

# LOW-TECH PROCESS-BASED RESTORATION OF RIVERSCAPES

## VIRTUAL WORKSHOP Synthesis – Call to Action August 14, 2020



Workshop by:

**Utah State University**  
RESTORATION CONSORTIUM



United States  
Department of  
Agriculture

Natural Resources Conservation Service

Sponsored by:



Hosting &  
Facilitation by:



# Hanging Chads

- Follow up Survey
- LTPBR Mailing List
- Resources
- You contribute...
- Certificate of Participation
- Network
- Professional Credit (CEU vs. University Credit)
- Your Questions → FAQs
- Sharing

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**REGISTER**  
your BDA Project  
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First five people to enter five  
or more projects, will also get  
a signed copy of Eager

<https://bda-explorer.herokuapp.com/>

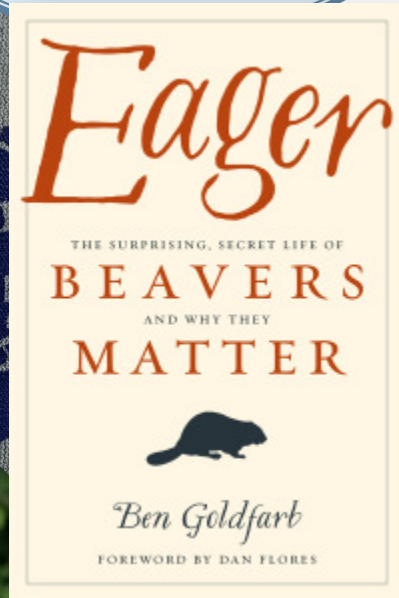
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Low-Tech PBR SWAG

**#lowtechPBR**

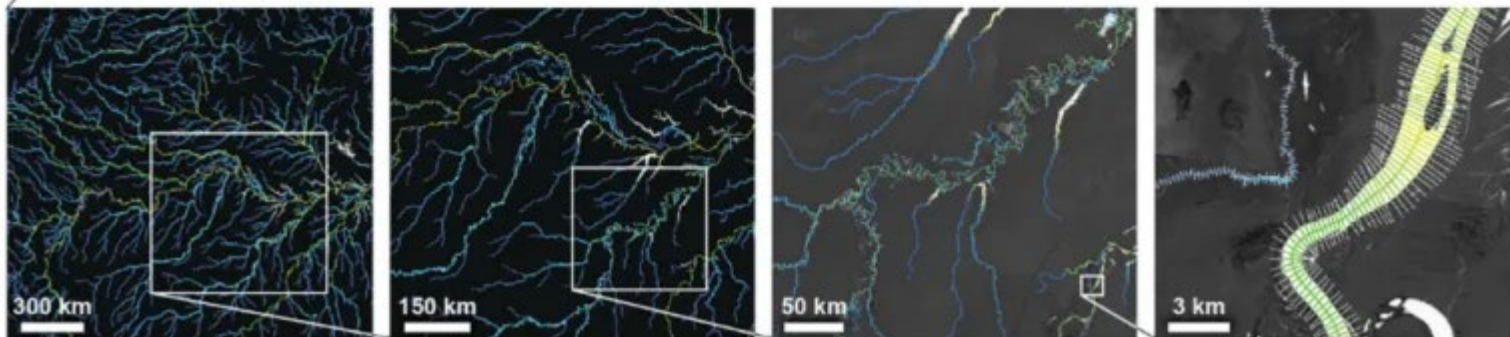




# Don't forget, how serious this is...



“Rivers are the most impacted ecosystems worldwide (Best 2019, Sabater et al. 2018, Tickner et al. 2020, Vorosmarty et al 2010)... ” – Barbra Belletti & Herve Piegay



Global extent of rivers and streams Allen & Pavelsky (2018): Science  
DOI: [10.1126/science.aat0636](https://doi.org/10.1126/science.aat0636)



# Some of our (instruction team) goals:

By **2020**:

Through partnerships with our clients:

- ✓ Promote adoption of low-tech process-based pilot projects across the full diversity of land management groups and physiographic settings in the Western States
- ✗ ? Directly be involved in design and restoration ~ 50 miles implementation of dozens of projects spanning 100's of miles of streams, building > 10,000 structures and share what we learn (successes and failures) with others. ~ 2500 structures
- ✓ Discover and spread the adoption of as many new low-tech PBR solutions .
- ✓ Support and influence agencies, watershed councils, tribes, landowners and stewards of riverscapes to help give them the tools and the confidence to tackle 100's of pilot projects and make the transition to full-scale implementation projects (e.g. 10's to 100's of miles)..



