LAND CARE COOPERATIVE

Harnessing the VT Ripsower, Healing our Watershed Homes

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Land Care Cooperative Chair and CEO
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Communities can come together, cooperate, and create the credit to hire organized land stewards – catchment contractors –

to heal and nurture our common watershed homes.

This will be the largest physical project in history.

Livestock herders, Indigenous land stewards, ranchers and farmers, and allied scientists have learned how to grow topsoil & biodiversity and turn deserts back into prairies


Subsoil to A-horizon topsoil:
8” within a few years. How?


1-4 16
1-5 17
1-6 18
1-7 19
1-8 20
1-9
40 1 2 3 4 5 6 7 8 9 50 1 2

Healing whole watersheds, locally, regionally and globally includes –

- Growing deep topsoil watersheds with massive biodiversity and productivity
- Commoning – practicing cooperation and rule-making to heal and govern the CPR of whole-watershed health and function
- Bottom-up watershed contracting
- Focus on rapidly healing and caring for insect populations
- Refusing Ecosystem Services enclosure
- Solidarity with peasants and Indigenous peoples who are the first targets of ES enclosure
- Maximum infiltration farming
- Rapidly achieving groundwater recharge and deep water security for our communities
- New, landscape-compliant built infrastructure
- Reclaiming credit as a commons to hire land stewards to heal the land
- Linking locally governed mutual credit networks
- Building massive public support for public banks, owned by us, to create credit for our priorities

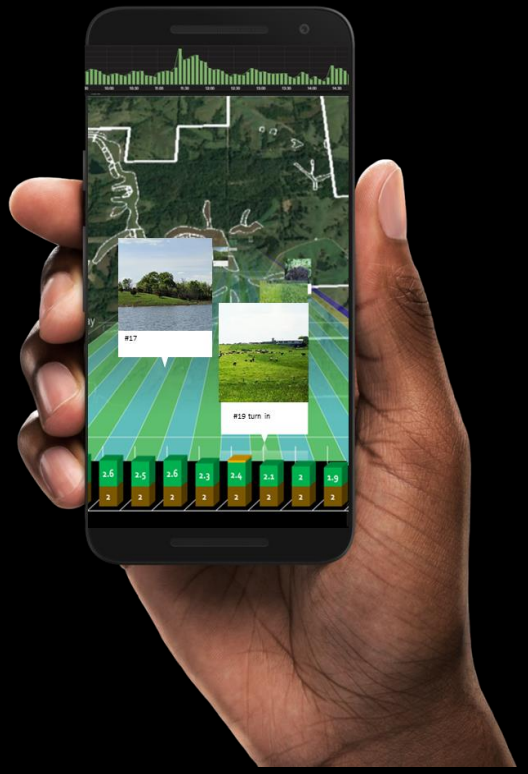
The practice of economic democracy to finance hiring land stewards who can competently do this work will not come from private banks, asset managers, venture capital, other finance capital, or the financialization of nature.

We are watershed contractors in community

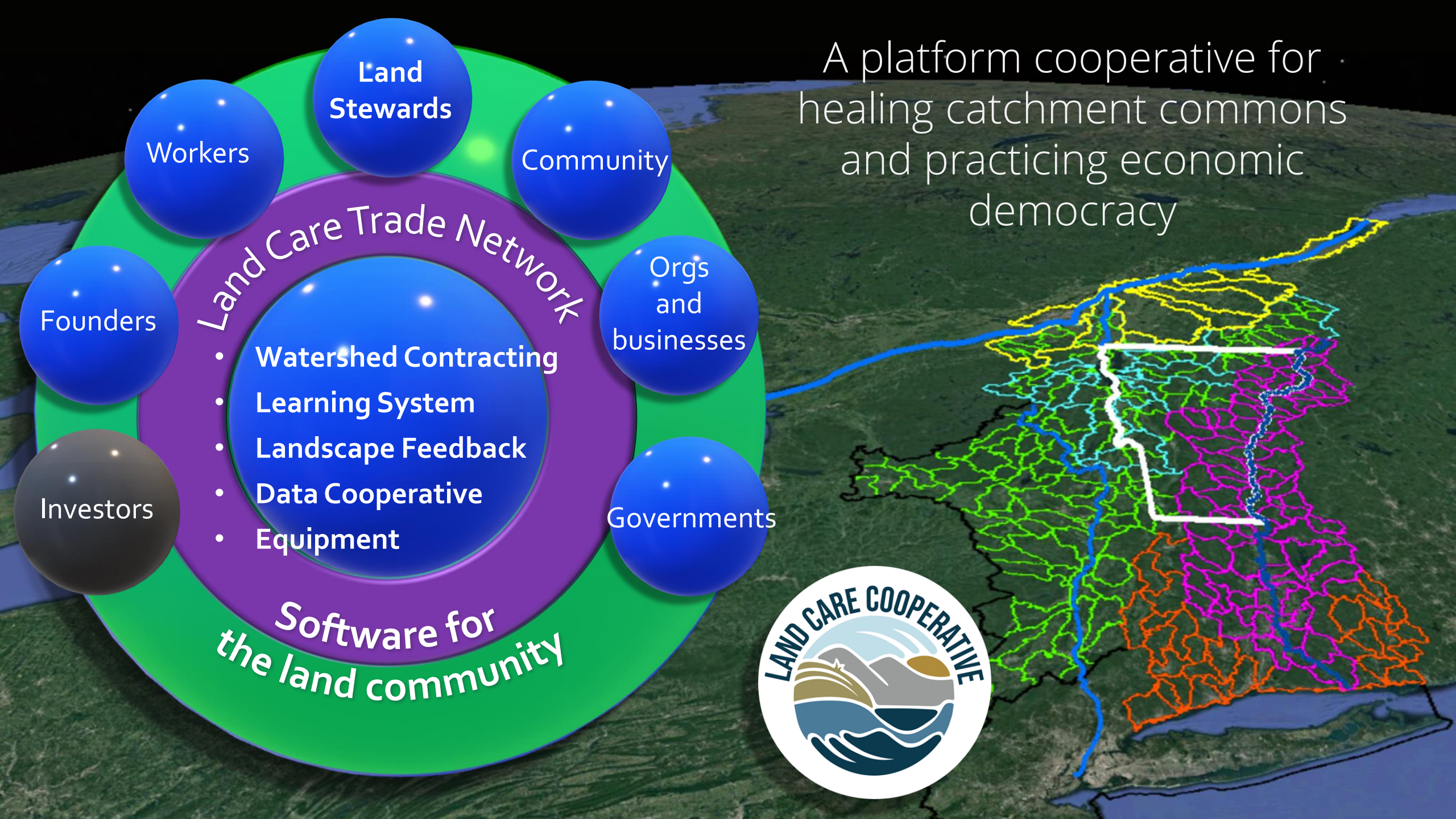
We grow deep-topsoil catchments, water security and high biodiversity as a service

We operate a learning system with landscape-feedback for healing land
We practice neighborly economics

Map:
Fejetlenfej



A platform cooperative for healing catchment commons and practicing economic democracy



Founding farms

Catchment Contracting – local, regional, continental and global

2,256 HUC-8 watersheds in the US
Average size: 450,000 acres

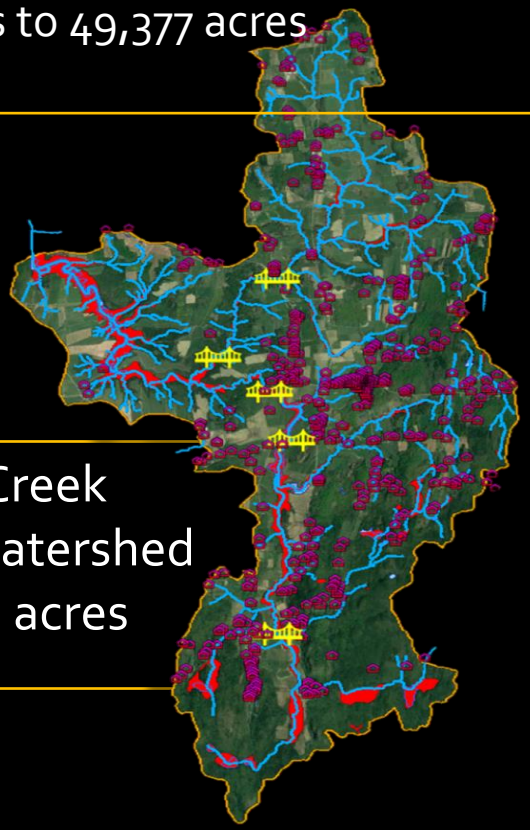
~160,000 HUC-12 watersheds in the US
~10,000-50,000 acres

18 HUC 8 watershed river and lake basins in Vermont

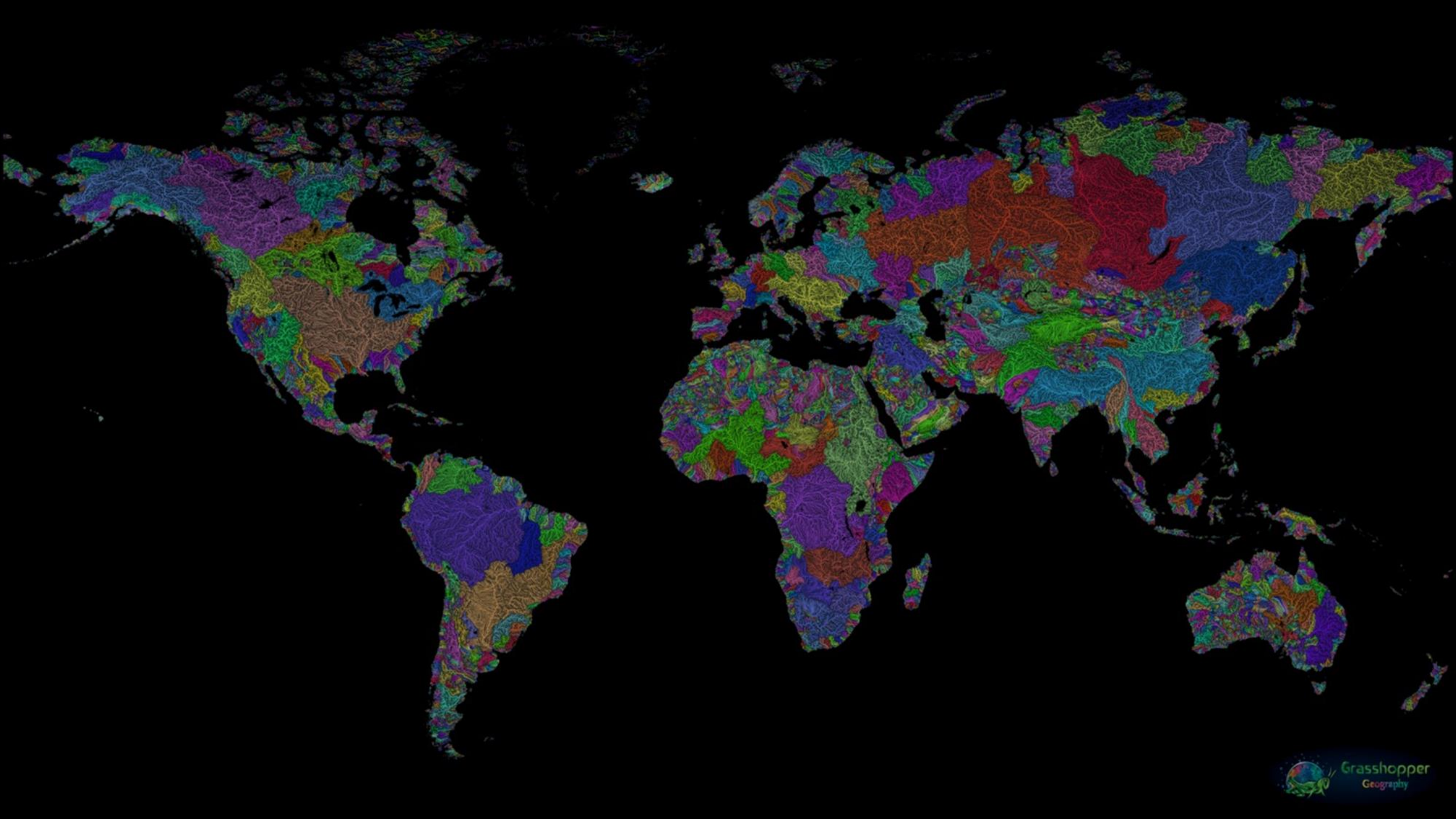
265 HUC 12 catchments in Vermont

- 186 complete, 79 partial

7,836 acres to 49,377 acres

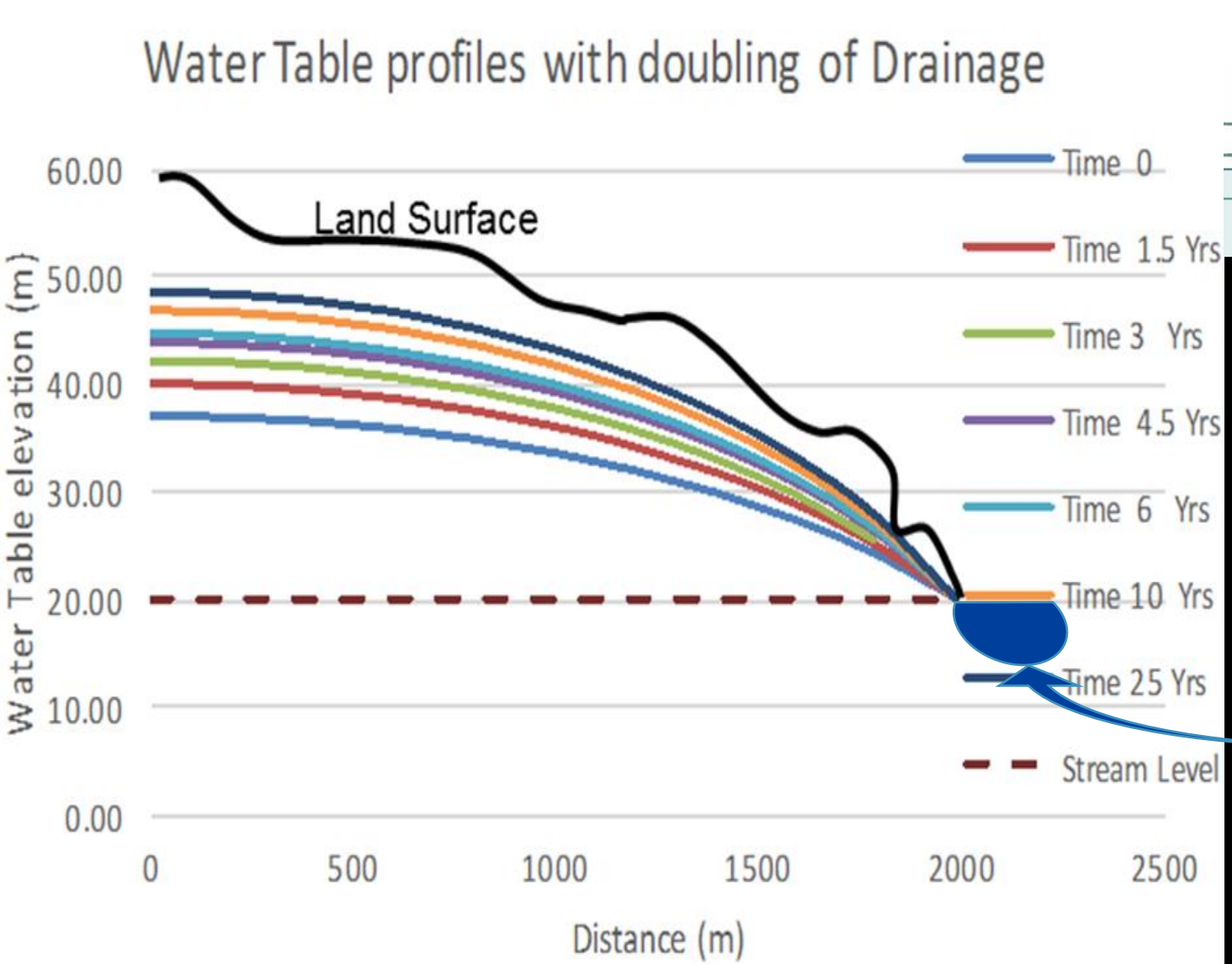


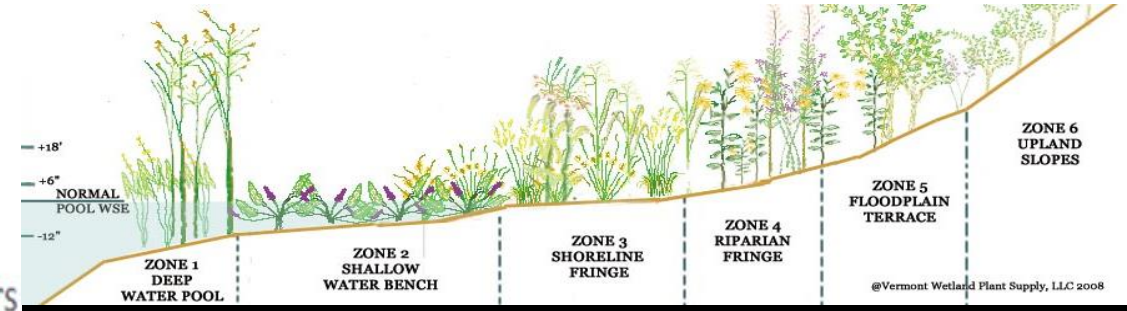
East Creek
HUC 12 watershed
20,526 acres


Grasshopper
Geography

Watershed contracting and groundwater

Instance: doubling drainage to groundwater raises groundwater level 30 feet over 25 years





https://www.vermontwetlandplants.com/index/emergent-herbaceous/

Springs, streams and rivers will run longer and cooler

Emergent wetlands will proliferate

Local Catchment Contracting pricing model
for healing land:

Cost of Production + Profit

Nature is not abstracted or valuated
No credits – carbon, water, biodiversity, wetlands
No futures. No derivatives.
No land grabs. No bubbles

