenous organizations
- Incorporate culturally significant resources into conservation and land management plans



SHARE RESOURCES
/ CO-STEWARD

PUTTING IT INTO PRACTICE

Monitor for culturally relevant species

Develop cultural stewardship plans

Consider access for harvesting

Distribute culturally important resources



INDIGENOUS LAND STEWARDSHIP PROGRAM CONSERVATION STRATEGIES

“Western science and technology, while appropriate to the present scale of degradation, is a limited conceptual and methodological tool – it is the “head and hands” of restoration implementation. Native spirituality is the ‘heart’ that guides the head and hands...Cultural survival depends on healthy land and a healthy, responsible relationship between humans and the land. The traditional care-giving responsibilities which maintained healthy land need to be expanded to include restoration. **Ecological restoration is inseparable from cultural and spiritual restoration.**”

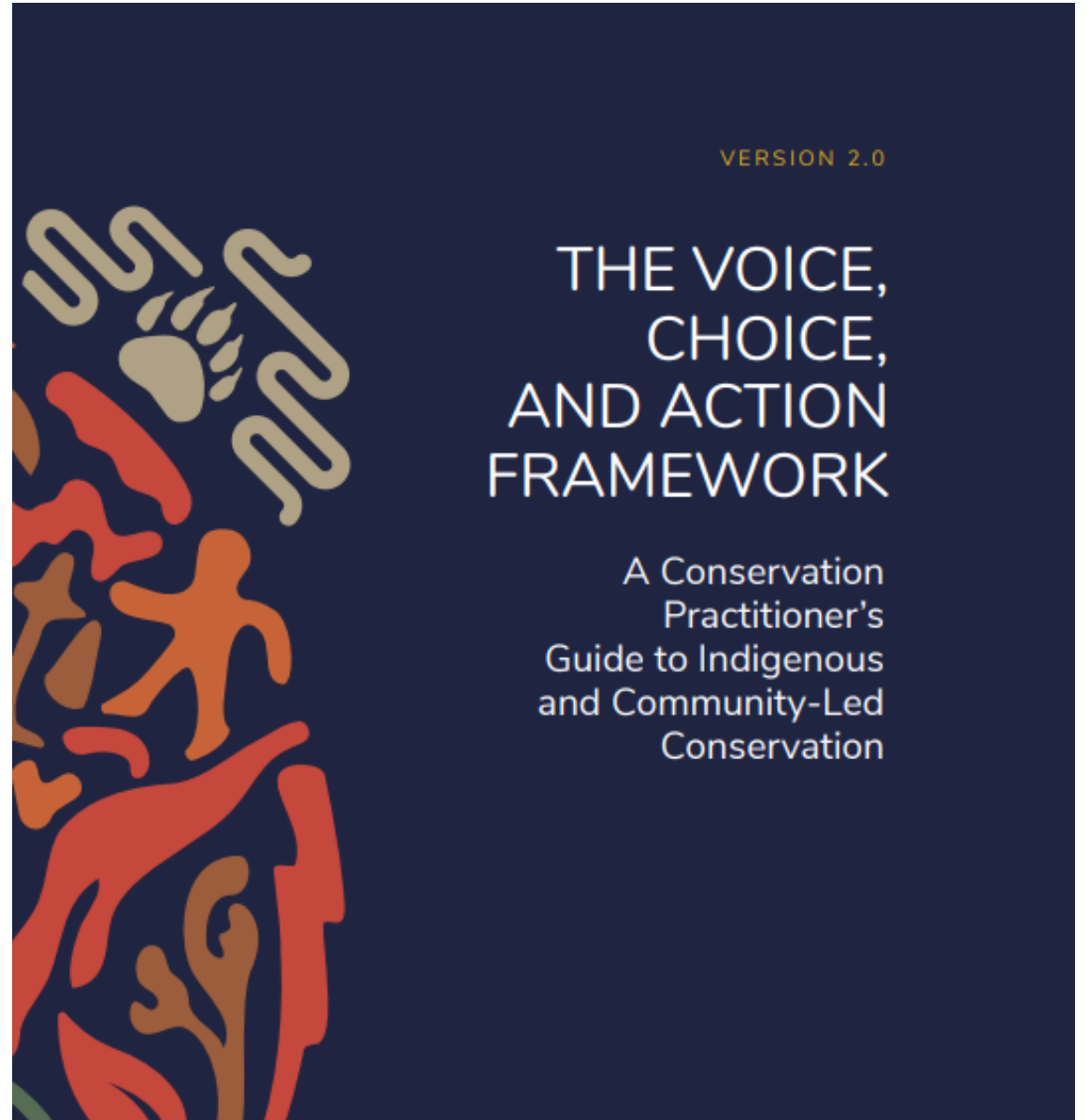
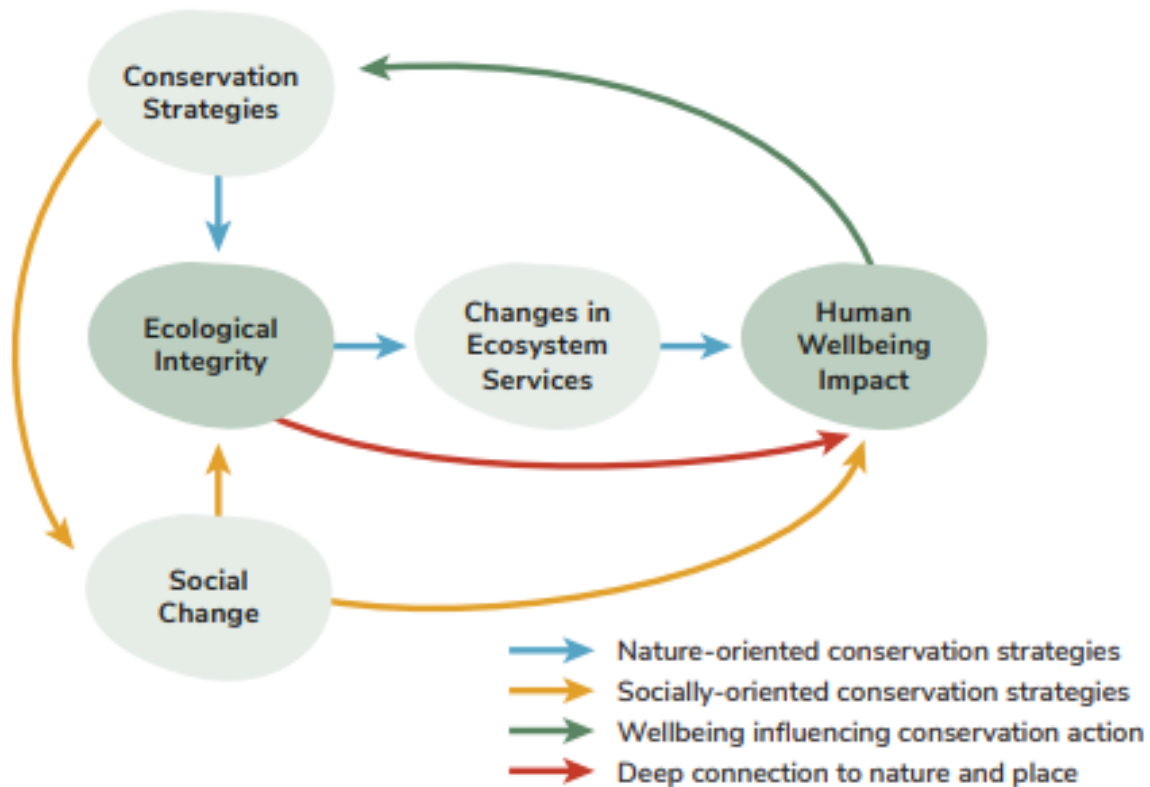
Indigenous Environmental Network, 1994