By **2025**, we hope to have:

- Helped change the way restoration practitioners think about restoration throughout the world, and instill a 'cheap and cheerful' ethos. This is not just about littering streams with low-tech, hand-built structures. Rather, this is about getting practitioners to think about what they're really trying to achieve and using those limited and precious restoration dollars as wisely as possible to extend their impact as far as possible (i.e. PBR light).
- Directly be involved in design and restoration of 100's of projects spanning 1000's of miles of streams.
- Support others in design and restoration of 1000's of projects spanning tens of 1000's of miles of streams.
- Be able to rigorously document, and publish in peer-reviewed scientific literature the positive impact (and any unforeseen consequences) of above restoration actions on target populations and ecosystems of management concern.

All the while, we will:

- Take great care of our employees and create an inspiring and supportive environment to work in that fosters creativity, diversity and innovation.
- We will invest back in the communities and causes we care about through volunteer work, subsidizing projects and efforts we can, and investing in research & development that can yield scientific results that can inform and improve policy, planning and practice in restoration and conservation.
- Have fun while doing it.

From:

<http://www.anabrancheolutions.com/about.html>c

# On Behalf of Instruction Team



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Journalist)



THERE IS STRENGTH IN NUMBERS  
RESTORATION PRINCIPLE 6.

THANK YOU

For helping **Build** and **Be** the workforce!



CC Jeremy Maestas

See Wheaton et al. (2019, p. 283)

Chapter 7 of LTPBR Manual

DOI: [10.13140/RG.2.2.18332.33922](https://doi.org/10.13140/RG.2.2.18332.33922).



# Key Processes to **DESIGN** & **SOLVE** for!!!



From Shahveridan et al. (2019)

Chap 4 LTPBR Manual

DOI: [10.13140/RG.2.2.22526.64324](https://doi.org/10.13140/RG.2.2.22526.64324)



# Genuine Partnerships

## BEEF

Animal Health

Market Reports

Management

BEEF Vet

Cow-Calf

Our Ev



MIDDAY Midwest Digest, March 3, 2020



MAR 03, 2020

Farm Progress America, March 3, 2020



MAR 03, 2020

SPONSORED CONTENT

Autogenous vaccines: A targeted option for bovine enteric diseases



## Beaver power provides year-long water to Idaho ranch

Beavers? You read that right. Here's how four-legged engineers helped restore an Idaho ranch.

By Brianna Randall | Feb 20, 2020

Beavers are some of nature's best engineers. They were key to improving the water supply to one Idaho rancher's pastures.