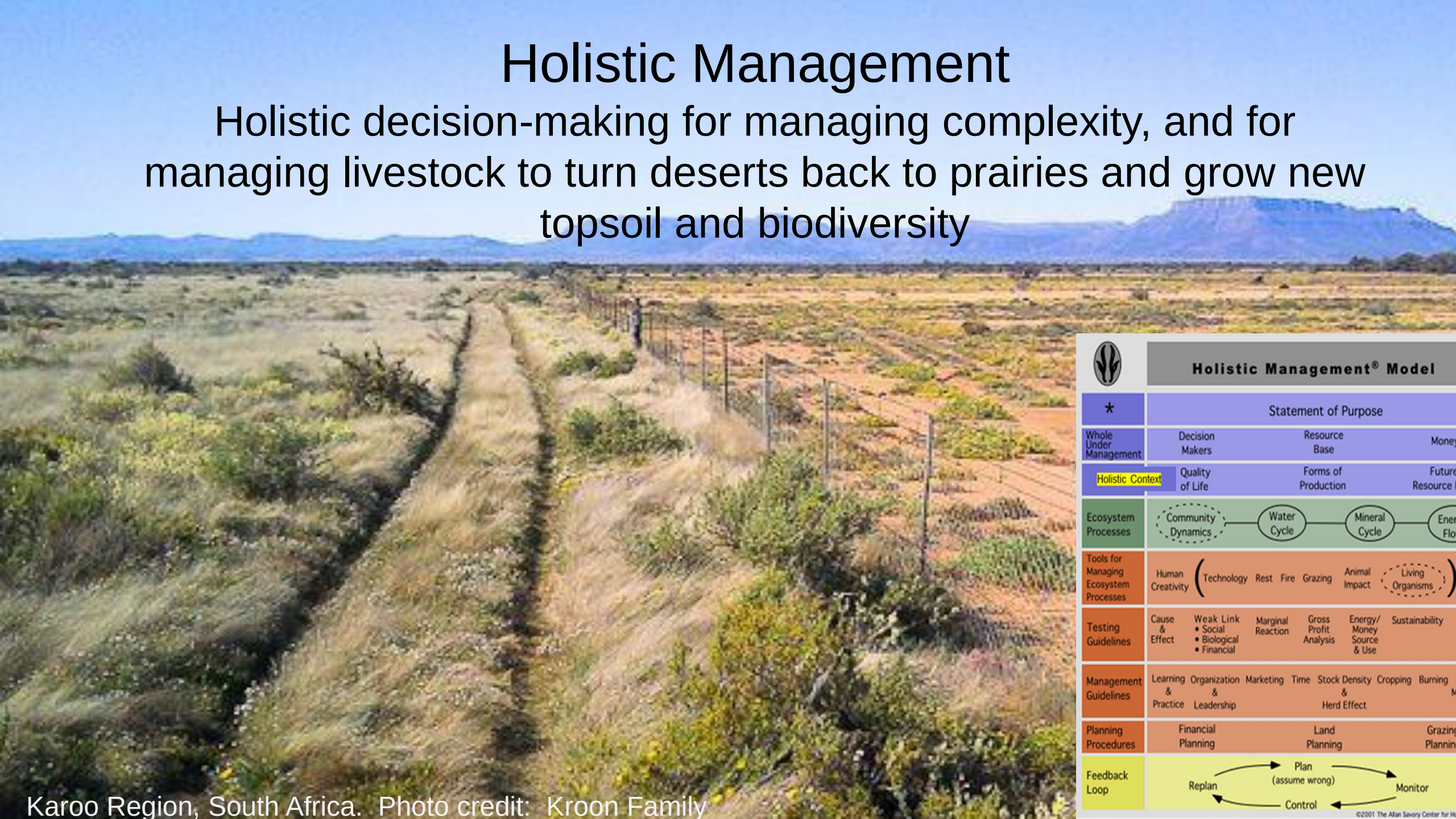
Healing land in practice

Birdwell and Clark Ranch, Henrietta TX

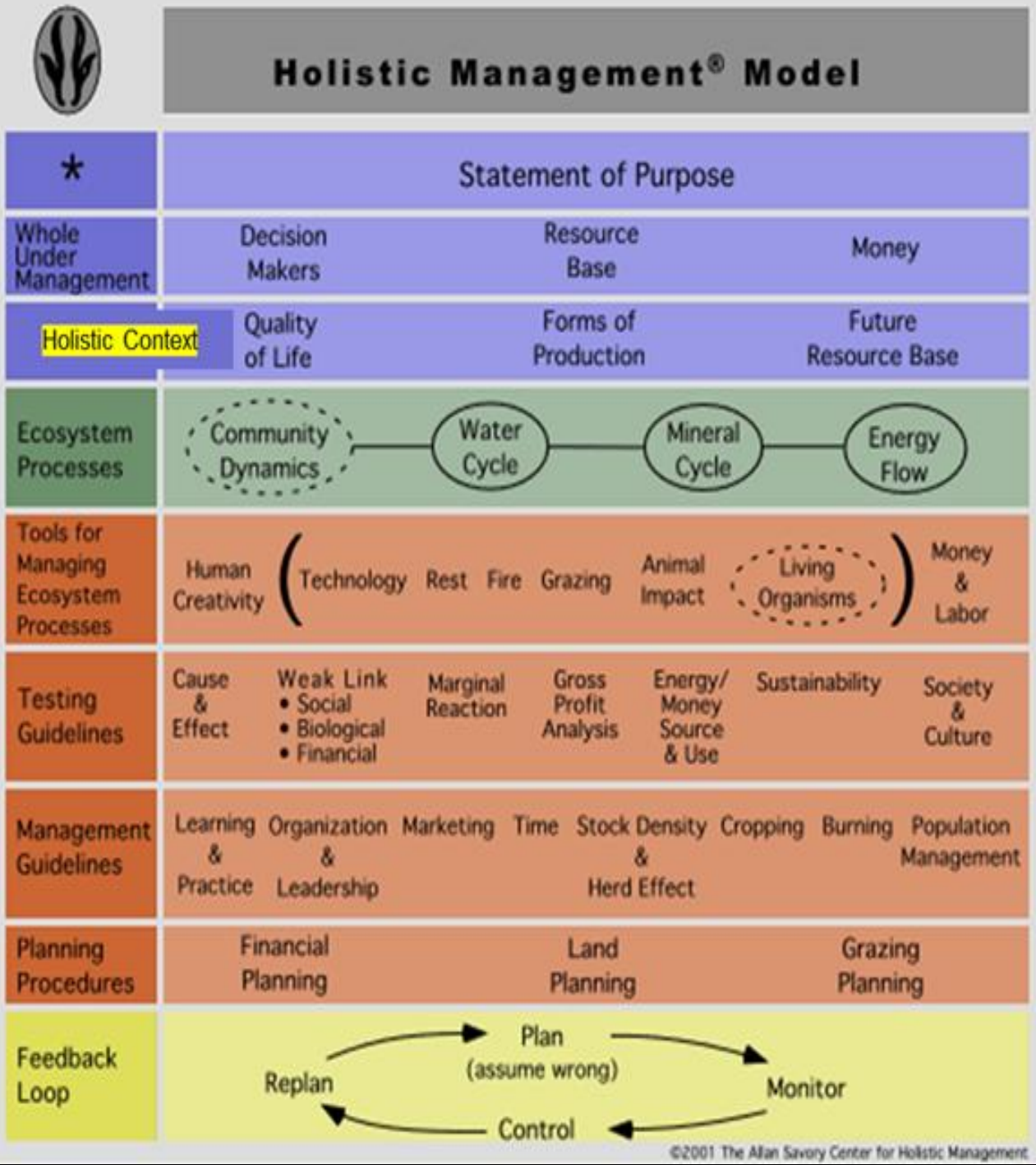
https://www.birdwellandclarkranch.com/grazing.html

Holistic Management

Holistic decision-making for managing complexity, and for managing livestock to turn deserts back to prairies and grow new topsoil and biodiversity



Karoo Region, South Africa. Photo credit: Kroon Family



1. Cause and Effect. Does this action address the root cause of the problem?
2. Weak Link
   - *Social.* Could this action, due to prevailing attitudes or beliefs, create a weak link in the chain of actions leading toward your holistic goal?
   - *Biological.* Does this action address the weakest point in the life cycle of this organism?
   - *Financial.* Does this action strengthen the weakest link in the chain of production?
3. Marginal Reaction. Which action provides the greatest return, in terms of your holistic goal, for the time and money spent?
4. Gross Profit Analysis. Which enterprises contribute the most to covering the overheads of the business?
5. Energy/Money Source and Use. Is the energy or money to be used in this action derived from the most appropriate source in terms of your holistic goal? Will the way in which the energy or money is to be used lead toward your holistic goal?
6. Sustainability. If you take this action, will it lead toward or away from the future resource base described in your holistic goal?
7. Society and Culture. How do you feel about this action now? Will it lead to the quality of life you desire? Will it adversely affect the lives of others?

paddock by paddock healing

1. Fertility and nutrient management
    1. Soil testing and mineral amendments to trigger the process
2. Massive plant and microbial diversity
    1. Bloomtrain planting and management strategies
    2. Ferment, compost, vermicompost, etc.
3. Keyline soil-formation
    1. De-compaction (biological, mineral, mechanical)
4. Neighborly grazing for healing and yield
5. Bringing it all together with grazing planning (Land Care planning)

Massive Plant Diversity

Image: Heidi Natura, 1995

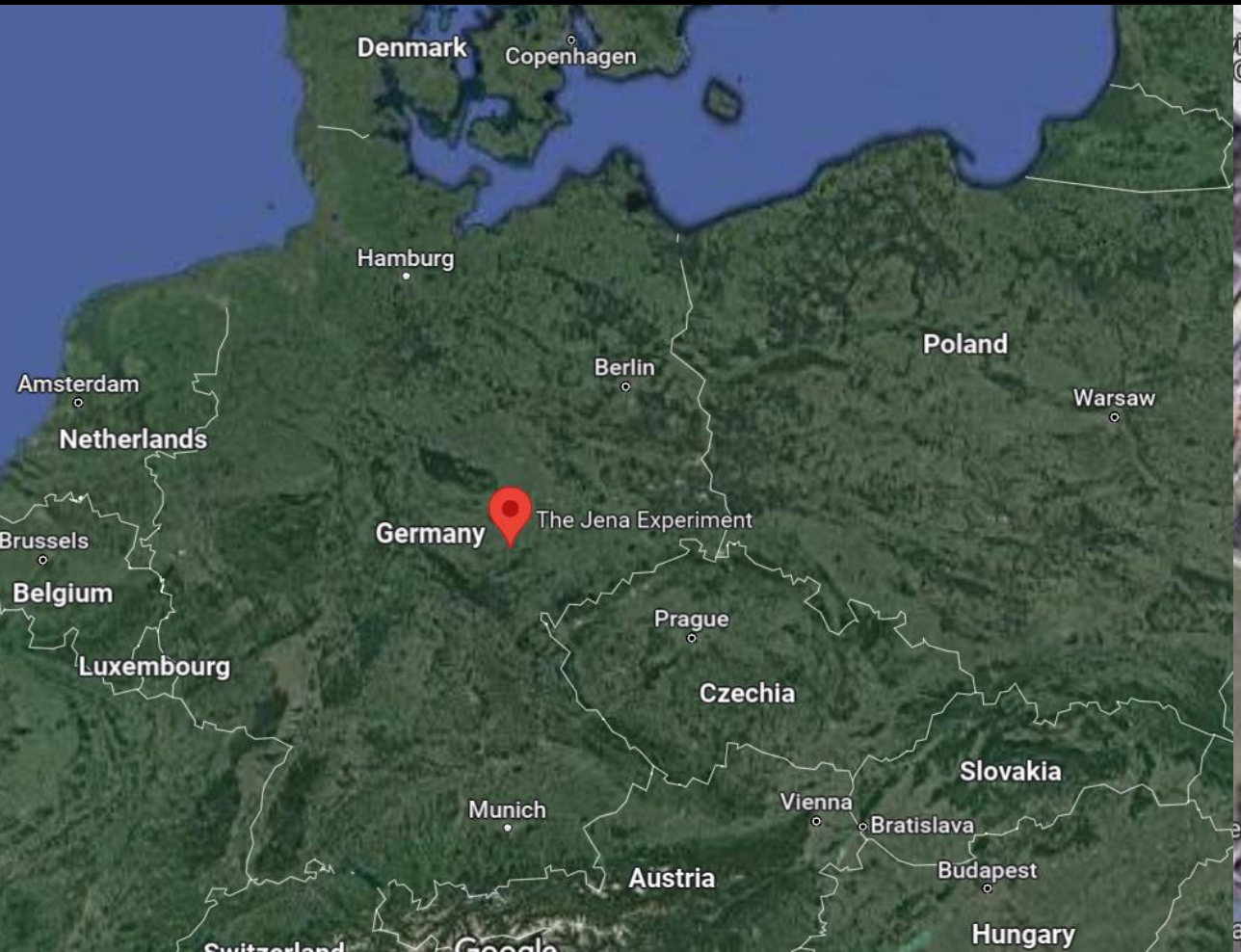
Jena Experiments

More plant diversity
→

- more yield
- more soil carbon
- more diversity of microbes and insects
- less nutrient loss

Image from an amazing Jena Experiments Video!!!! Watch it here

Jena experiments 1, 2, 4, 8, 16 species (groups, families)




Larson Farm

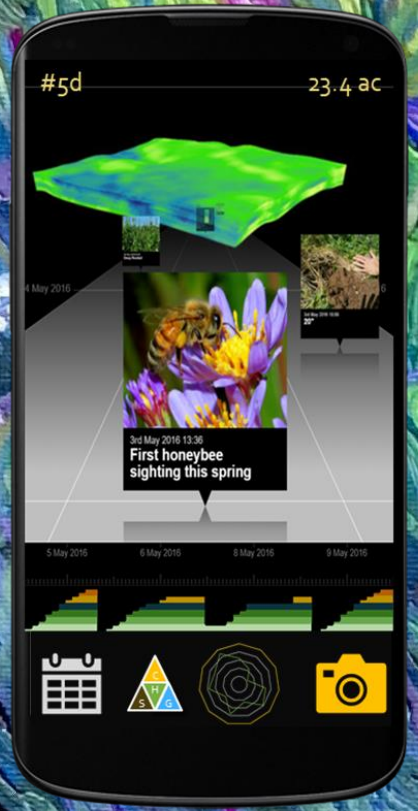

Larson Farm

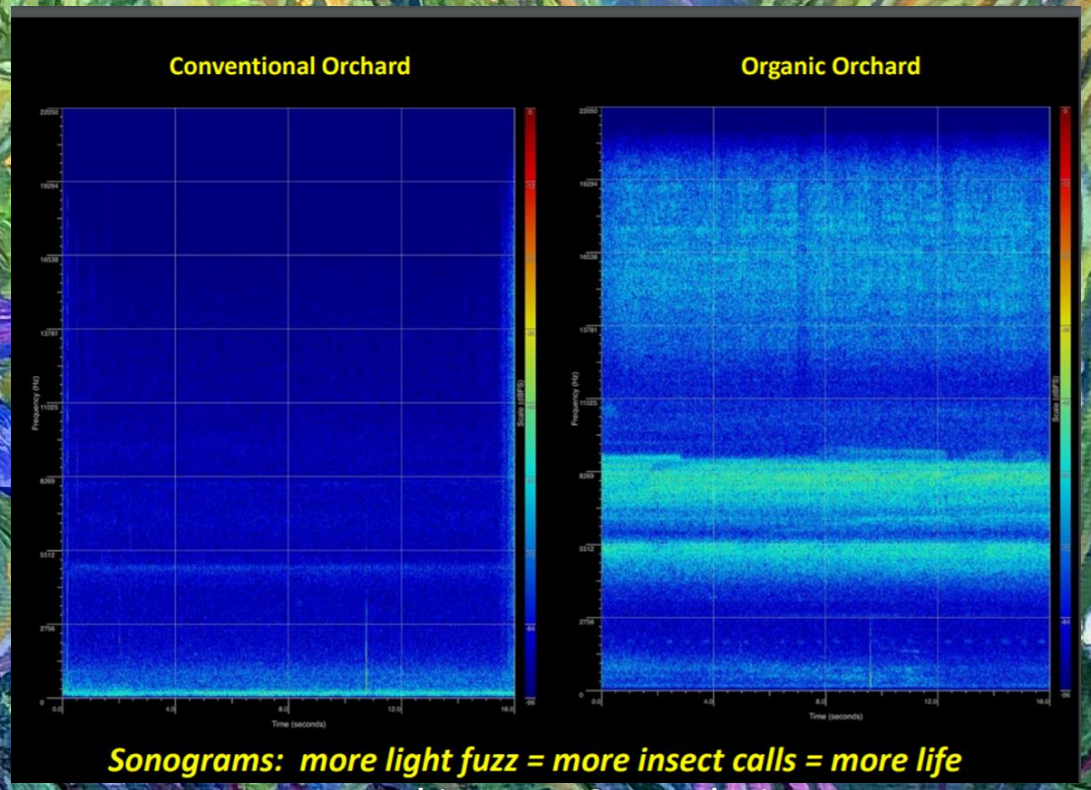
Massive perennial plant diversity to grow food and topsoil, feed pollinators, and infiltrate and clean water

Bloomtrain

Community–wide holistic management for pollinator health

Billions of flowers to heal our farms and watersheds & reverse pollinator extinction