SGI- Tribal Program Initiatives

- ▶ Prioritize tribal data sovereignty
- ▶ Collaboration without expectation
- ▶ Incorporate Tribally- led Traditional Ecological Knowledge into SGI's conservation planning and projects
- ▶ Support tribal communities by providing access to culturally significant plants and animals at our restoration sites



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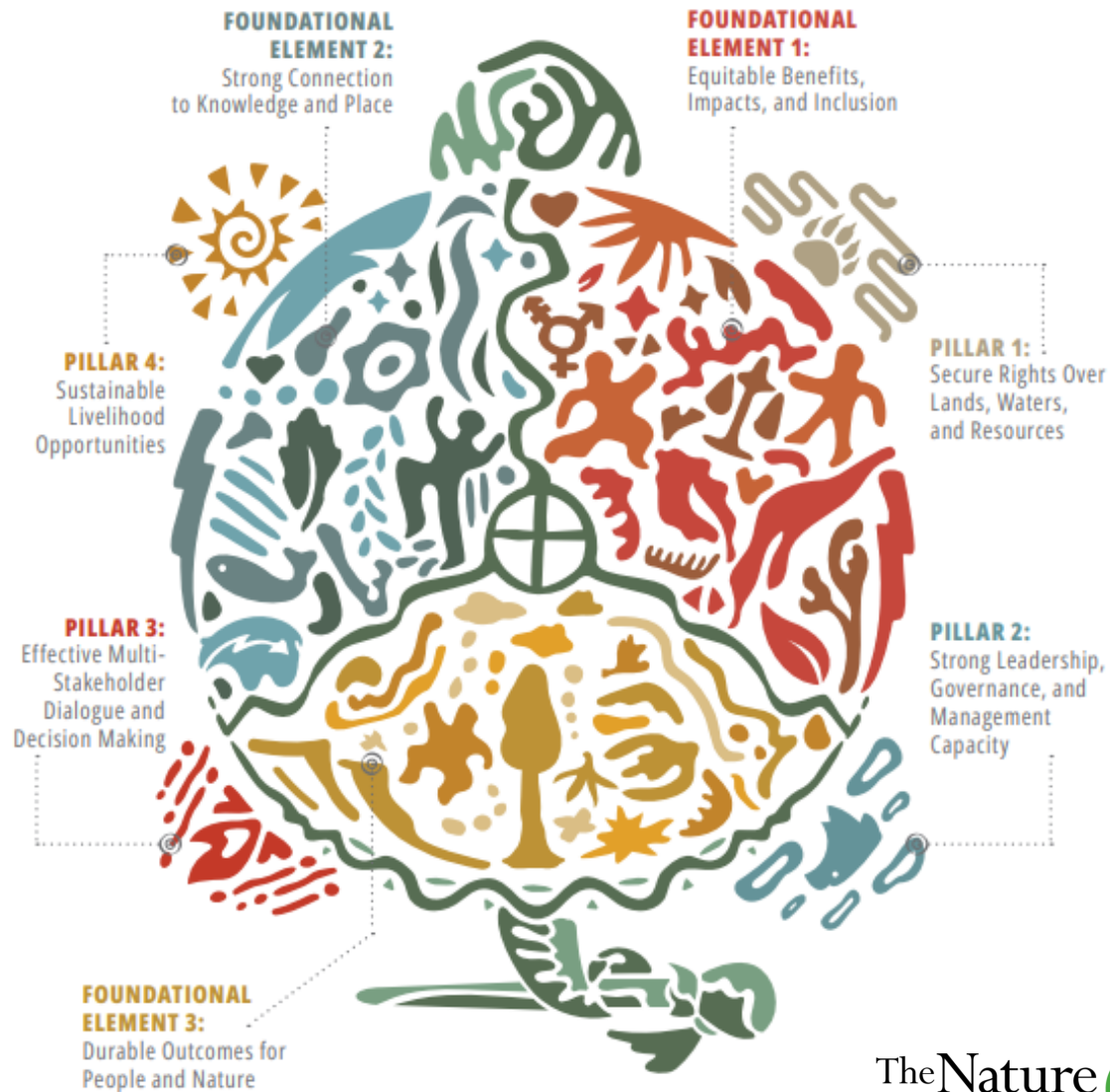