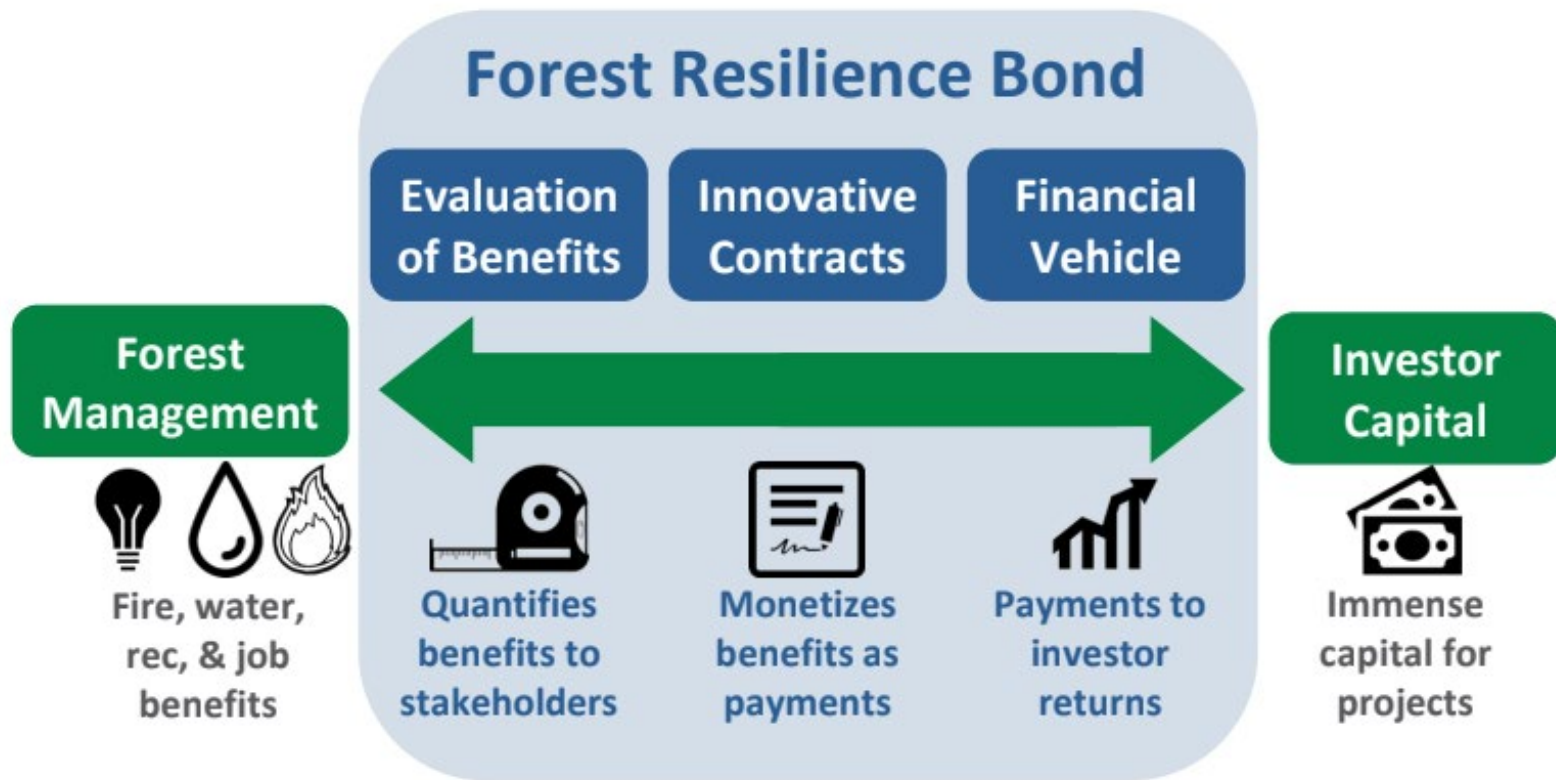
Beavers are some of nature's best engineers. They were key to improving the water supply to one Idaho rancher's pastures.

Jay Wilde's story of restoring perennial flow to his creek using beaver...

[http://capstone.restoration.usu.edu/Course\\_Topics/WATS\\_5350/Low-Tech/Projects/birch/](http://capstone.restoration.usu.edu/Course_Topics/WATS_5350/Low-Tech/Projects/birch/)

# Creative Financing to Scale Restoration to Scope of Problem

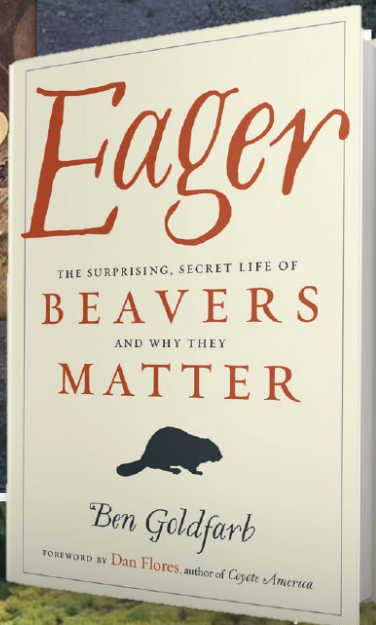
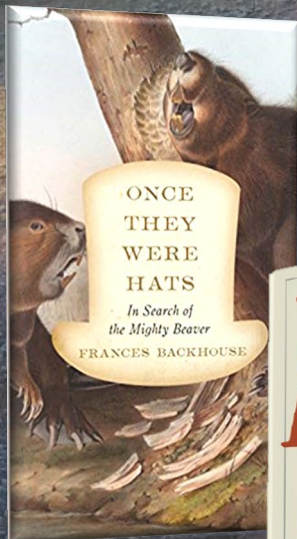
## Connecting Investor Capital to Conservation