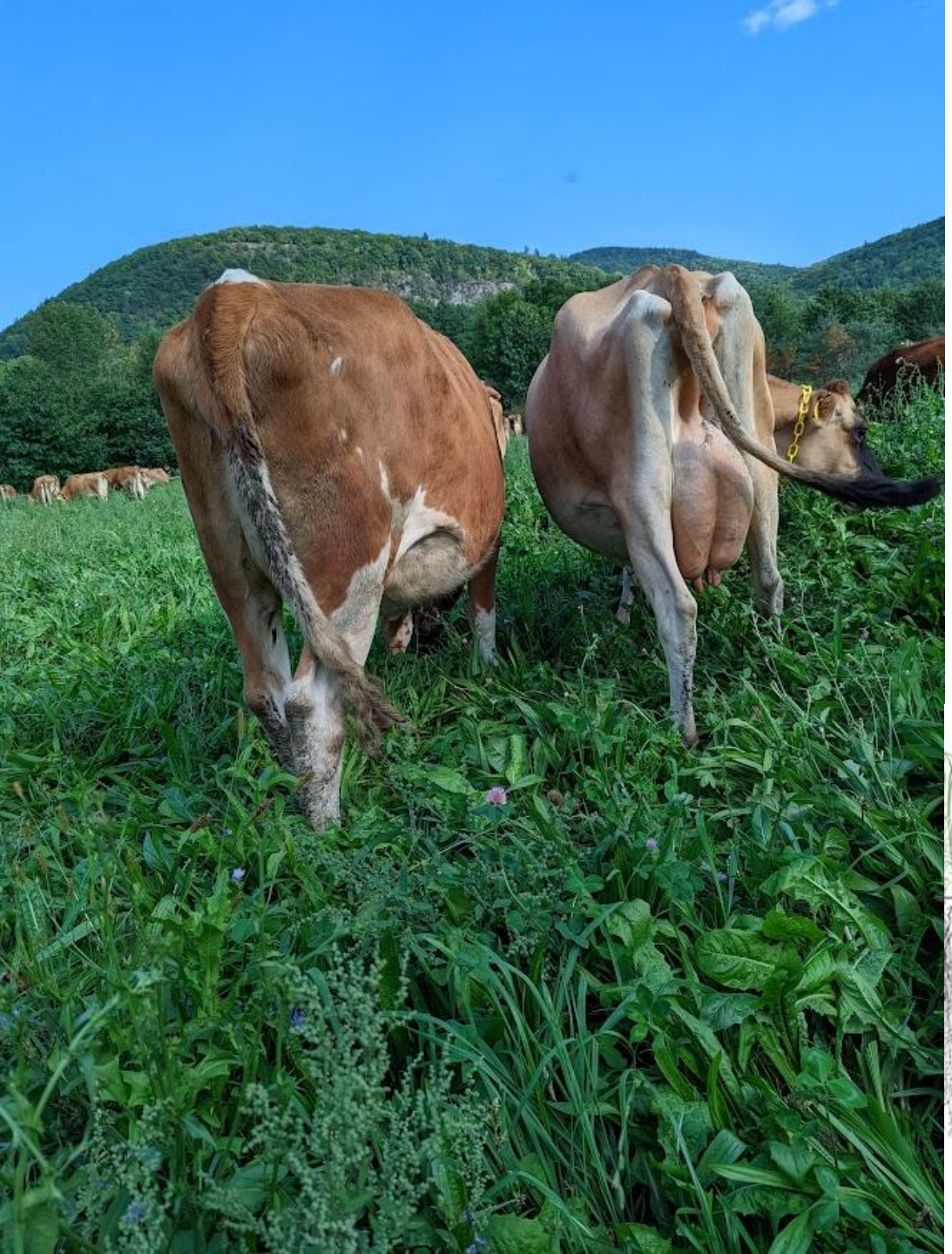




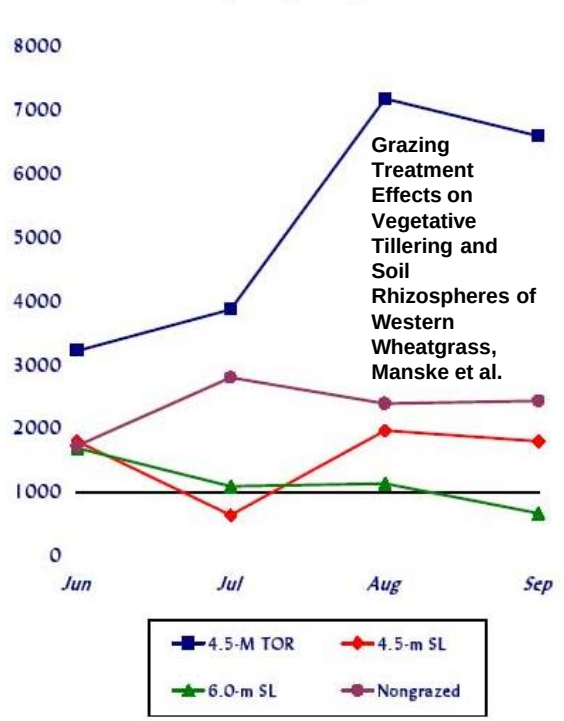
Data and image: Conrad Vispo

Image: Anna Widmer *Wildflower Valley*


~ 8’ + tall
<1 year old chicory plant

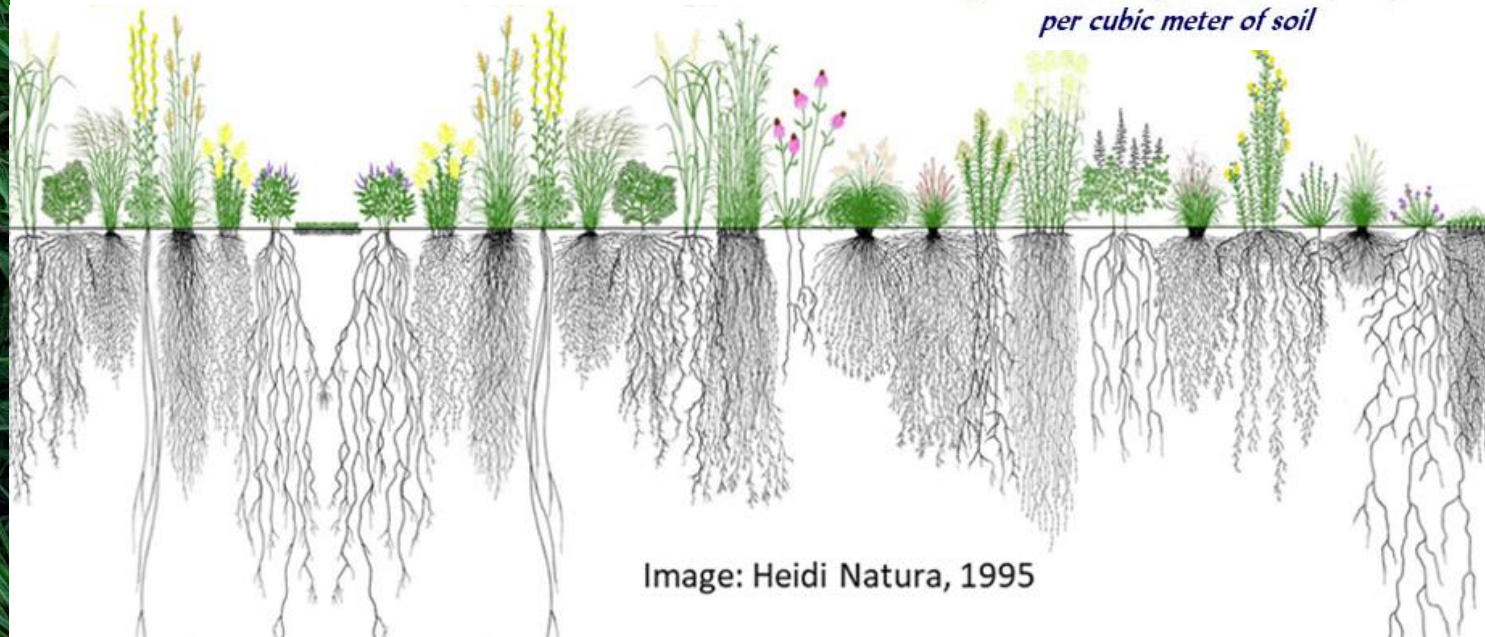


Grazing for healing and yield



Grazing Treatment Effects on Vegetative Tillering and Soil Rhizospheres of Western Wheatgrass, Manske et al.

Figure 5. Rhizosphere volume (cm^3) per cubic meter of soil



3 Year Keyline conversion of subsoil to topsoil under pasture

Graze

- Learn and plan good grazing
  Address nutrient deficiencies

- Graze, leave ample residue
  Subsoil 2-4” below roots or pan
  Seed rips with diverse, deep-rooted mixes
  “Prime” seed
  Drip tailored landcream mix

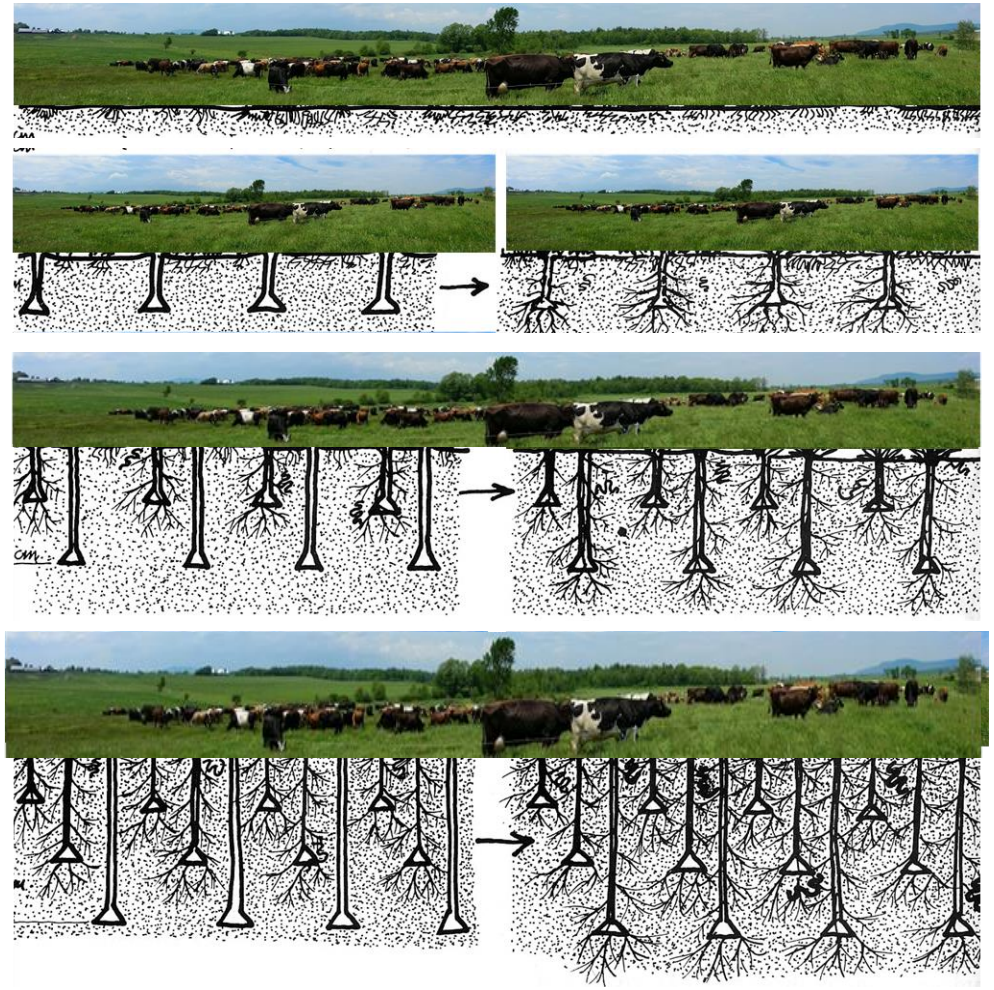
Recovery!

- Light soils – ripsow 1+ time per year
  Heavy soils – ripsow 2x per year

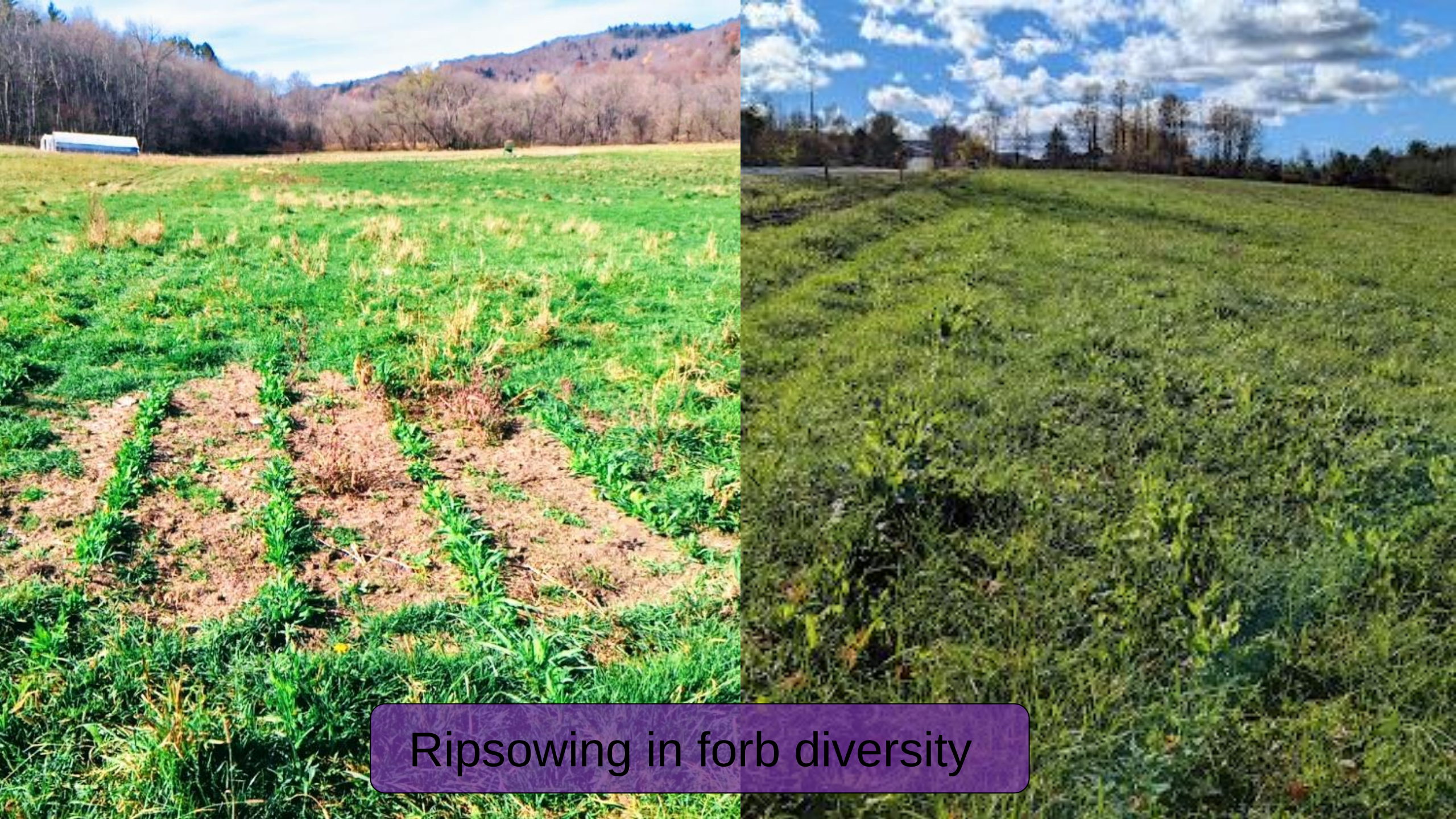
Recovery!

- Keep it up for 3 years,
  Monitor and make any necessary adjustments

Recovery!



Underground images: The Permaculture Designer’s Manual. Mollison and Jeeves Grazing photos from Blissful Dairy, Bridport, VT



Ripsowing in forb diversity


WARNING


Vita-Pak


DICKEY-john


DICKEY-john

Keyline Cultivation – Ridge Pattern Plowing

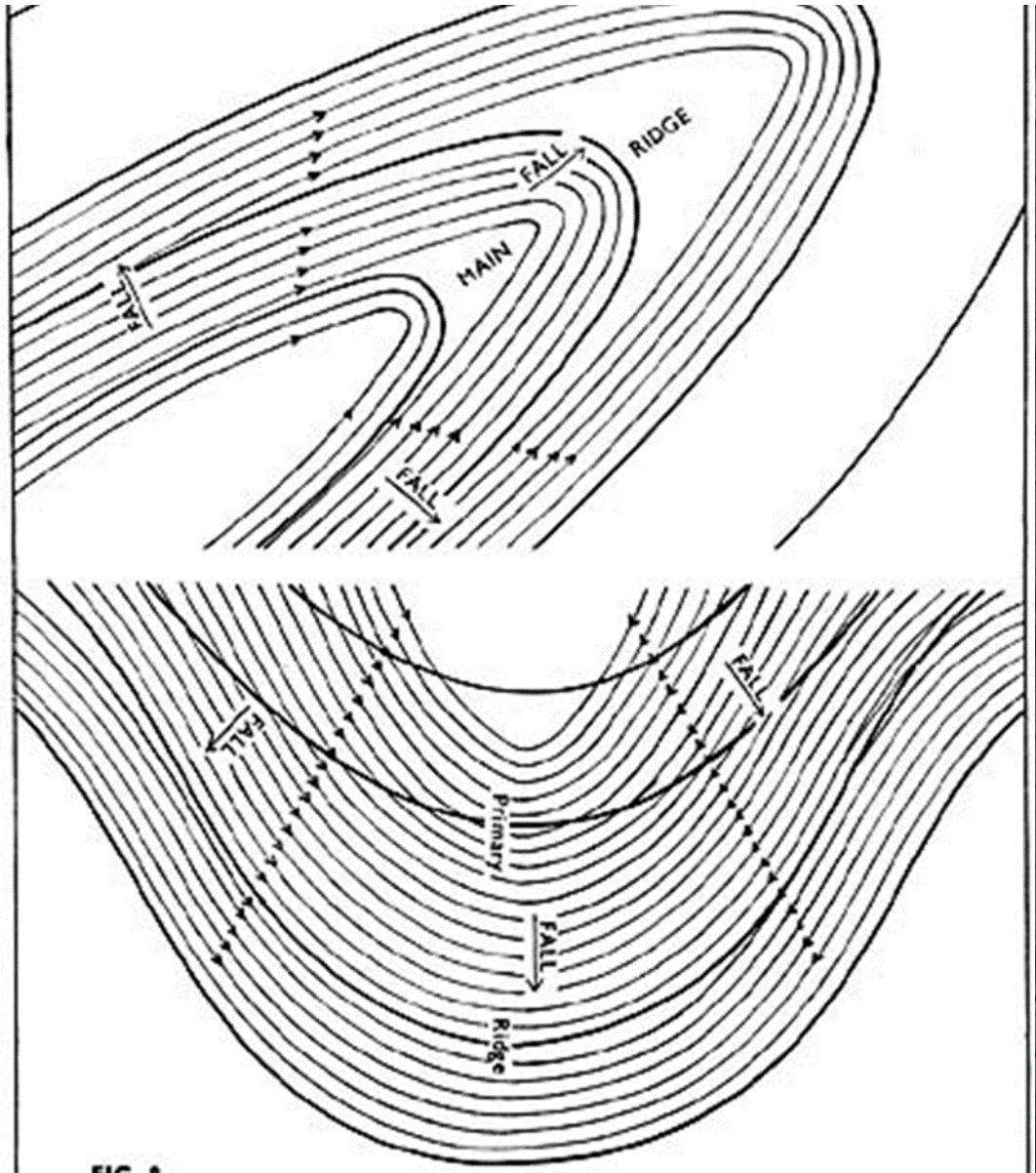


FIG. 8

The contour plans show two ridge shapes with keyline pattern cultivation designed to flow water down the centre of each ridge. The arrows on the furrow lines show the downhill direction of the furrows.
Upper: A typical main ridge shape. *Lower:* A typical primary ridge shape.