Figure 2: Visual representation of the VCA Framework

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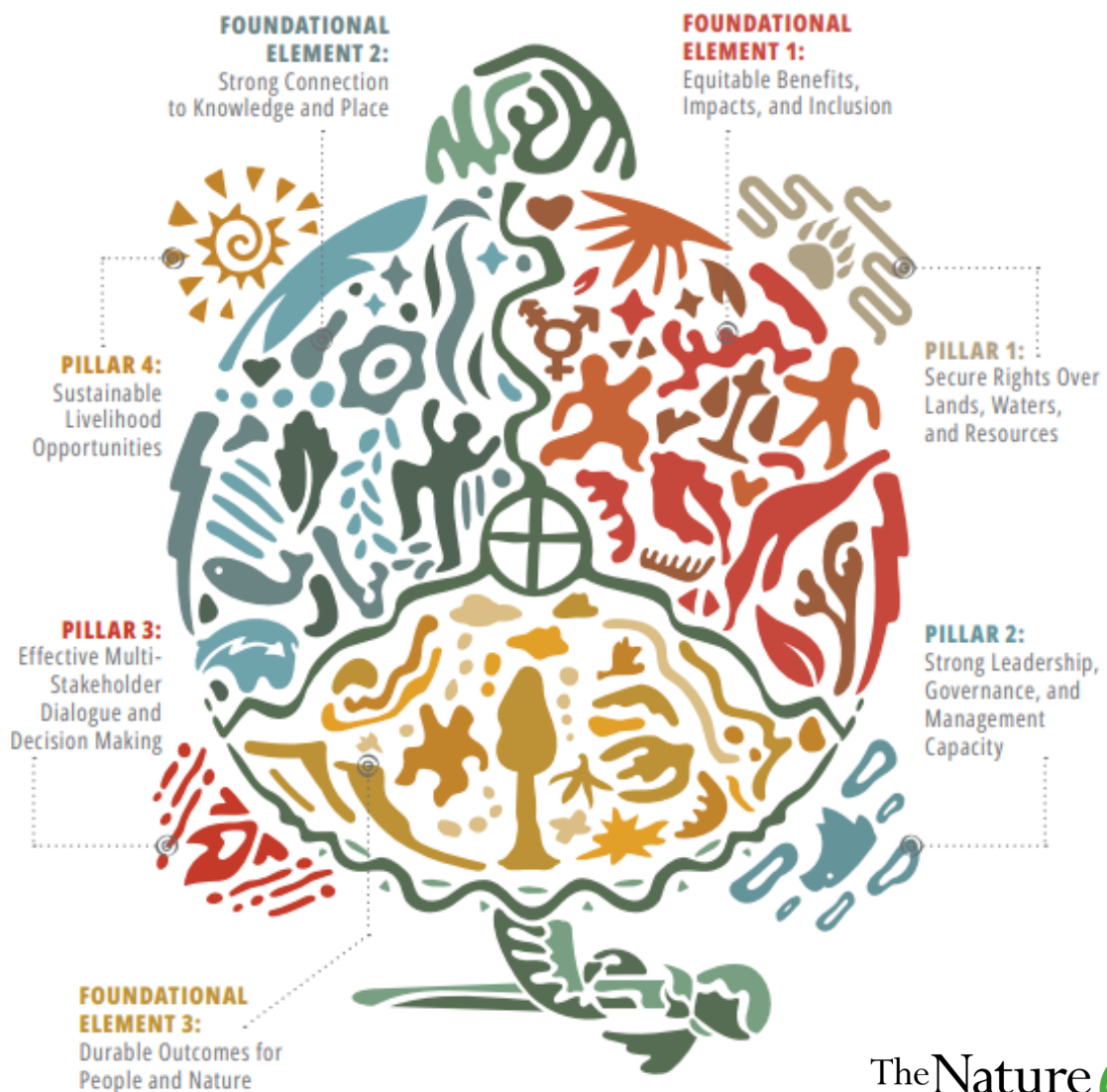