A

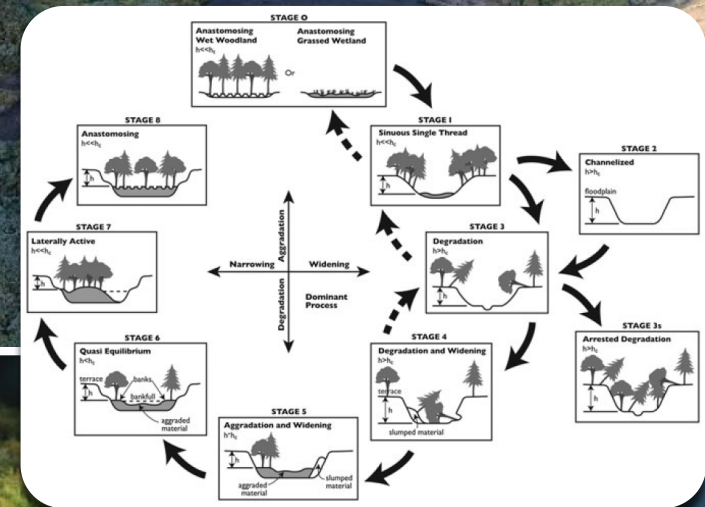
# We forgot what valley bottoms could be & that **STAGE 0** was **NOT** an anomaly!



CC Joe Wheaton

E

Stage 0 or 8  
Anastomosing



From: Cluer & Throne (2013)

DOI: [10.1002/rra.2631](https://doi.org/10.1002/rra.2631)

Adapted from Figure 1.7 (p 36) of Shahverdian et al. (2019) –  
Chapter 1 LTPBR Manual DOI: [10.13140/RG.2.2.14138.03529](https://doi.org/10.13140/RG.2.2.14138.03529)