Source: The Challenge of Landscape

Keyline Cultivation – Primary Valley Pattern Plowing

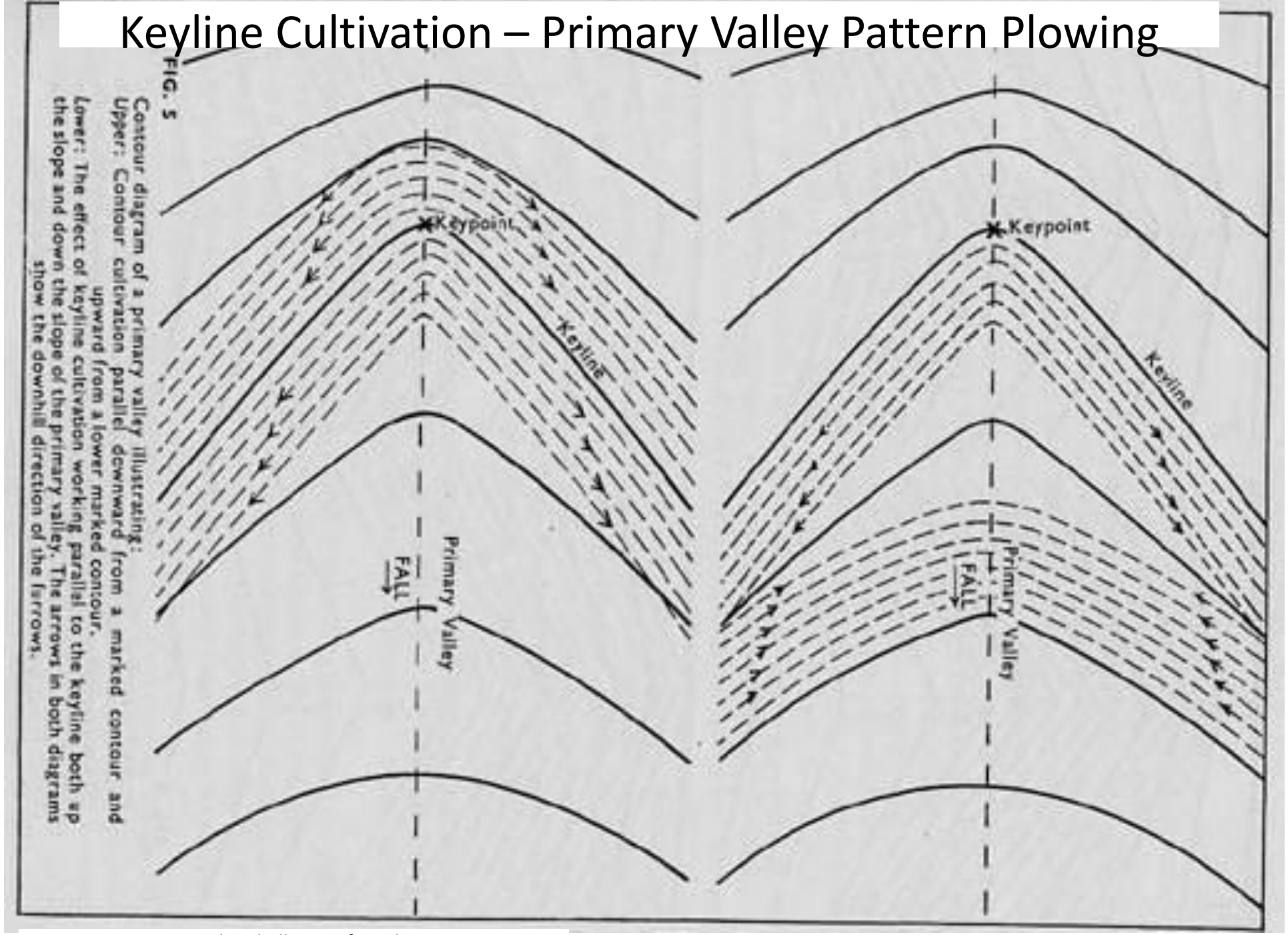
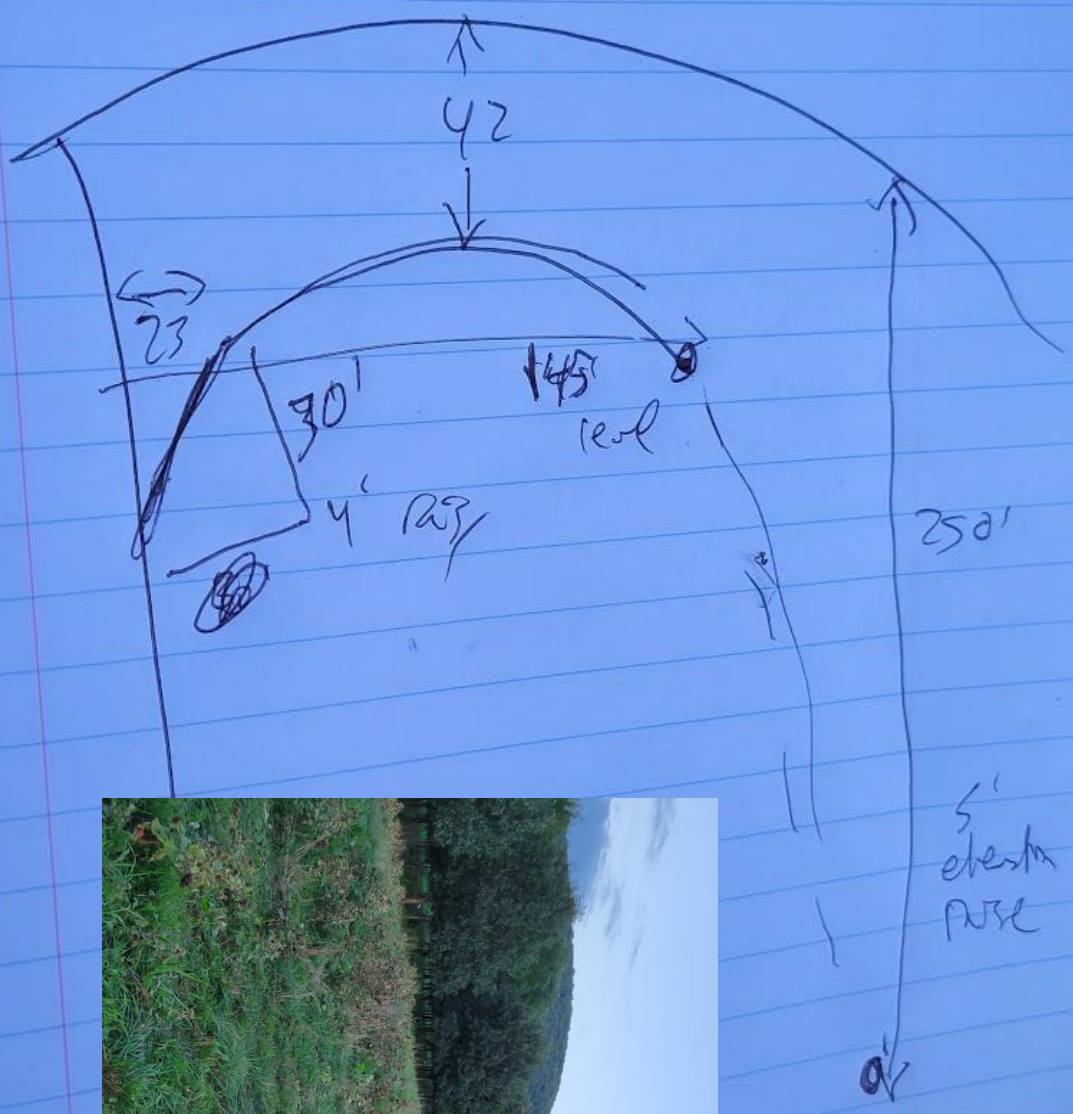


FIG. 5
Contour diagram of a primary valley illustrating:
Upper: Contour cultivation parallel downward from a marked contour and upward from a lower marked contour.
Lower: The effect of keyline cultivation working parallel to the keyline both up the slope and down the slope of the primary valley. The arrows in both diagrams show the downhill direction of the furrows.

Source: The Challenge of Landscape

Edge of road 42' we go up



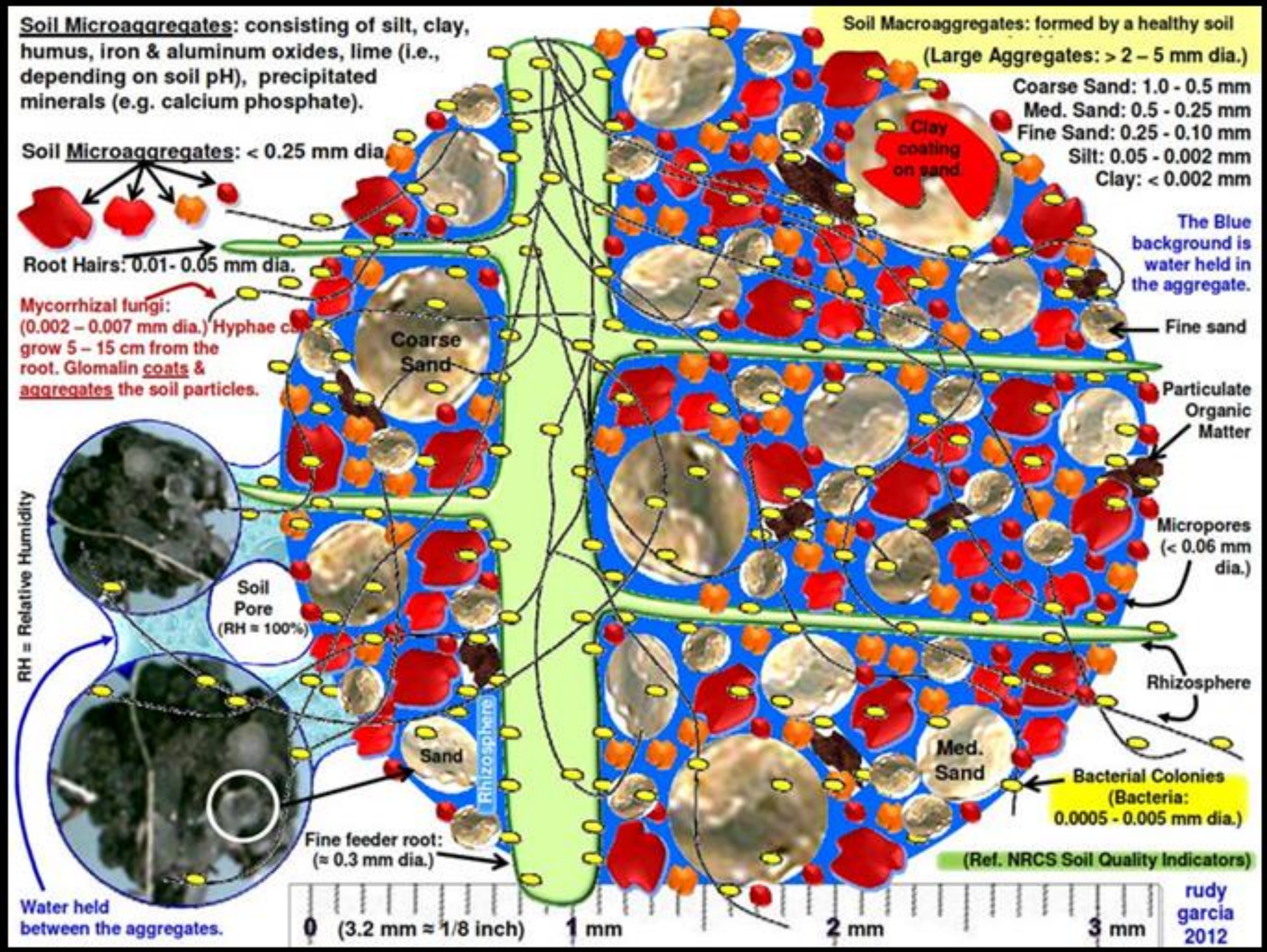
Massive Microbial Diversity

A whole lot of genes in plants and soils have been switched off because we don’t have the microbial diversity that, a couple hundred years ago, would naturally have been there…

Christine Jones

Soil aggregates- the “fundamental unit of soil function”

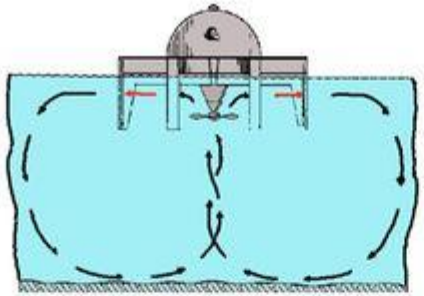
The biofilms that glue them result from quorum sensing



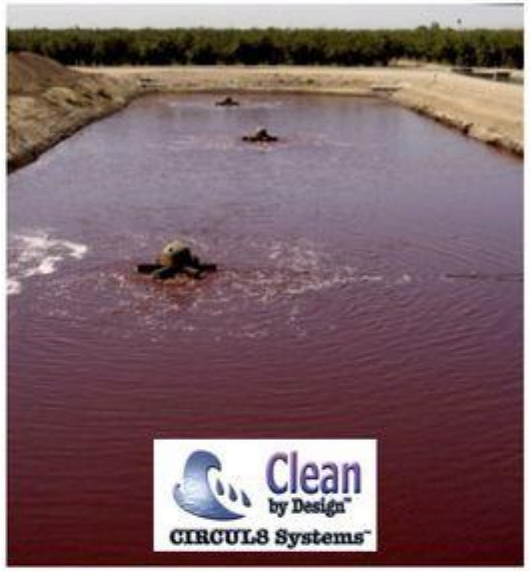
Nutrient transformation
for microbial diversity, yield, livestock performance, & soil formation

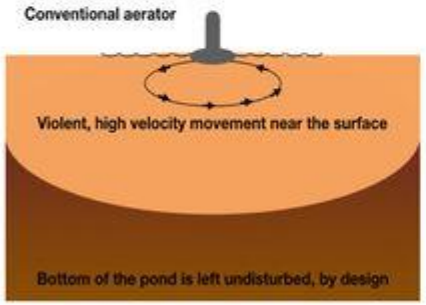
Circul8 dilute effluent to grow photosynthetic purple-sulfur bacteria

Clean by Design™
CIRCUL8 Systems™



CirCulator's pull water from the bottom of the pond, with vortex action. Low velocity, high volume movement **brings every gallon of the pond to the surface several times each day**. Driven by sunlight, **phototrophic bacteria** retain the Nitrogen and Sulfur in their living protoplasm, so it is not lost.





Surface aerator, running on a dairy pond. Uses lots of energy, creates lots of biofilm (note the foam), with significant odor accompanied by significant loss of Nitrogen and Sulfur.

There is a BIG difference!

Johnson-Su static aerated high-fungal compost

integrity_soils

2 lbs. compost/acre trial

Vermicomoposting

SPICE Lactobrews

Soil Report

Job Name: North Hollow Farm ripsower demo Date: 8/23/2023

Company: Land Care Cooperative Submitted By:

Sample Location			NHF-102				
Sample ID			LS				
Lab Number			68				
Sample Depth in inches			6				
Total Exchange Capacity (M. E.)			6.88				
pH of Soil Sample			6.5				
Organic Matter, Percent			6.33				
ANIONS	SULFUR:	p.p.m.	15				
	Mehlich III Phosphorous:	as (P_2O_5) lbs / acre	955				
EXCHANGEABLE CATIONS	CALCIUM: lbs / acre	Desired Value	1871				
		Value Found	1801				
		Deficit	-70				
	MAGNESIUM: lbs / acre	Desired Value	200				
		Value Found	172				
		Deficit	-28				
	POTASSIUM: lbs / acre	Desired Value	214				
		Value Found	512				
		Deficit					
	SODIUM:	lbs / acre	69				
BASE SATURATION %	Calcium (60 to 70%)		65.44				
	Magnesium (10 to 20%)		10.42				
	Potassium (2 to 5%)		9.54				
	Sodium (.5 to 3%)		2.19				
	Other Bases (Variable)		4.90				
	Exchangable Hydrogen (10 to 15%)		7.50				
TRACE ELEMENTS	Boron (p.p.m.)		0.76				
	Iron (p.p.m.)		534				
	Manganese (p.p.m.)		80				
	Copper (p.p.m.)		2.69				
	Zinc (p.p.m.)		6.91				
	Aluminum (p.p.m.)		890				
OTHER	Cobalt ppm		0.342				
	Molybdenum ppm		< 0.02				
	Selenium ppm		< 0.02				
	Silicon ppm		10				
	Estimated Nitrogen Release #N/Acre		107				
	EC mmhos/cm		0.09				

Logan Labs, LLC

Saturated Paste Report

Job Name: North Hollow Farm ripsower demo Date: 8/23/2023

Company: Land Care Cooperative Submitted By:

Sample Location			NHF-102				
Sample ID			LS				
Lab Number			203007				
Water Used			DI				
pH			6.5				
Soluble Salts		ppm	49				
Chloride (Cl)		ppm	56				
Bicarbonate (HCO3)		ppm	38				
ANIONS	SULFUR	ppm	2.29				
	PHOSPHORUS	ppm	0.15				
SOLUBLE CATIONS	CALCIUM	ppm	8.27				
		meq/l	0.41				
	MAGNESIUM	ppm	1.37				
		meq/l	0.11				
	POTASSIUM:	ppm	5.51				
		meq/l	0.14				
	SODIUM	ppm	2.61				
		meq/l	0.11				
PERCENT	Calcium		52.68				
	Magnesium		14.60				
	Potassium		18.24				
	Sodium		14.49				
TRACE ELEMENTS	Boron (p.p.m.)		0.05				
	Iron (p.p.m.)		1.89				
	Manganese (p.p.m.)		0.13				
	Copper (p.p.m.)		< 0.02				
	Zinc (p.p.m.)		< 0.02				
	Aluminum (p.p.m.)		1.36				
OTHER							

LOGAN LABS
SOIL TESTING SERVICES

Recommendation Report

Bill McKibben, Independent Agronomist 419-303-7053 (10 minutes please)EST

NAME		Date 8/24/23		
Sample Identification		NFH-102 LS		
Lab Number		68		

DESIRED VALUES			ALUATION based on Soil Report		
NUTRIENT	General Crops	Specialty Crops			
Calcium	65%	65%	Good		
Magnesium	15%	15-20%	Low		
Potassium	4%	6-8%	OK		
Phosphorous	200#/A	350#/A	High		
Sulfur	25 ppm	25 ppm	Low		
pH	6.2-6.5	6.2-6.5	Good		

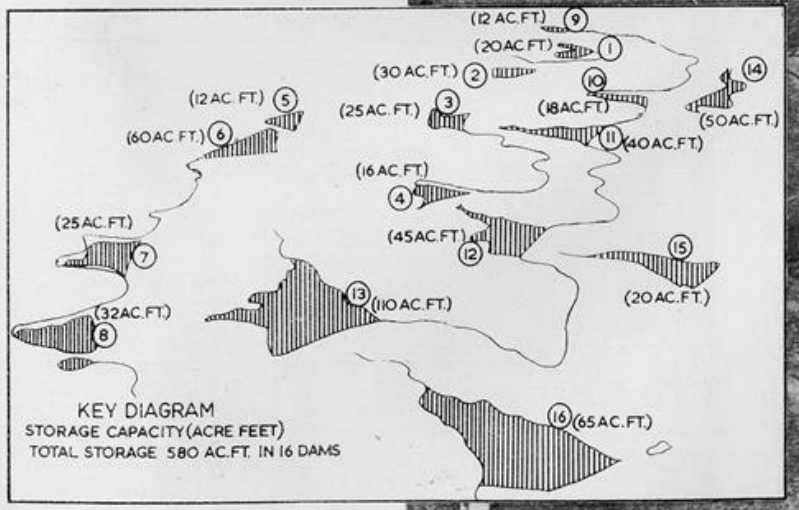
RECOMMENDED TO APPLY TO SOIL :	s per acre		
Elemental Sulfur 90%			
Phosphate 11-52-0			
Magnesium Sulfate (Epsom Salts)			
Dry Humic Acid			
Potassium Sulfate 0-0-50			
K-Mag (Sul-po-Mag)	350		
Manganese Sulfate			
Boron (10%)	15		
Zinc Sulfate 36%	20		
Copper Sulfate 25% Cu	5		
High Calcium Lime			
Dolomite Lime			
Gypsum			
Composted manure			
Calcium Silicate/ Wollastinite	300		
Nitrogen Levels at early growth stage.			