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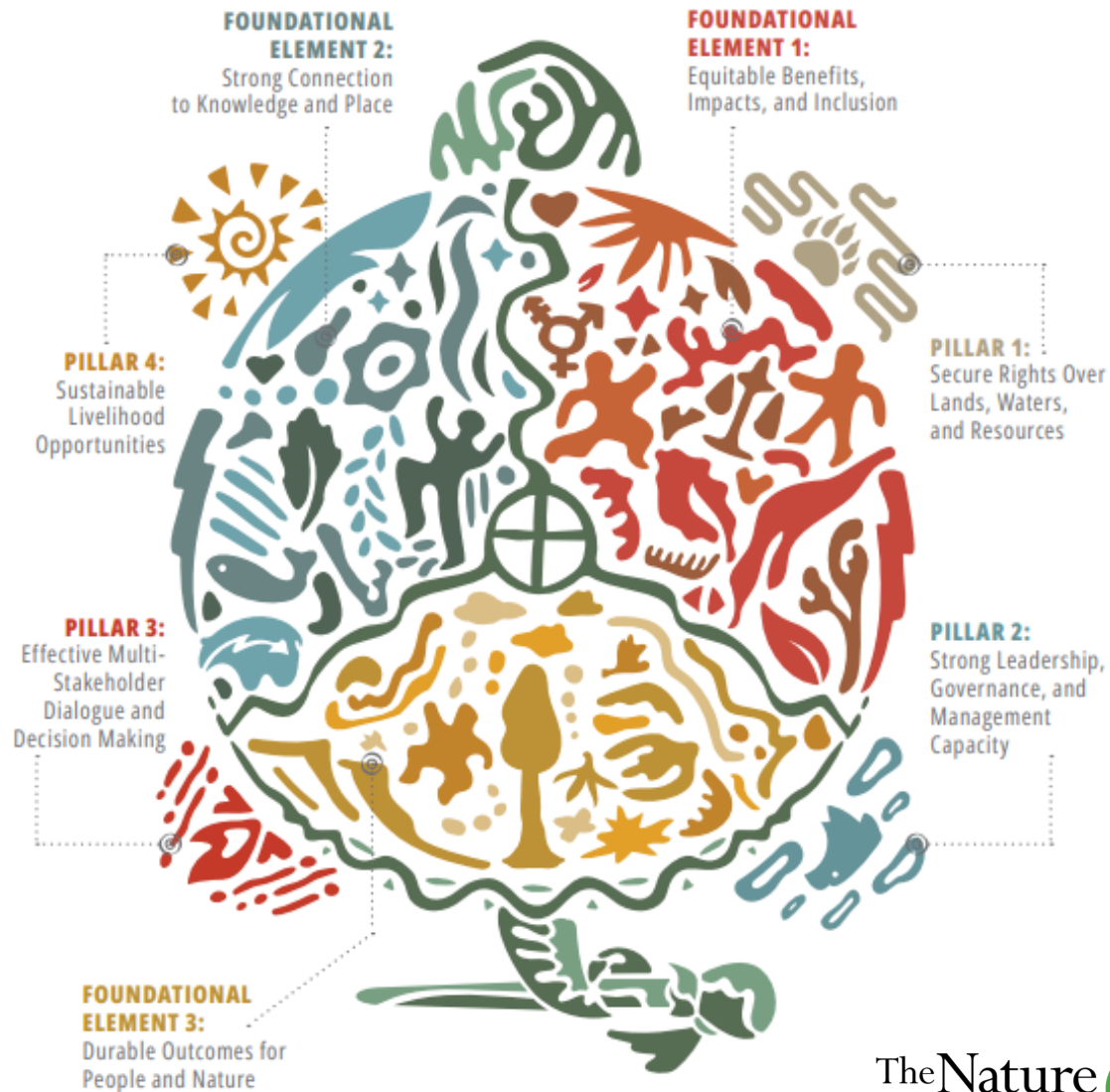