CC Joe Wheaton



# Shared Vision: **Resiliency**

## By re-wetting the “sponge”



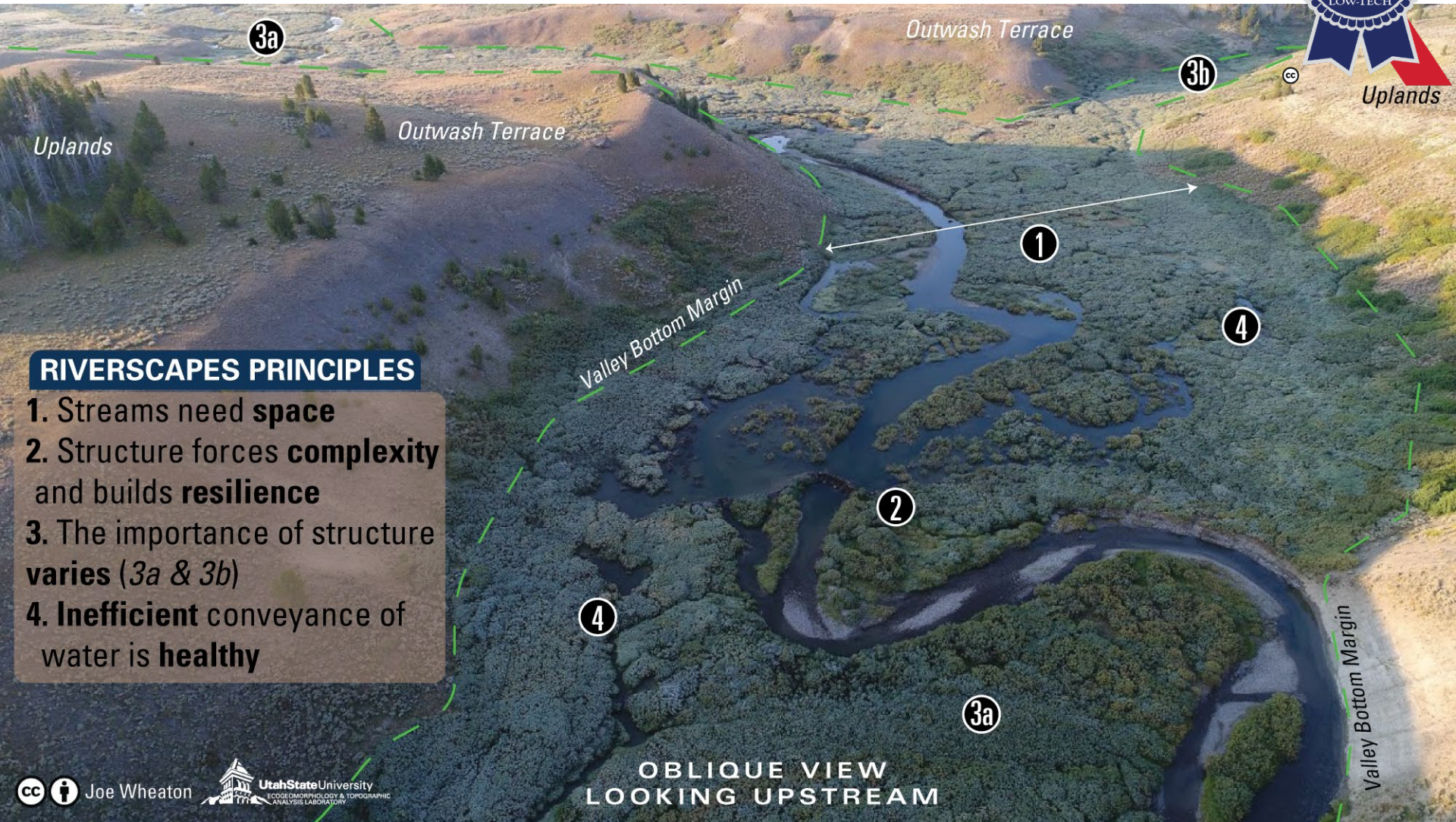
Natural  
Storage

Soil Moisture  
↓  
Productivity  
↓  
Resiliency





# Riverscapes Principles



## RIVERSCAPES PRINCIPLES

1. Streams need **space**
2. Structure forces **complexity** and builds **resilience**
3. The importance of structure **varies** (3a & 3b)
4. **Inefficient** conveyance of water is **healthy**

From pages 3-4 of Pocket Guide; Wheaton et al. (2019)

DOI: [10.13140/RG.2.2.28222.13123/1](https://doi.org/10.13140/RG.2.2.28222.13123/1)

See Wheaton et al. (2019, p 60): Chapter 2 LTPBR Manual for Principles

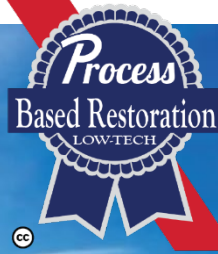
DOI: [10.13140/RG.2.2.34270.69447](https://doi.org/10.13140/RG.2.2.34270.69447)



## RESTORATION PRINCIPLES

5. It's okay to be **messy**
6. There is strength in **numbers**
7. Use **natural** building materials
8. Let the system **do the work**
9. **Defer decision making** to the system
10. **Self-sustaining** systems are the solution

# Restoration Principles



From pages 3-4 of Pocket Guide; Wheaton et al. (2019)

DOI: [10.13140/RG.2.2.28222.13123/1](https://doi.org/10.13140/RG.2.2.28222.13123/1)

See Wheaton et al. (2019, p 72)