** Total applications over 6#/1000 ft2 with the exception of Lime, Gypsum, and Rock Phosphate should be split over a 40 – 60 day period unless incorporated 6-8". (multiply lb/1000 ft2 by 40 for lb/acre) .

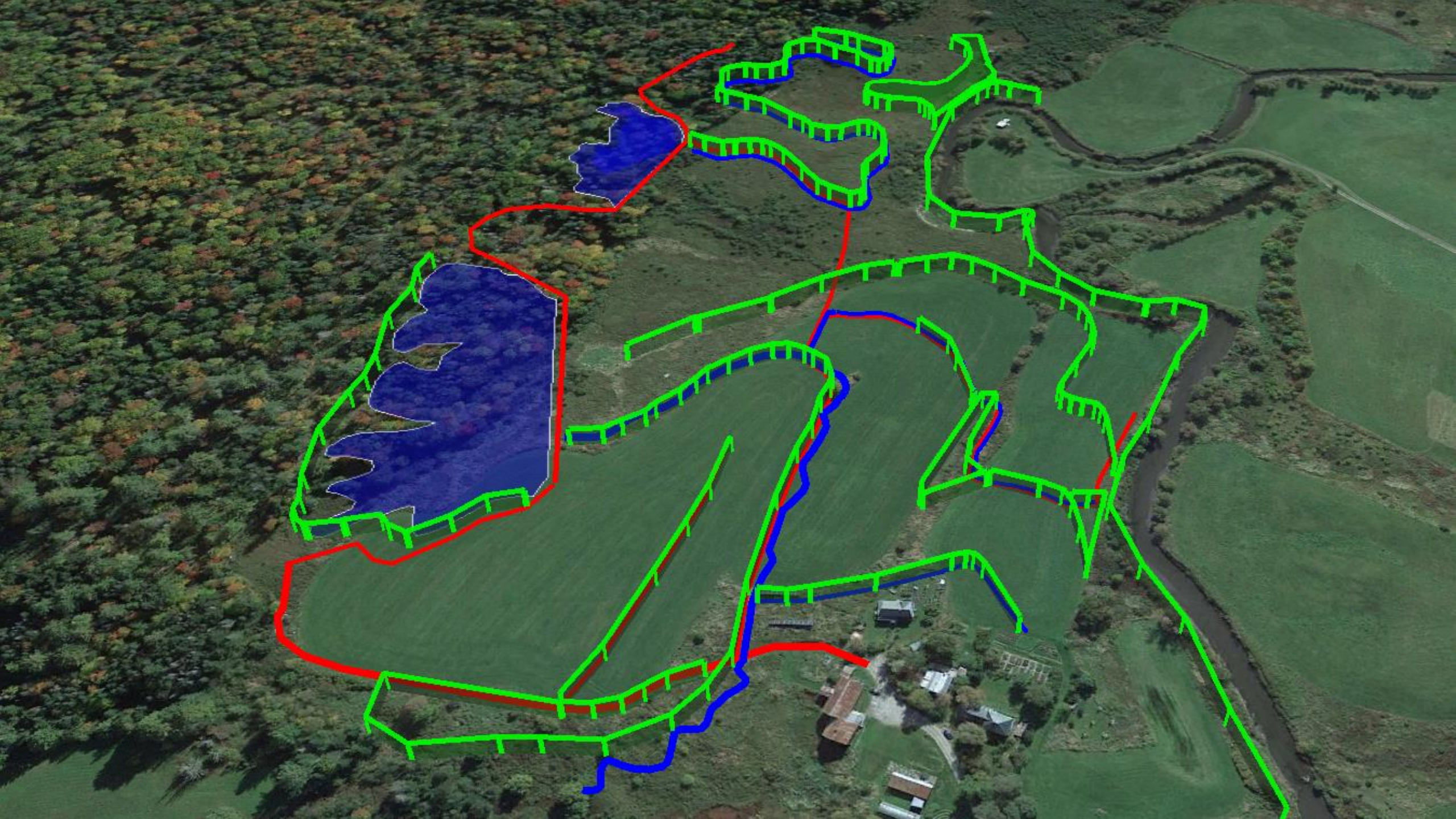
PLATE 5

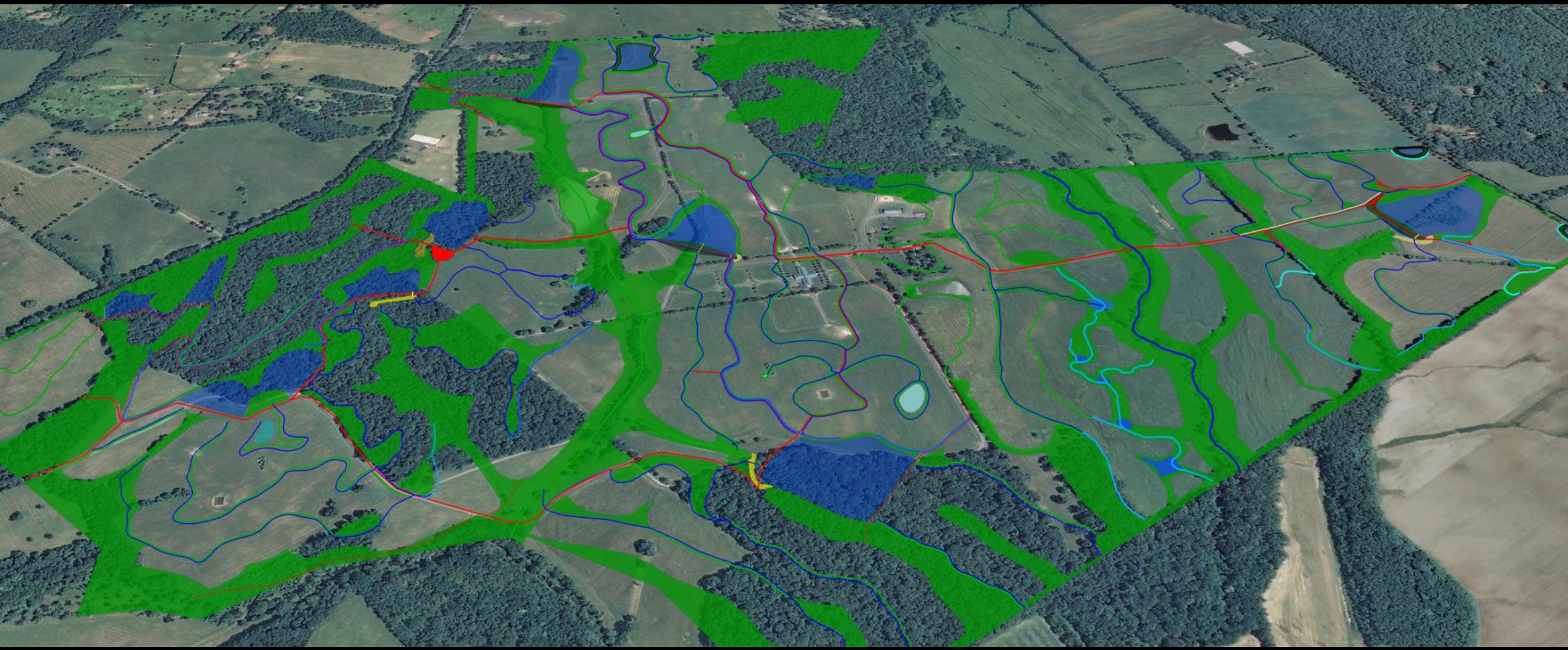
"Yobarnie" photographed from the air, after 17 years of Keyline irrigation development. The property covers about 760 acres and fifteen full farm irrigation dams are visible in this picture. (Photographed by Douglass Baglin.)

Water-Secure Infrastructure



Yobarnie, Water for Every Farm, P.A. Yeomans





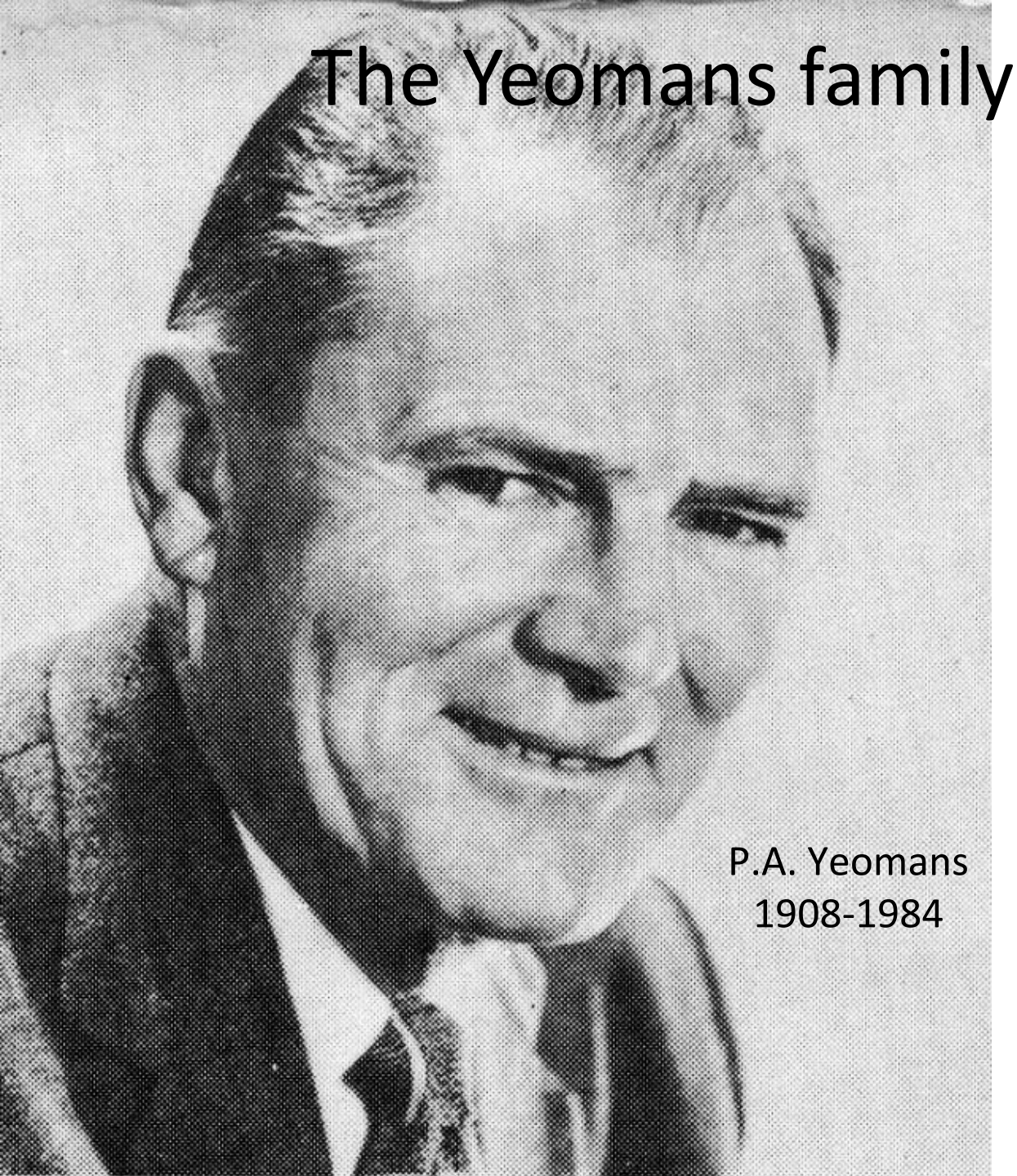
Design: Collins and Doherty
Rendering: Pavlov

KEYLINE SCALE OF PERMANENCE

*An order for planning based on the **relative permanence** of the elements comprising the completed landscape.*

1. Climate
2. Land shape
3. Water control
4. Roads
5. Trees
6. Buildings
7. Subdivision
8. Soil

The Yeomans family and history of Keyline



P.A. Yeomans
1908-1984

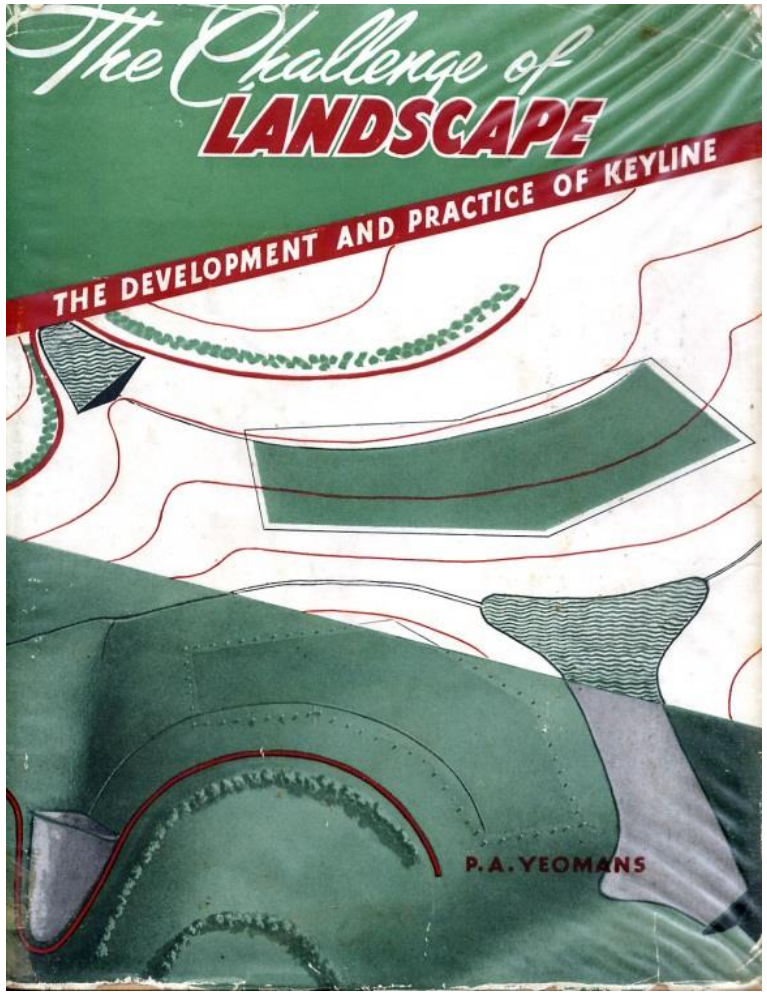
- "The land[person's] job is not so much to conserve soil as it is to improve [their] soil and to make it more fertile than it ever was."

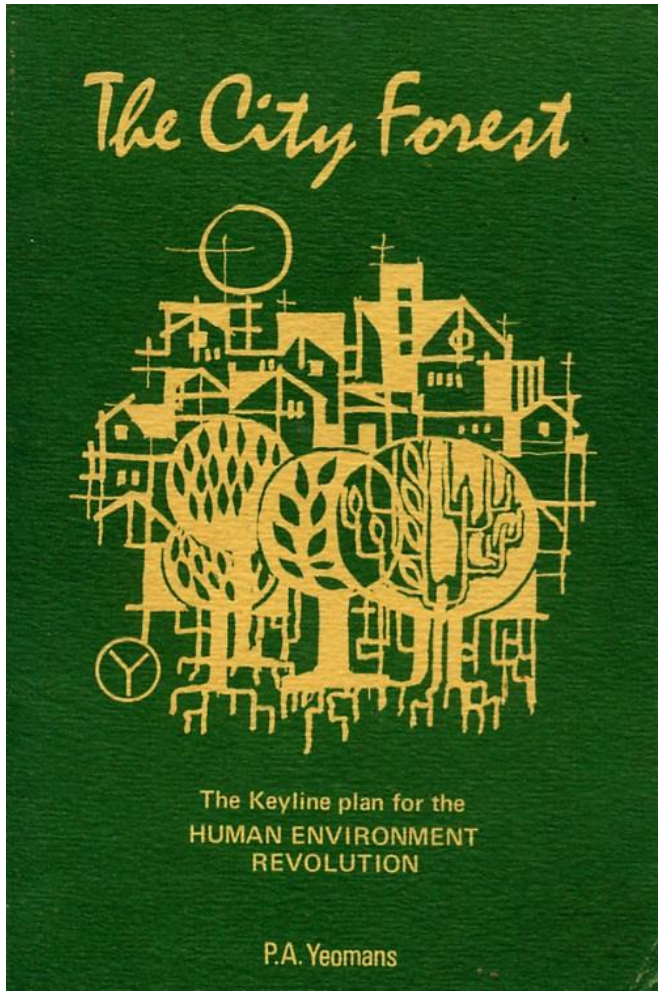
- "Subsoils remaining on the farm and grazing land after the real soil has been lost by erosion have been easily transformed into fertile and highly productive soil in two or three years by precise management of existing or sown pasture species and Keyline cultivation."