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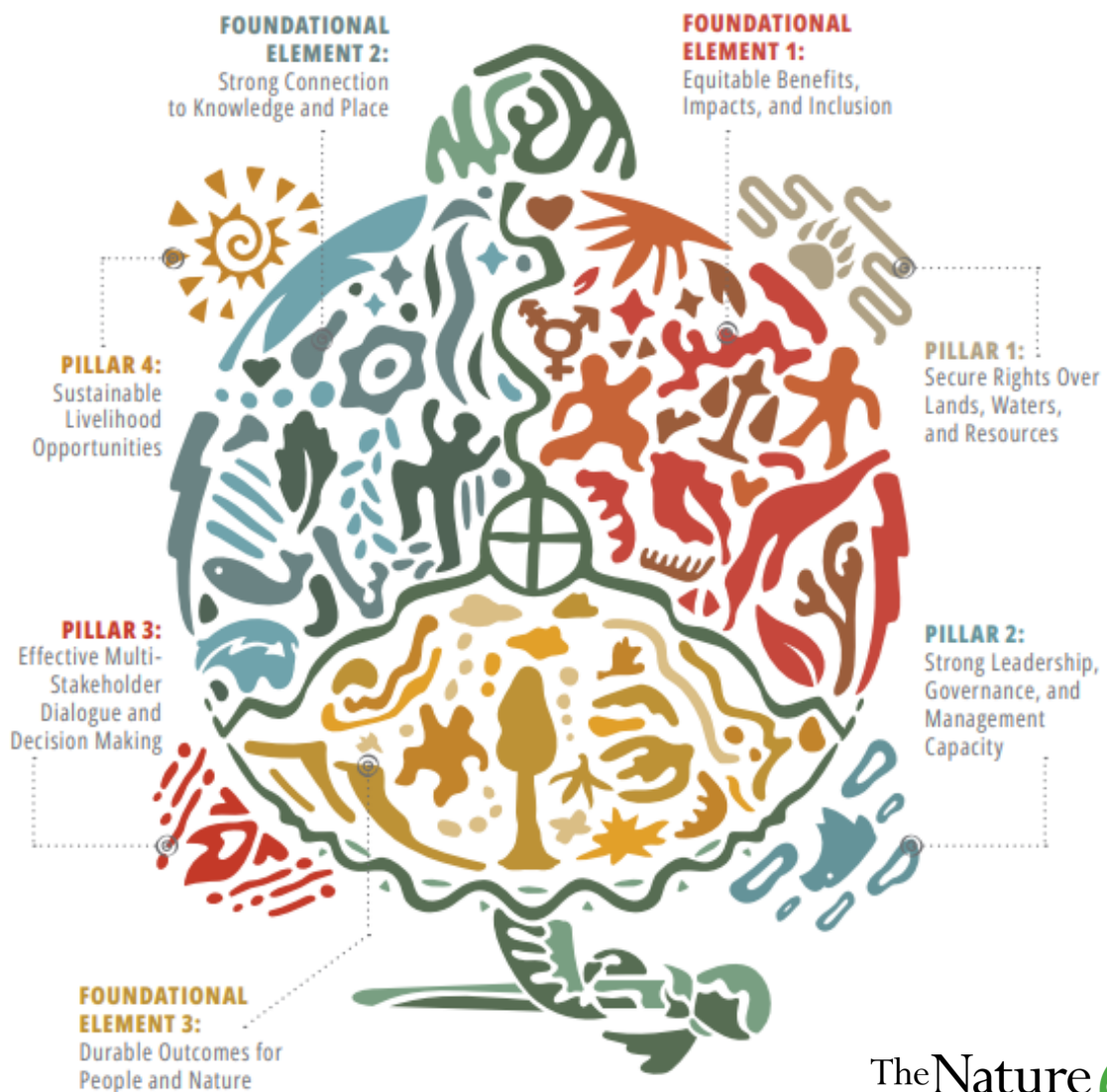


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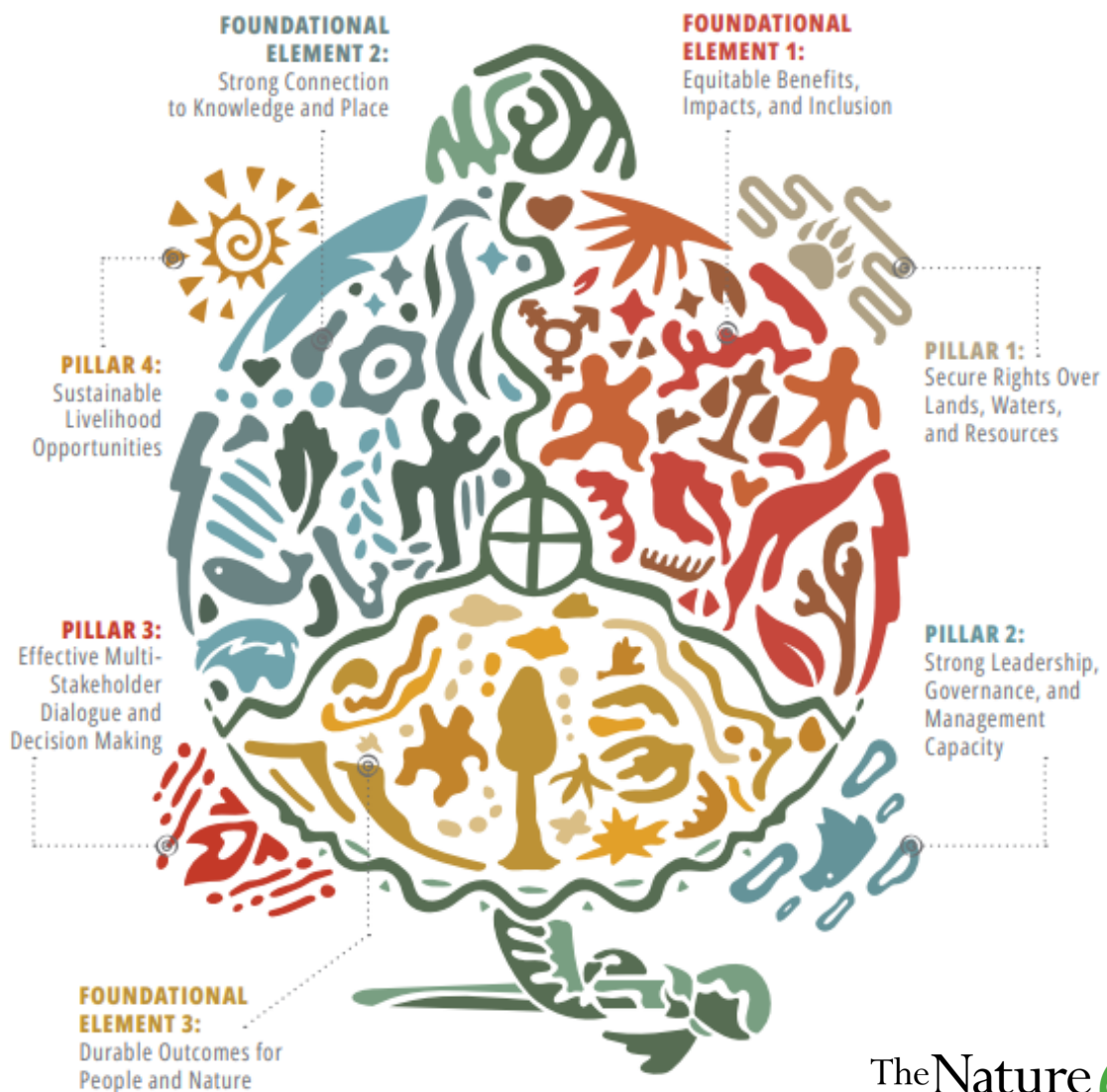