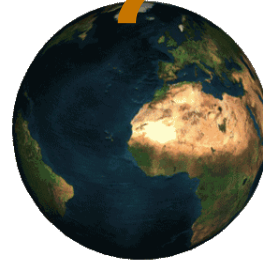
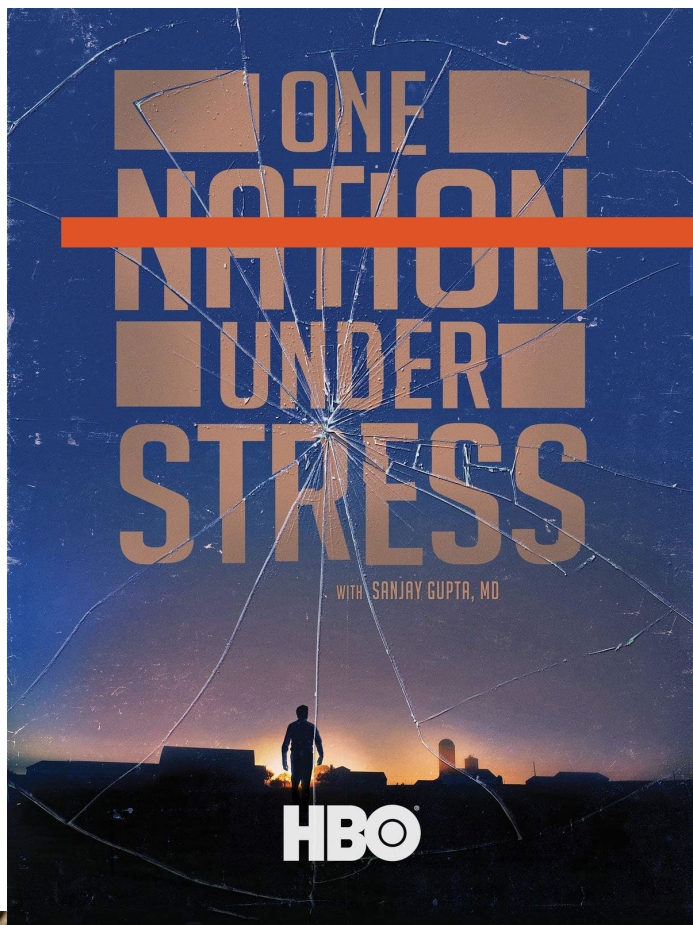
Chapter 2 LTPBR Manual for Principles

DOI: [10.13140/RG.2.2.34270.69447](https://doi.org/10.13140/RG.2.2.34270.69447)



[illegible]





Ecosystem(s)  
e.g. Riverscape under stress



thriveglobal.com

## One Nation Under Stress: Sanjay Gupta Shows How Stress Is Killing Us

Examples of chronic stressors include:

- Disease and disorders, like chronic pain.
- Abuse of any kind, including mental and emotional.
- The loss of a job, loved one as a result of death, or a spouse due to divorce.



"Could it be that a society gets so stressed out that it actually starts to break?"

— DR. SANJAY GUPTA



# If you have not already, please read Chapter 7

## Chapter 7 – CALL TO ACTION, ADDITIONAL RESOURCES & CONCLUSIONS



**Learning:** workshop participants building a post-line wicker weave structure, in a parking lot.

Prepared by:

Joseph M. Wheaton, Stephen N. Bennett, Nicolaas Bouwes, Reid Camp, Christopher E. Jordan, Jeremy D. Maestas, & Scott M. Shahverdian

### Recommended Citation:

Wheaton, J.M., Bennett, S.N., Bouwes, N., Camp, R., Jordan, C.E., Maestas, J.D. and Shahverdian, S.M., 2019. Chapter 7 - Call to Action, Additional Resources & Conclusions. In: J.M. Wheaton, S.N. Bennett, N. Bouwes, J.D. Maestas and S. Shahverdian (Editors), Low-Tech Process-Based Restoration of Riverscapes: Design Manual. Utah State University Restoration Consortium, Logan, Utah, 7 pp.