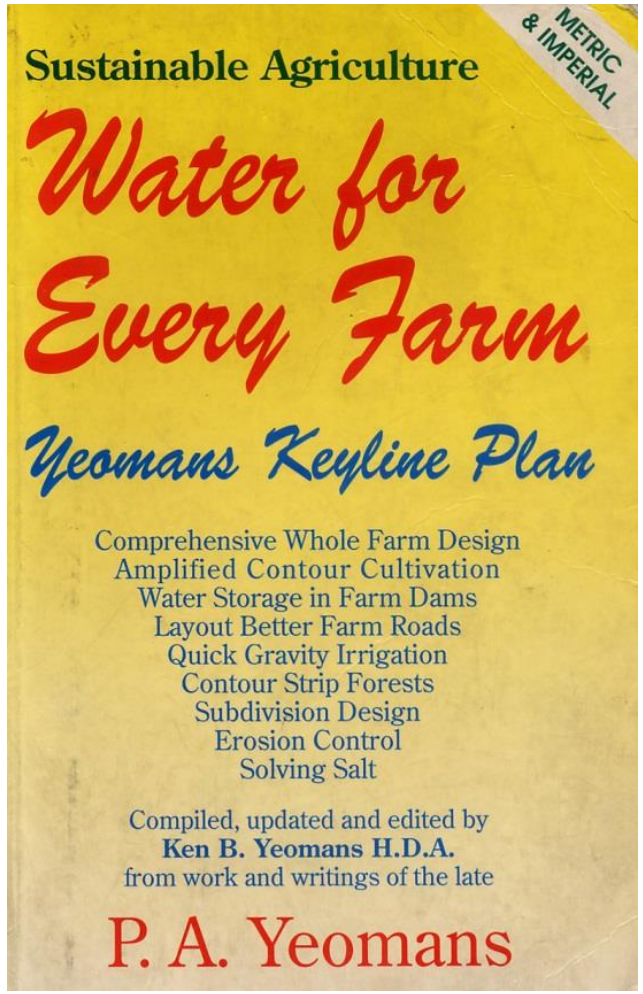
Allan Yeomans

Ken Yeomans

The Keyline Canon







Landscape design and ripsowing patterns

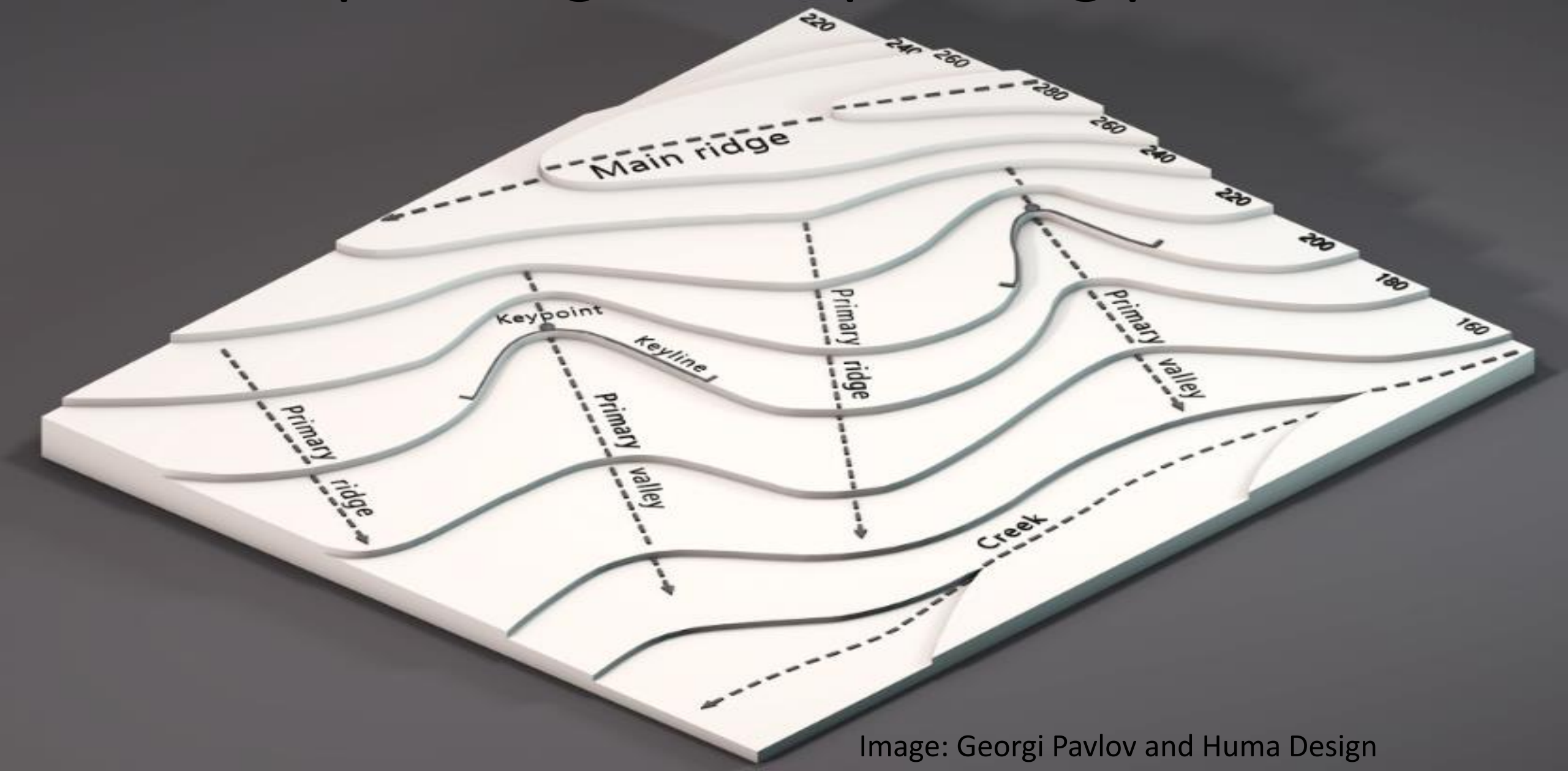


Image: Georgi Pavlov and Huma Design

Keypoints

- occur (only) within primary valleys
- The Keypoint is the point at which the primary valley gets suddenly steeper

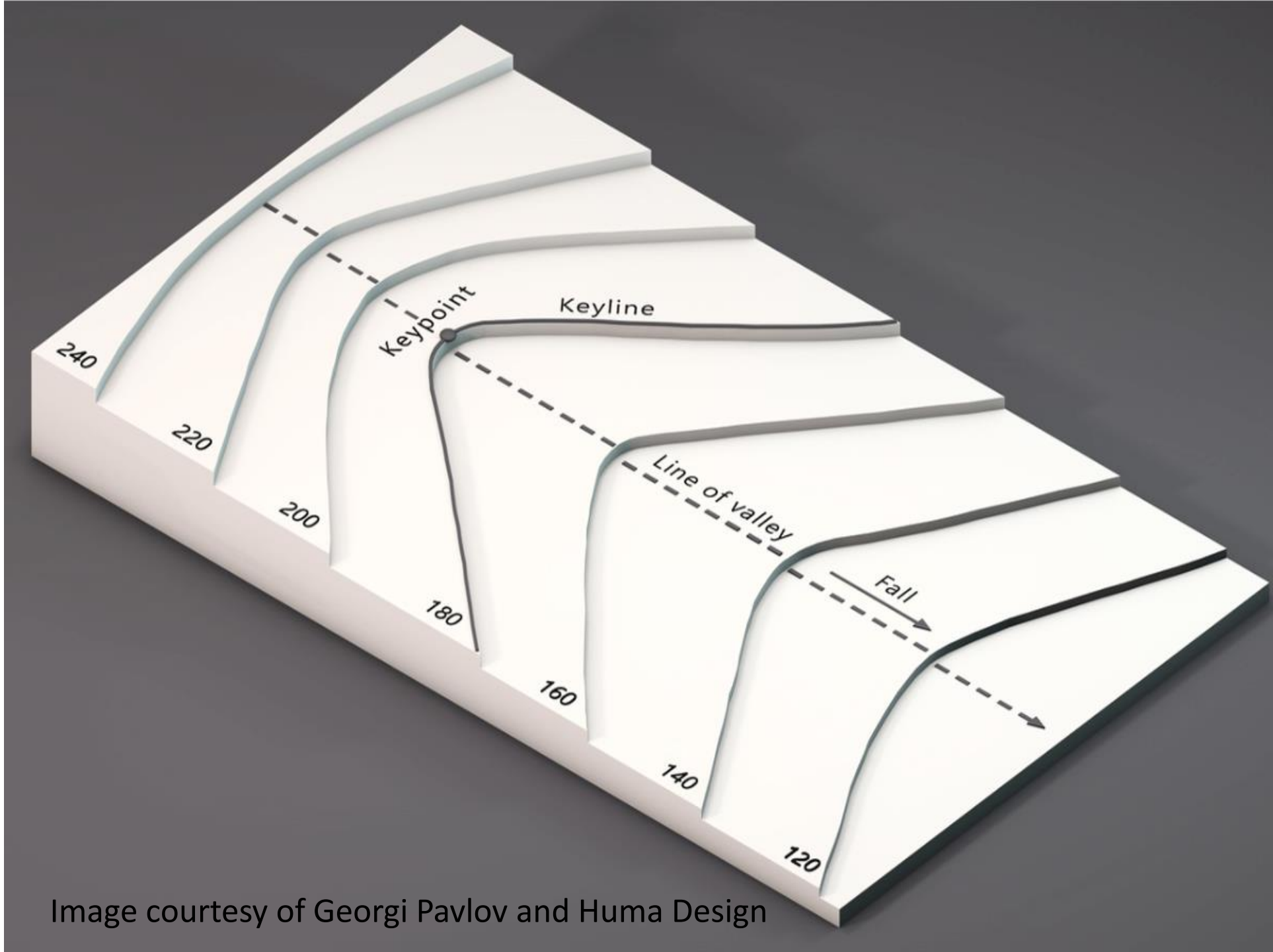
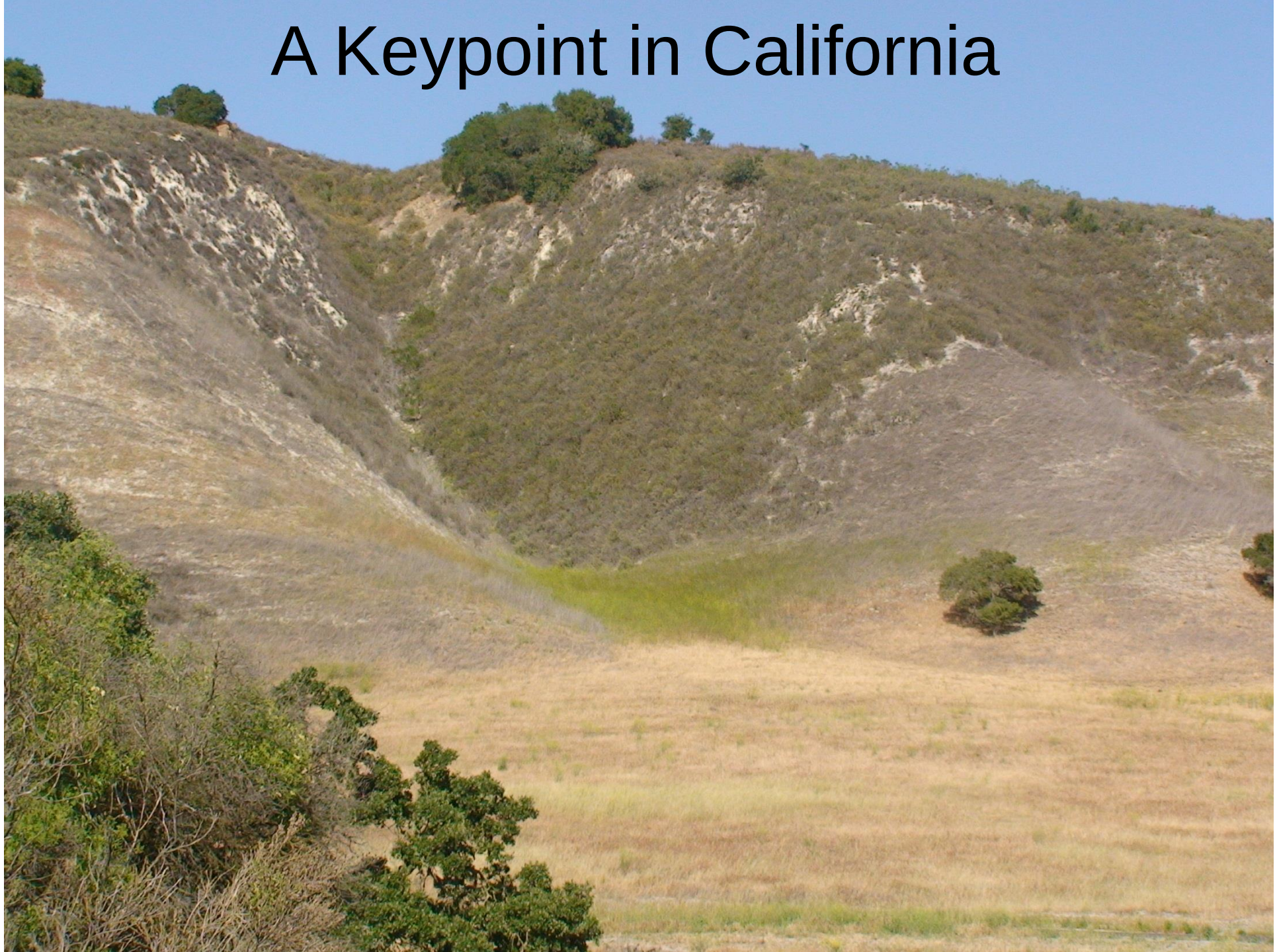


Image courtesy of Georgi Pavlov and Huma Design

A Keypoint in California



Photos credit: Darren Doherty

A Keypoint in Virginia

Images: courtesy of Regrarians. www.regrarians.org/regrarian-handbook/

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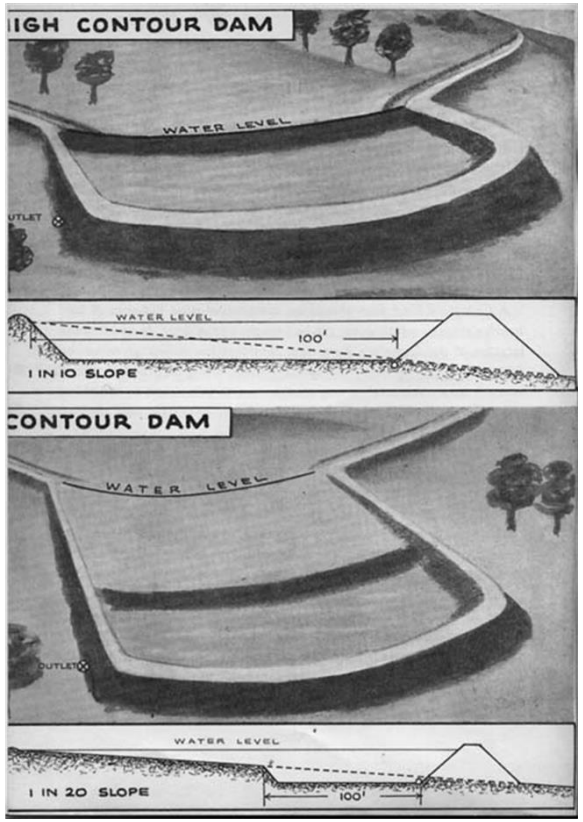
Images: courtesy of Regrarians. www.regrarians.org/regrarian-handbook/