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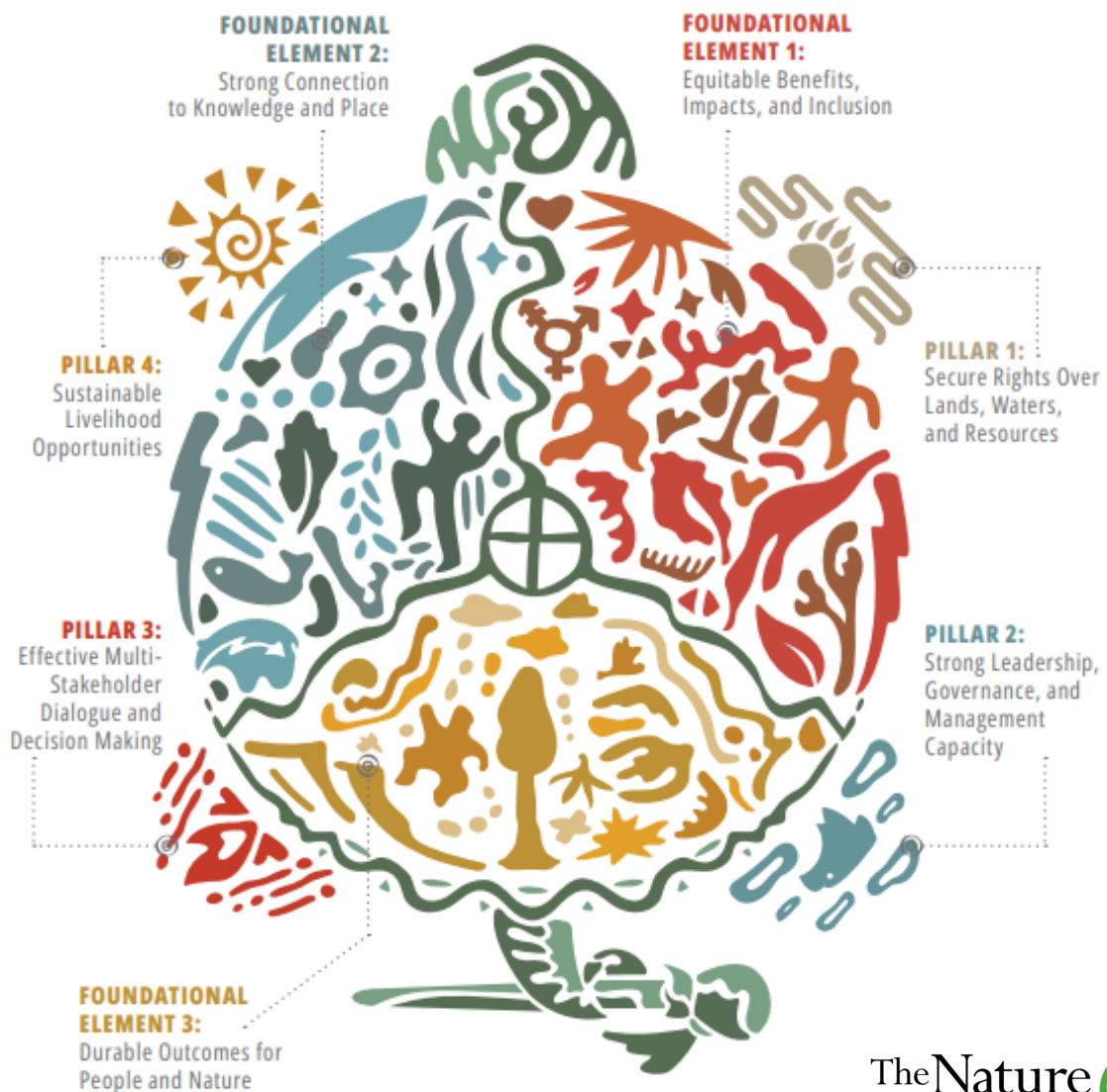