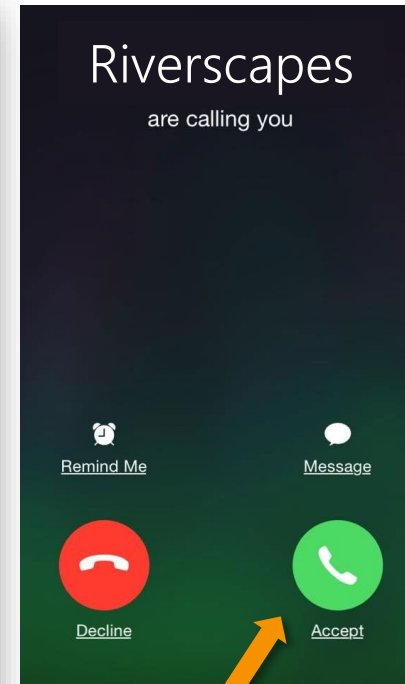


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### CALL TO ACTION

Scaling restoration to match the scope of degradation will require a re-imagining of what's possible and an expansion of the restoration toolbox to include low-tech process-based approaches that get more people off the sidelines and into riverscapes restoration. In the American West alone, it is estimated that conservatively between 50,000 to 100,000 miles of perennially flowing riverscapes are degraded (USEPA, 2016), depending on definitions of degradation, choice of indicators of stream health, or the bar we set for stream recovery. The impairments to riverscapes are well understood and documented (Allan, 2004; Montgomery and Wohl, 2003), but the sobering scope of this degradation is often not emphasized enough. The grand challenge is what to do about it. As practitioners, scientists, land owners, and resource managers, do we standby, continue to observe and accept this degradation? Do we settle for the economic, social and environmental consequences that go along with these more vulnerable riverscape states? Or do we re-imagine what these riverscapes could be and invest in re-establishing sustainable and resilient riverscapes and, in turn, the communities and ecosystems that depend on these riverscapes?

In the [Fourth National Climate Assessment](#), the U.S. Global Change Research Program USGCRP (2018) highlight that investing in proactive adaptation like low-tech process based restoration (e.g., using beaver as a climate adaptation strategy) produces benefits that far exceed the costs of such restoration efforts. Specifically, USGCRP (2018),



The **Call to Action** is most important!

- Additional Resources
  - Workforce
  - Innovation, Shared Lessons & Expectation Management
  - Leveraging Technology to do Low-Tech

# A few excerpts worth highlighting

## Chapter 7

ecosystem services and water resources these riverscapes provide.

To scale up restoration efforts to the scope of riverscape degradation, we need to work smarter and more efficiently. The key is working with an understanding of how healthy riverscapes function and recognizing the processes that shape and sustain healthy riverscapes. The four Riverscape Principles we laid out

al., 2019b) are tailored to focus on complexes (groups of structures), and what processes they are collectively intended to mimic and promote. This de-emphasis of the structure itself translates to: i) shorter expected structure design life, ii) quicker structure design and implementation, and iii) subsequently, the ability to build more structures and treat more miles than society can afford with engineering-based approaches alone. This focus will be crucial to seriously tackling the true scope of riverscape degradation. However, instead of dismissively setting aside the work that riverscapes themselves can play in shaping their own more resilient futures, this entire approach relies on an understanding and appreciation of what riverscapes can do for themselves. It recognizes the critical role that practitioners can play in initially mimicking, quickly promoting and eventually simply stepping aside to let natural processes find sustainable solutions.

this is the essence of process-based restoration— where the process of beaver dam activity was initially mimicked (with BDAs), promoted (reintroducing beaver), and beaver have taken over that process in a self-sustaining way.



Figure 1 – The future of low-tech restoration is promising. Looking over the shoulder here of the next generation that could help initiate the reshaping of our riverscapes into resilient systems, we see promising signs. In the background are posts sticking out of the water from a BDA this boy helped build, and that beaver are now maintaining. In the foreground, we see beaver's latest remodeling, a dam built so tall that it completely drowned out the constructed BDA. While not precisely predictable, this is the essence of process-based restoration— where the process of beaver dam activity was initially mimicked (with BDAs), promoted (reintroducing beaver), and beaver have taken over that process in a self-sustaining way.