Dams

- Keypoint dam
- Contour dam
- Ridge Dam

- Saddle Dam
- Ring Dam
- Excavated Pond
- Low Valley Dam



Images: The Challenge of Landscape

Channels for diverting water to dams, connecting dams, and irrigation

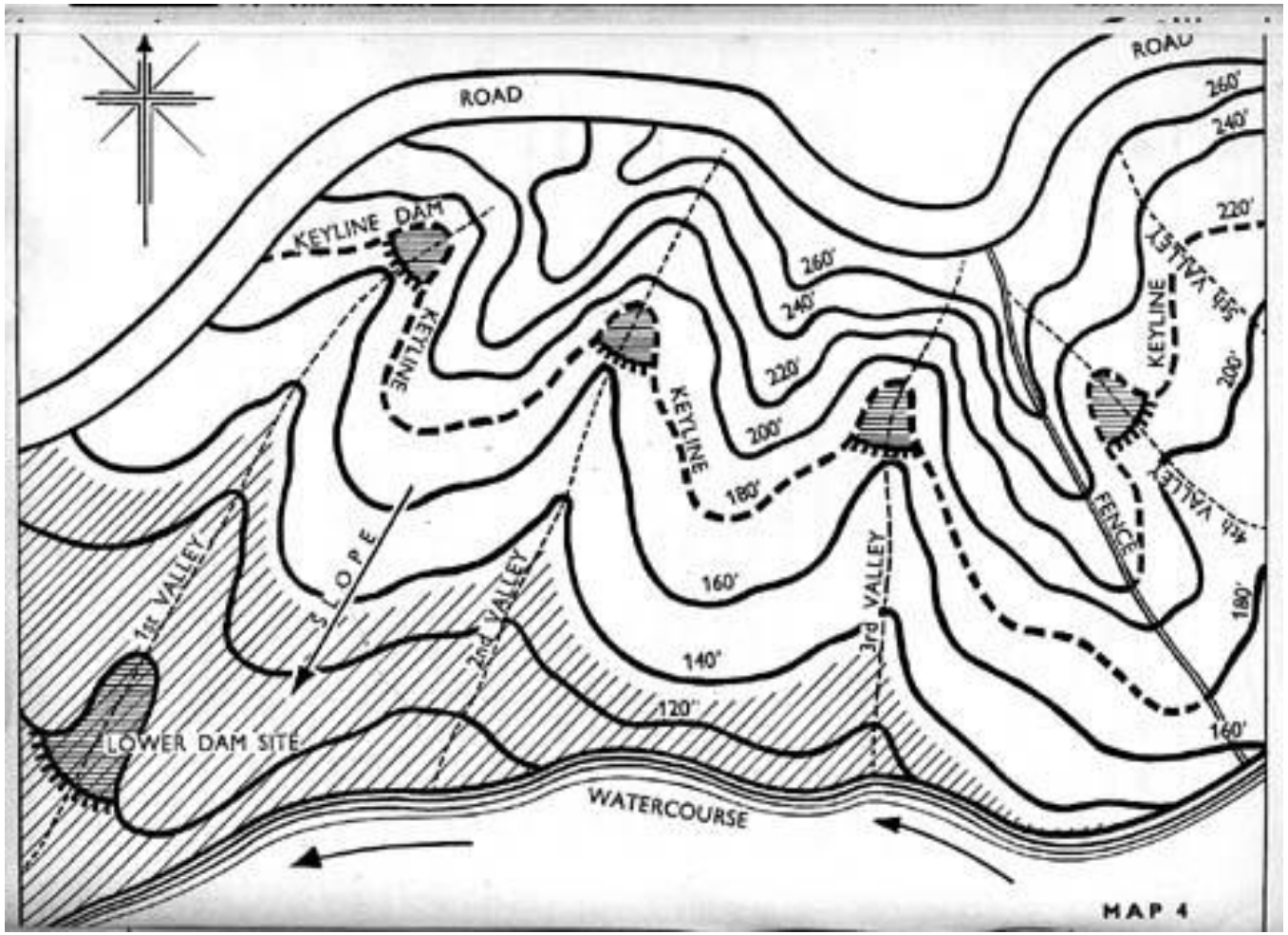
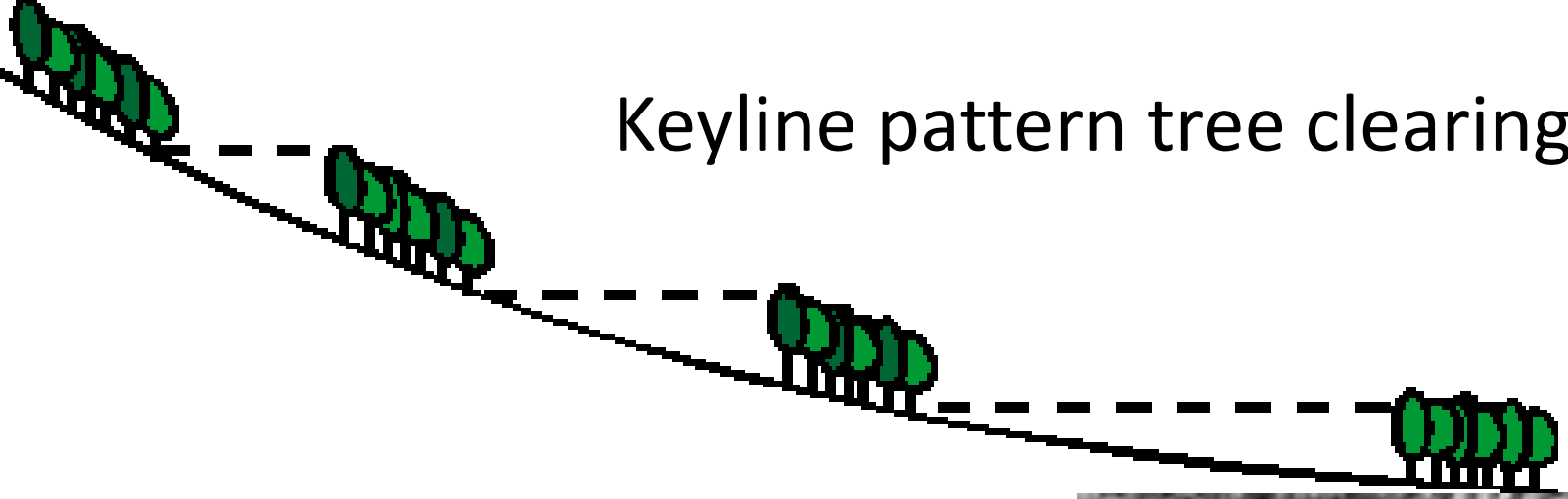


Image: The Challenge of Landscape

Image: Milkwood Permaculture

Keyline pattern tree clearing and tree planting



Contour Strip Forests

- Generally follow the patterns of water harvesting/distribution channels and roads.
- Trees usually border roads, and are located above irrigation channels.
- Along riparian corridors and around lakes and ponds.
- On ridges to provide shade for livestock, moving nutrients uphill.
- Tree placement for windbreaks enhances crop productivity and livestock performance.
- Browse is valuable livestock feed.

Image: The Challenge of Landscape

A carbon offset company that bought more than 100,000 acres raises concerns in NH's North Country

New Hampshire Public Radio | By Adriana Martinez-Smiley
Published August 29, 2023 at 1:21 PM EDT

CONSERVATION

Forest carbon offsets are failing

Analysis reveals emission reductions from forest conservation have been overestimated

By **Julia P. G. Jones**[1,2] *and* **Simon L. Lewis**[3,4]

Conserving tropical forests is of utmost importance for the future of humanity and biodiversity. Changes in land use, mostly deforestation in the tropics, emit 5 billion metric tons of carbon dioxide annually—second only to fossil fuel use, which emits 35 billion tons (*1*). Reducing emissions to net zero is necessary to stabilize global temperatures (*2*). One controversial approach to tackle fossil-fuel emissions from private companies, individuals, and governments has been to "offset" them by investing in projects to either stop emissions that would have otherwise occurred, such as by reducing deforestation, or by investing in carbon uptake projects, such as forest restoration. On page 873 of this issue, West *et al.* (*3*) show that offsetting through paying projects to reduce emissions by conserving tropical forests is not reducing deforestation as claimed and is worsening climate change.

West *et al.* studied 26 projects spanning six countries across three continents. These projects issued REDD+ (Reducing Emissions from Deforestation and Degradation) credits to the voluntary carbon market. Each credit equates to 1 metric ton of carbon dioxide that has not been emitted because of the existence of the project, which conducts activities to lower deforestation in the project area. The credits studied by West *et al.* were issued under the Verified Carbon Standard, the largest crediting program in the voluntary carbon

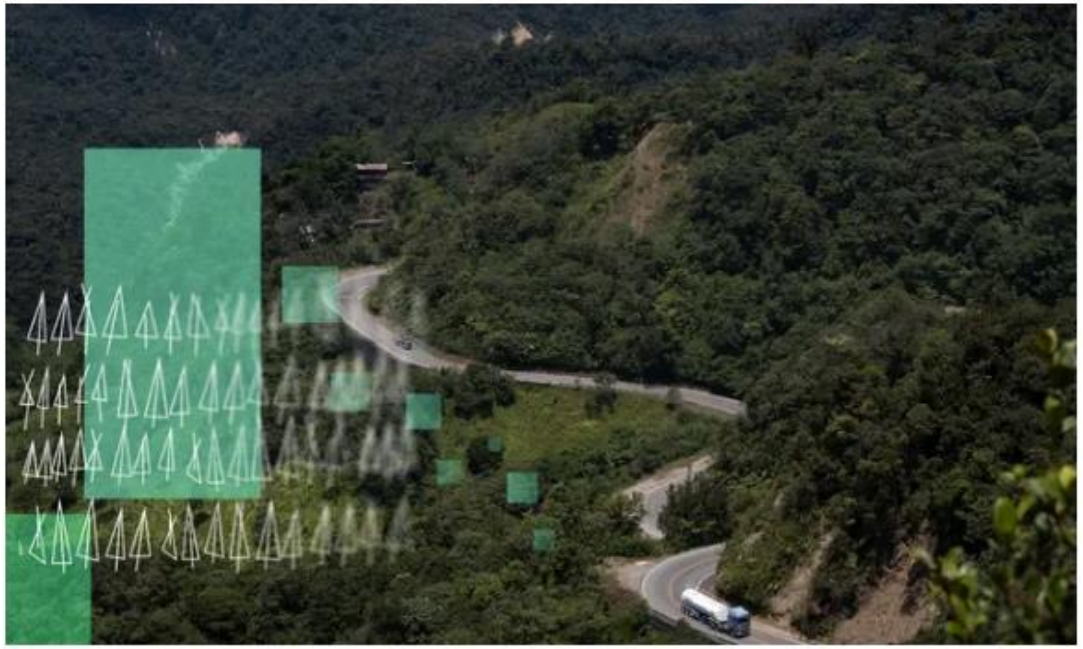
[1]College of Environmental Science and Engineering, Bangor University, Bangor, UK. [2]Department of Biology, Utrecht University, Utrecht, Netherlands. [3]School of Geography, University of Leeds, Leeds, UK. [4]Department of Geograhpy, University College London, London, UK.
Email: julia.jones@bangor.ac.uk

PHOTO: RAUL ARBOLEDA/AFP/GETTY IMAGES

Revealed: more than 90% of rainforest carbon offsets by biggest certifier are worthless, analysis shows

Investigation into Verra carbon standard finds most are 'phantom credits' and may worsen global heating

- 'Nowhere else to go': Alto Mayo, Peru, at centre of conservation row
- Greenwashing or a net zero necessity? Scientists on carbon offsetting
- Carbon offsets flawed but we are in a climate emergency



The Alto Mayo protection forest in Moyobamba, Peru, was supposed to be a flagship offsetting project but has faced human rights issues. Composite: Guardian Design/AFP/Getty Images

The forest carbon offsets approved by the world's leading certifier and used by Disney, Shell, Gucci and other big corporations are largely worthless and could make global heating worse, according to a new investigation.

The Guardian

https://www.theguardian.com/environment/2023/jan/18/revealed-forest-carbon-offsets-biggest-provider-worthless-verra-aoe

This article is more than **11 years old**

2011 warning

Peruvian Amazon could become global centre of 'carbon piracy': report

Warnings that illiterate communities are being pressured to sign up to offsetting schemes in the rush to tap into the potentially vast new global carbon market for forest-rich countries

The Peruvian Amazon could become the global centre of 'carbon piracy' a report warns. Photograph: Ricardo Beliel/Alamy

The Peruvian Amazon is the new global centre of "carbon piracy", as banks, conservationists and entrepreneurs rush to snap up the legal rights to trade carbon, according to a report published today at the UN climate talks in Durban.

More than 35 major projects covering around 7m hectares of Peruvian rainforest have been set up to profit from the global voluntary carbon offset

https://www.theguardian.com/environment/2011/nov/30/peruvian-amazon-carbon-piracy

The Guardian

https://www.theguardian.com/environment/2023/jan/21/amazon-indigenous-communities-carbon-offsetting-pirates-aoe

2023 verification

The 'carbon pirates' preying on Amazon's Indigenous communities

Campaigners fear some Indigenous communities are being taken advantage of in carbon offsetting deals with western companies. Photograph: Martín Mejía/AP

Selling credits should fund forest protection, but unscrupulous firms are making deals where land stewards lose out, say local leaders

- Revealed: 'over 90% of rainforest offsets by biggest provider worthless'
- Greenwashing or a net zero necessity? Scientists on carbon offsetting
- 'Nowhere else to go': Alto Mayo, Peru, at centre of conservation row

A number of Indigenous communities in the Amazon say that "carbon pirates" have become a threat to their way of life as western companies seek to secure deals in their territories for offsetting projects.

Across the world's largest rainforest, Indigenous leaders say they are being approached by carbon offsetting firms promising significant financial benefits from the sale of carbon credits if they establish new projects on their

Most viewed

First Thing: 'octagonal' flying object shot down in Michigan

Middlemen Snag Carbon-Credit Cash Aimed at Peruvian Amazon

Only a small amount of money designated for rainforest preservation reaches the people who live there

https://www.wsj.com/articles/middlemen-snag-carbon-credit-cash-aimed-at-peruvian-amazon-11672321001

"We of La Vía Campesina, small family farmers, landless workers, Indigenous and migrant communities – men and women – stand in direct opposition to the commodification of nature, of our territories, of water, seeds, foods, and human life."

"**Payment for Environmental Services** is being used to displace Indigenous people and small farmers from their lands and territories."

"The most ambitious plan…is to place a price on all of nature (including water, biodiversity, landscapes, wildlife, seeds, rain, etc.) so as to privatize…and later charge us for its use."

"Our challenge is to reestablish another way of relating to nature, and between peoples."

Indigenous Environmental Network

(IEN)

https://www.ienearth.org/

“Carbon trading, carbon offsets and REDD+ are fraudulent climate mitigation mechanisms that in fact help corporations and governments keep extracting and burning fossil fuels.”

Carbon credit speculators could lose billions as offsets deemed 'worthless'

The Guardian

Many credits in the voluntary market going unused, with study finding some offsetting could make global heating worse

Thu 24 Aug 2023 14.00 EDT

Carbon credit speculators could lose billions as scientific evidence shows many offsets they have bought have no environmental worth and have become stranded assets.

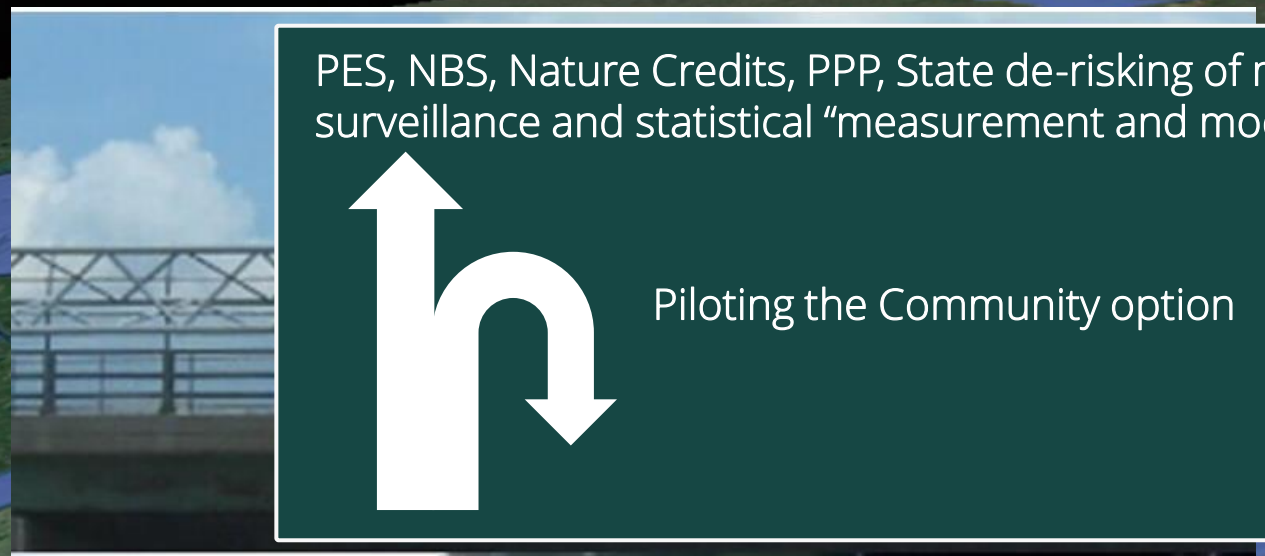
Amid growing evidence that huge numbers of carbon credits do nothing to mitigate global heating and can sometimes be linked to alleged human rights concerns, there is a growing pile of carbon credits equivalent to the annual emissions of Japan, the world's fifth largest polluter, that are unused in the unregulated voluntary market, according to market analysis.

From Apple to Disney, Gucci to Shell, many of the largest companies in the world have used carbon credits for their sustainability efforts from the unregulated voluntary market, which grew to $2bn (£1.6bn) in size in 2021 and saw prices for many carbon credits rise above $20 per offset.

The credits are often generated on the basis they are contributing to climate change mitigation such as stopping tropical deforestation, tree planting and creating renewable energy projects in developing countries. Proponents say they need to massively increase in size and scale to help meet the Paris agreement to limit global heating.