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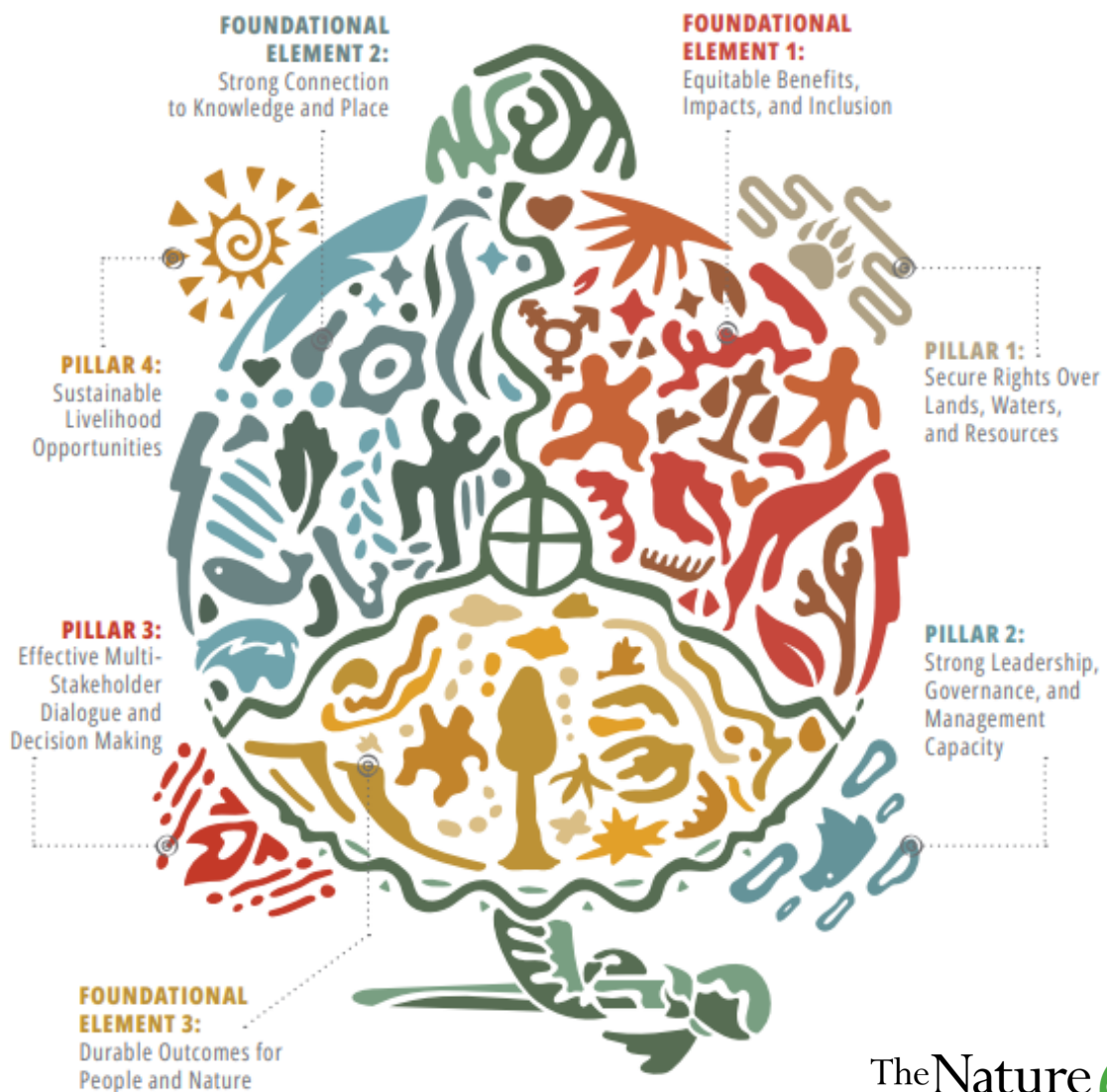