# Really... Remember the Principles



Take some time to pause and focus on health, healing & hope

**RIVERSCAPES PRINCIPLES:**

- 1 Streams need space. Healthy streams are dynamic, regularly shifting position within their valley bottom, re-working and interacting with their floodplain. Allowing streams to adjust within their valley bottom is essential for maintaining functioning riverscapes.
- 2 Structure forces complexity and builds resilience. Structural elements, such as beaver dams and large woody debris, force changes in flow patterns that produce physically diverse habitats. Physically diverse habitats are more resilient to disturbances than simplified, homogeneous habitats.
- 3 The importance of structure varies. The relative importance and abundance of structural elements varies with the context of the stream, its location, and the surrounding landscape.
- 4 Efficiency is a hallmark of a healthy stream. Structures should be designed to promote the processes of wood accumulation and beaver dam activity that lead to the desired outcomes.



**RESTORATION PRINCIPLES:**

- 5 It's okay to be messy. When structure is added back to streams, it is meant to mimic and promote the processes of wood accumulation and beaver dam activity. Structures are fed to the system like a meal and should resemble natural structures (log jams, beaver dams, fallen trees) in naturally "messy" systems. Structures do not have to be perfectly built to yield desirable outcomes. Focus less on the form and more on the processes the structures will promote.
- 6 There is strength in numbers. A large number of smaller structures working in concert with each other can achieve much more than a few isolated, over-built, highly-secured structures. Using a lot of smaller structures provides redundancy and reduces the importance of any one structure. It generally takes many structures, designed in a complex to promote the processes of wood accumulation and beaver dam activity that lead to the desired outcomes.
- 7 Use natural building materials. Natural materials should be used because structures are simply intended to initiate process recovery and go away over time. Locally sourced materials are preferable because they simplify logistics and keep costs down.
- 8 Let the system do the work. Giving the riverscape and/or beaver the tools (structure) to promote natural processes to heal itself with stream power and ecosystem engineering, as opposed to diesel power, promotes efficiency that allows restoration to scale to the scope of degradation.
- 9 Defer decision making to the system. Wherever possible, let the system make critical design decisions by simply providing the tools and space it needs to adjust. Deferring decision making to the system downplays the significance of uncertainty due to limited knowledge. For example, choosing a floodplain elevation to grade to based on limited hydrology information can be a complex and uncertain endeavor, but deferring to the hydrology of that system to build its own floodplain grade reduces the importance of uncertainty due to limited knowledge.
- 10 Self-sustaining systems are the solution. Low-tech restoration actions in and of themselves are not the solution. Rather they are just intended to initiate processes and nudge the system towards the ultimate goal of building a resilient, self-sustaining riverscape.



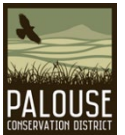
A whole day to say what we cover in 4 pages and a top 10 list...

Free Digitally @: <http://lowtechpbr.restoration.usu.edu>

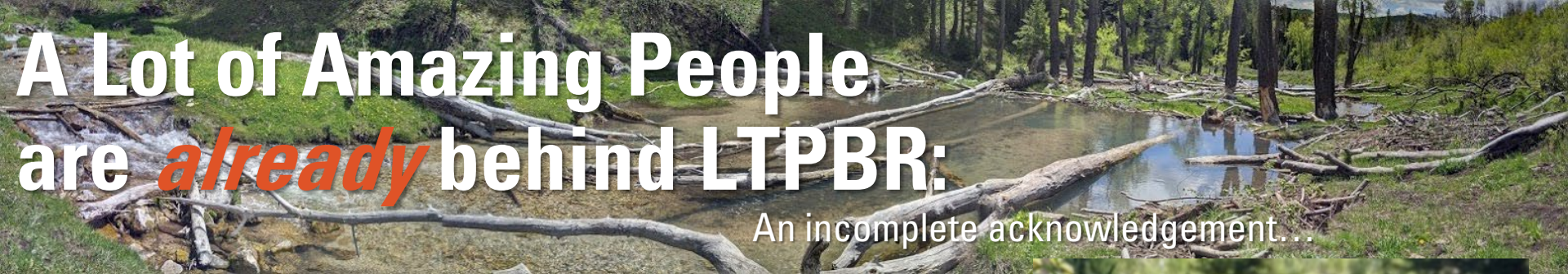


# A Lot of Amazing People are behind LTPBR:

An incomplete acknowledgement...







# A Lot of Amazing People are *already* behind LTPBR:

An incomplete acknowledgement...



The  
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ver  
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