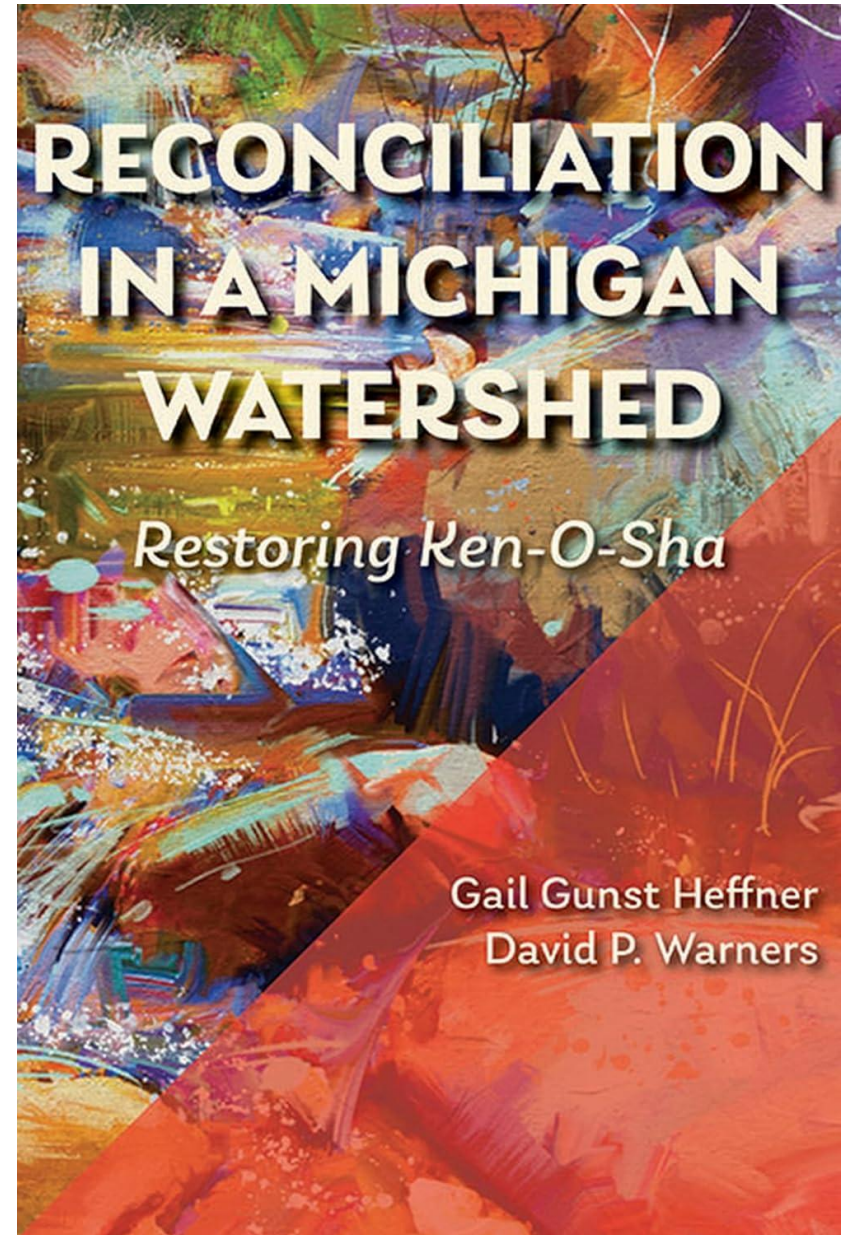
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Steps to **reconciliation ecology**⁸:

- 1) **Recognizing the problem** as the broken relationships among people and between people and the natural world
- 2) **Acknowledging our complicity in the broken relationships** among people and between people and the natural world
- 3) **Motivating restorative action** among people and between people and the natural world



Lessons Learned

Don't force things

Be open and transparent

Establish trust and good relationships

Have an open mind

Allow the process to inform the outcome

“If organizations need to be incentivized to work with Native people, then they probably aren't safe to work with Native people [paraphrased]” - Annita Lucchesi

Highlights

Value in this work

Mutual learning opportunities

Relational, not transactional

Environmental justice

There is no precedent in PA

Indigenous knowledge is not for extraction



Indigenous science is rooted in place-based knowledge, relationships, and responsibilities, and therefore cannot be treated as a resource to be extracted by outside researchers.



Instead, researchers must engage through genuine partnership, uphold community authority, and honor protocols that safeguard the integrity of the knowledge and the people who hold it.



Indigenous science belongs to the communities who steward it, and it carries cultural, spiritual, and ecological significance that requires consent, reciprocity, and respect.



Treating Indigenous science as data to be taken ignores its living context and erases the relationships that sustain it, ultimately undermining Indigenous sovereignty and community authority.



¹Kimmerer, Robin Wall. 2015. Braiding Sweetgrass. Minneapolis, MN: Milkweed Editions.

²[EPA – Restoration](#)

³[SER International Principals and Standards for the Practice of Ecological Restoration](#)

⁴[SUNY ESF - Biocultural Restoration](#)

⁵Martin et. al. Towards just and transformative social-ecological restoration. *Nature Sustainability* (2025).

⁶[Earth Daughters](#)

⁷[Oregon State University College of Forestry – Traditional Ecological Knowledge Lab – Two Eyed Seeing](#)

⁸Gunst Heffner, Gail and Warners, David P. 2024. Reconciliation in a Michigan Watershed: Restoring Ken-O-Sha. East Lansing MN: Michigan State University Press

Sources

Additional resources:

Anderson, M. Kat. 2013. Tending the Wild: Native American Knowledge and the Management of California's Natural Resources. University of California Press.

Bureau of Indian Affairs [Tribal Leader Directory](#) – Contacts for federally recognized Tribes and Nations within the U.S.

[Federal Register](#) – Current list of federally recognized Tribes and Nations within the U.S.

LandStudies Education – [Publications](#) & [Digital Soil Monoliths](#)

[PennDOT One Map](#) – Shows which federally recognized Tribes and Nations have ancestral ties to land in PA

[Society for Ecological Restoration](#)

Stakeholder websites:

[Circle Legacy Center](#)

[Conestoga-Susquehannock Tribe](#)

[Blue Rock Heritage Center](#)



Thank you!

Questions?

Contact information:

laurel@riverstewards.info

ahannigan@landstudies.com