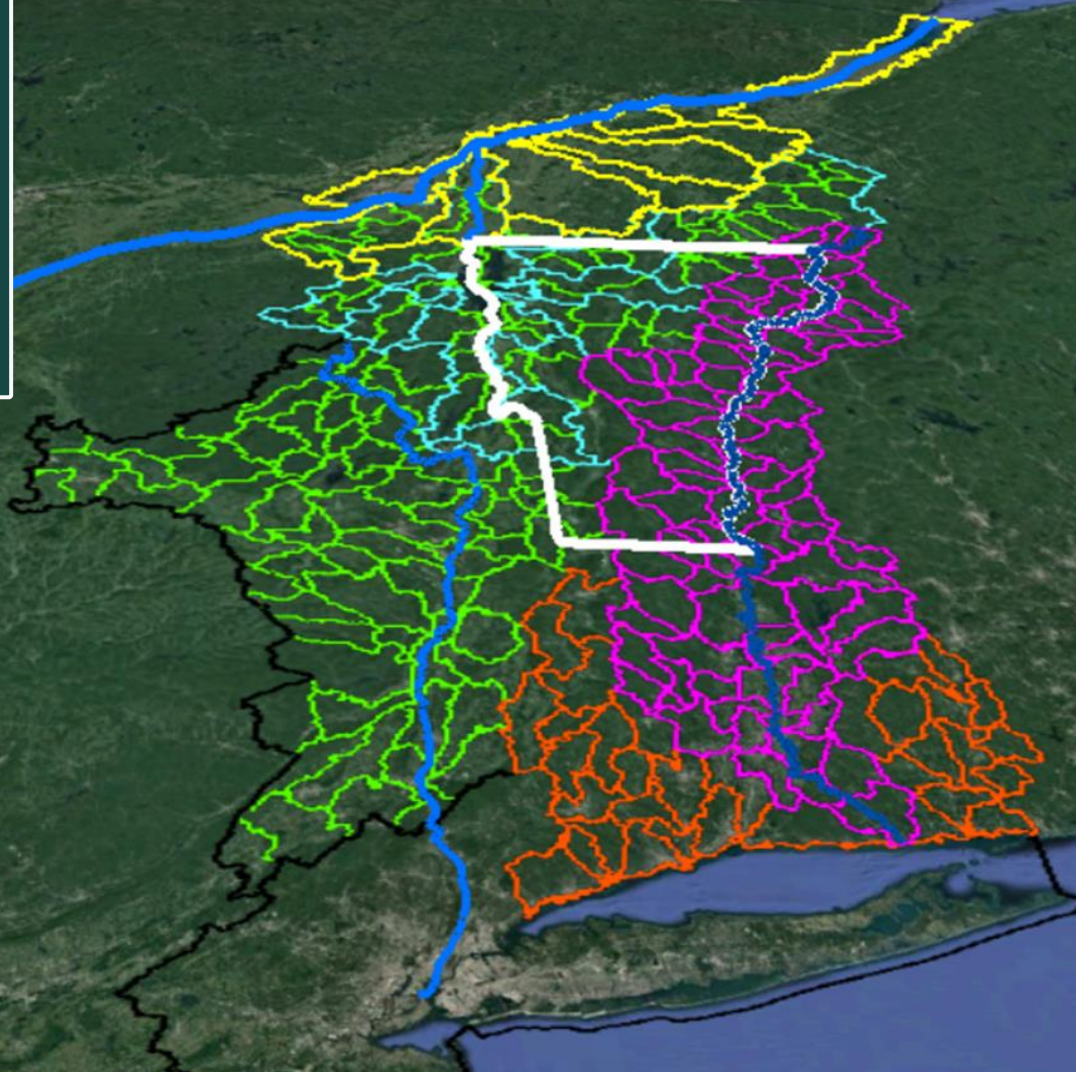
https://www.theguardian.com/environment/2023/aug/24/carbon-credit-speculators-could-lose-billions-as-offsets-deemed-worthless-aoe

Ecosystem Services, Carbon Credits etc. are enclosure



PES, NBS, Nature Credits, PPP, State de-risking of markets, surveillance and statistical “measurement and modeling”

Piloting the Community option



The unbroken legacy of the English aristocracy: Enclosure

- Enclosure of the English commons
- Commodification of labor
- Privatization of credit
- Colonization of the Americas, Africa, Asia, Australia
- Turning *the people and land* of the colonies into capital assets – enslavement, real estate, and commodities
- Ideas into Intellectual Property
- Gene Patenting and Seed Patenting
- Data Extraction and Commodification
- Behavioral Futures: predicted and modified Human Behavior
- Ecosystem Services, Carbon Offsets, Water Credits, Biodiversity Credits, etc.
- Biopiracy of human genetics
- Commodification of Indigenous knowledge and culture

- Time to abandon the tradition…

“Nature shrinks as capital grows. The growth of the market cannot solve the very crisis it creates.”

Vandana Shiva

Small farmers and land stewards in solidarity
Thousands of community alternatives to financializing nature

LAND CARE COOPERATIVE

We stand with hundreds of millions of small farmers, peasant farmers and Indigenous Peoples around the world who refuse – and will replace - the financialization of the Earth and the framework and schemes of Natural Capital, Ecosystem Services, Carbon Offsets, Biodiversity Credits, Wetland Mitigation banking, Nature Based Solutions, etc.

There is a better way – **a Community Option** - led by land stewards in community – and it will serve us all to pilot developing it in the real world.

The Main COP27 Solution to Saving the Planet: Make It an Asset Class & Sell it

By Lynn Fries and John Bellamy Foster

NOV 9, 2022 | ENVIRONMENT

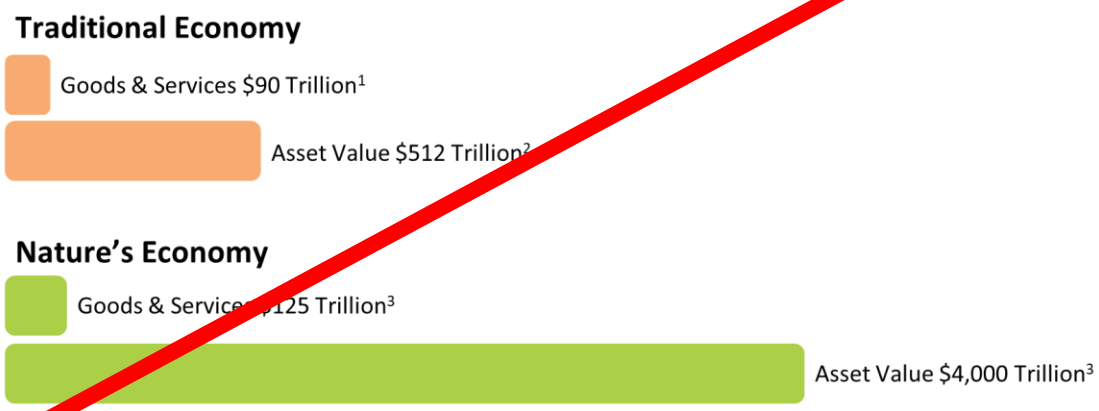
Share Tweet SHARE

"The 'solution' master-minded by global finance at COP27 to resolve the imminent environmental crisis: create a multi-quadrillion dollars' worth of assets on the back of everything nature does and expropriate it from the global commons to make a profit."

https://www.ineteconomics.org/perspectives/blog/the-capitalist-solution-to-save-the-planet-make-it-an-asset-class-sell-it

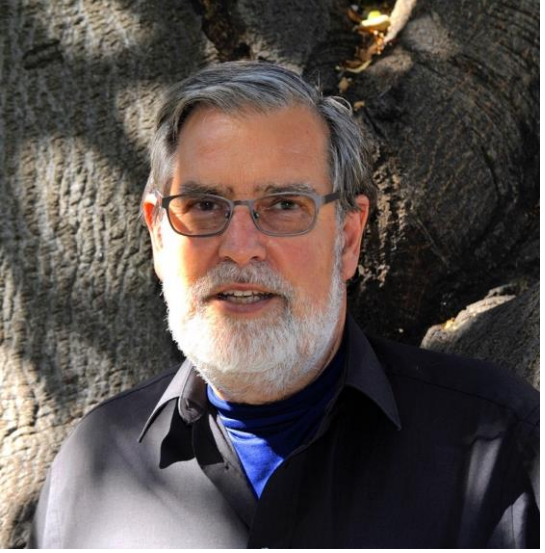
THE **OPPORTUNITY**

Nature's economy provides more value annually than the entire financial economy today, and is potentially worth 5-10 times more in asset value.



1. World Bank; 2. Asset Value: Arcadis, McKinsey; 3. Robert Costanza et. Al. 2014

Image1: boardroom: istockphoto.com. "Opportunity" slide: Source: Kyle Philipp, Regenerative Food Network, Regenerative Agriculture Investment Solutions (RAIS) Presentation, VT Farm to Plate conference, 2022



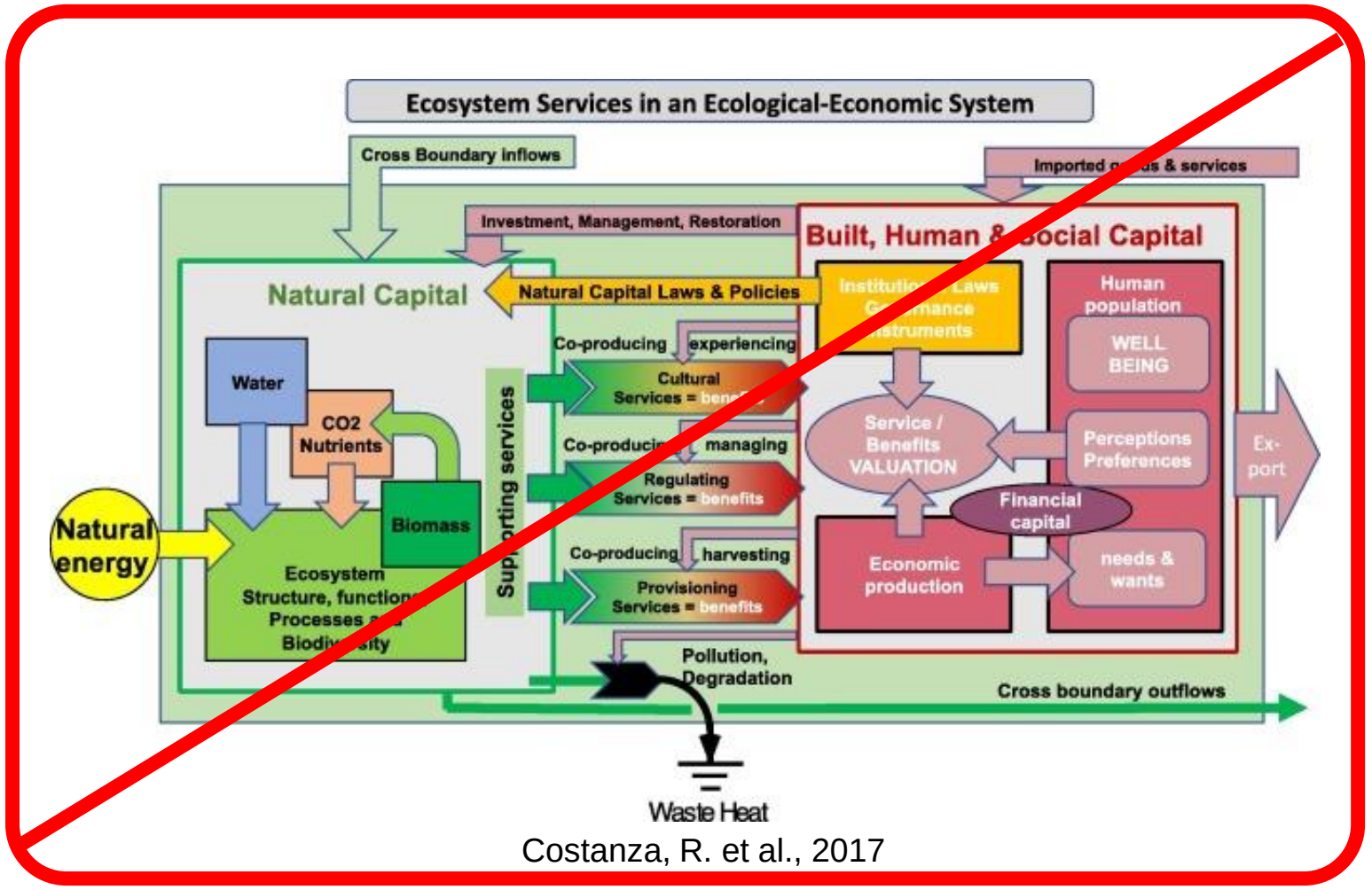
Ecosystem services: From eye-opening metaphor to complexity blinder

Richard B.Norgaard, 2009

Abstract

What started as a humble metaphor….of nature as a stock that provides a flow of services is insufficient for the difficulties we are in or the task ahead.

Indeed, combined with the mistaken presumption that we can analyze a global problem within a partial equilibrium economic framework and reach a new economy project-by-project without major institutional change, the simplicity of the stock-flow framework blinds us to the complexity of the human predicament.



Costanza, R. et al., 2017

INTRINSIC
EXCHANGE GROUP

ABOUT USE CASES TEAM MEDIA CONTACT

INTRINSIC EXCHANGE GROUP

Intrinsic Exchange Group (IEG) is introducing a new type of company whose equity captures the value of natural assets and the ecosystem services they produce. Natural Asset Companies (NACs) are fundamentally different than traditional companies because they are chartered to protect, restore, and grow the natural assets under their management to foster healthy ecosystems.

ENLISTING THE EQUITY MARKET TO MEET THE SCALE OF THE PROBLEM

IEG partnered with the New York Stock Exchange (NYSE) to create a special listing section for NAC equities, and we are going through the process of obtaining SEC approval for the NAC listing rules, based on IEG's NAC Reporting Framework.

By taking a NAC public through an IPO, the market transaction will succeed in converting the long-understood – but to-date unpriced – value of nature into financial capital. This monetization event will generate the funding needed to manage, restore, and grow healthy ecosystems around the world and bring us closer to achieving a truly sustainable, circular economy.

https://www.intrinsicexchange.com/en/home

We are witnessing, with increasing severity and frequency, the fragility of our financial and ecological systems and the need for systemic change. **IEG is a company tackling the root cause of some of the largest and most intractable social and environmental challenges we face today.**

OUR MISSION

To convert natural asset value to financial capital to provide the resources necessary to fund conservation and regenerative practices at scale, powering us to a sustainable future for the benefit of nature and humanity.

THE OPPORTUNITY FOR AN INCLUSIVE ECONOMY

The potential of NACs is immense. **Nature's economy is larger than our current industrial economy** – and more than 50% of global GDP is dependent or highly dependent on nature. We can tap this store of wealth and productivity to protect and grow nature and to transform our economy to one that is more equitable, resilient, and sustainable.

The IEG NAC Reporting Framework connects our social values with economic and ecological realities.

TRADITIONAL ECONOMY

Goods & Services **$96.5 Trillion**[1]

Asset Value **$1,540 Trillion**[2]

NATURE'S ECONOMY

Goods & Services (ecosystem services) **$125 Trillion**[3]

Asset Value **$5,000 Trillion**[3]

1. World Bank, 2021; 2. McKinsey, 2020; 3. Robert Constanza et. al. 2014

NACs (
TO:

- Generat
  a truly s
- Create t
- Create j
  from it.
- Establis
- Provide

CREAT

IDENTI

NATURA
VALUE

VALUES CAPTURED IN A NATURAL ASSET COMPANY

Natural Asset Companies are designed to capture the full value of natural assets including, but not limited to, the following:

- **Commercial Production** – The use of natural resources, built assets, financial capital, and labor to produce goods and services as reported under GAAP/IFRS. This includes the production of certain goods and services from nature that are monetized today (e.g., ecotourism, food production).
- **Production of Ecosystem Services** – The production of goods and services nature produces that are not monetized today (e.g., pollination or flood risk reduction) which will be captured within a NAC's ecological performance reporting.
- **Nature's Non-Use Value** – The less tangible inherent value of nature, including people's value for species and ecosystems in and of themselves. This category includes:
  - Bequest value – the value of preserving nature for future generations
  - Existence value – the value people place to ensure the continued existence of ecosystems and/or the species that live within them
  - Value for services not yet identified or quantified
- **Store of Value** – A NAC's equity is a store of value like any other security or asset. The stocks of water, timber, biodiversity, soil, carbon, fish, and other natural assets that make life on Earth possible are now protected under a NAC.
- **Risk Mitigation** – By recognizing positive and negative externalities, and a broad spectrum of ecosystem services, nature-based risks may be revealed, mitigated, and in some cases, converted into an asset/income stream. Additionally, financial, operational, litigation, and reputational risks may be managed through any resulting improvements in land management practices.
- **Uncorrelated Asset** – The production of ecosystem services is not dependent on systemic economic downturns and business cycles.
- **Increased Competitiveness** – As policy and regulatory environments evolve to manage climate change, biodiversity, and other natural resource pressures, NACs may be able to demonstrate the value of nature-positive impacts. As new markets emerge for ecosystem services, NACs may be able to capitalize on the ecosystem services that translate into new markets.

- Work w
  to iden
  ecosystem services or potential for ecosystem restoration

- Formalize governance structure, including bylaws and policies
- Develop business plan

assets
- Share price signals value of nature
- Benefits are shared with local communities

INVESTORS

IDB Inter-American Development Bank

NYSE

ROGER SANT

The ROCKEFELLER FOUNDATION

ABERDARE VENTURES

SELECT SUPPORTERS

UnderstandingAG

CONSERVATION INTERNATIONAL

WWF®

BirdLife INTERNATIONAL

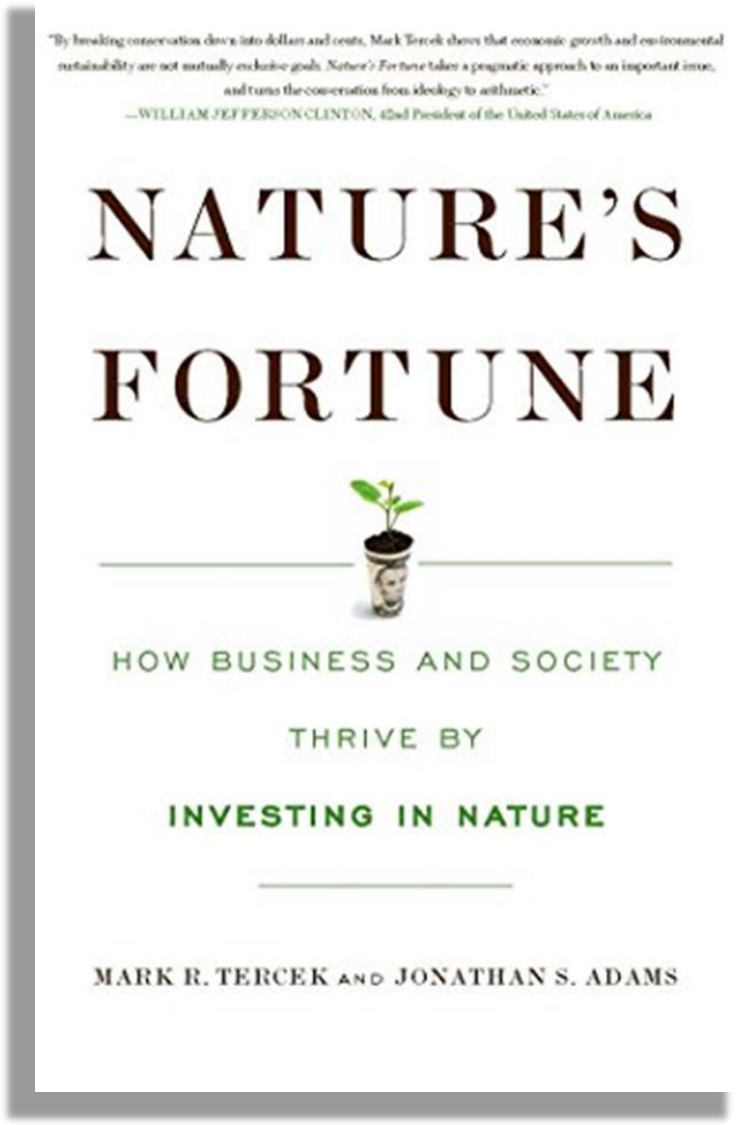
AMAZON CONSERVATION

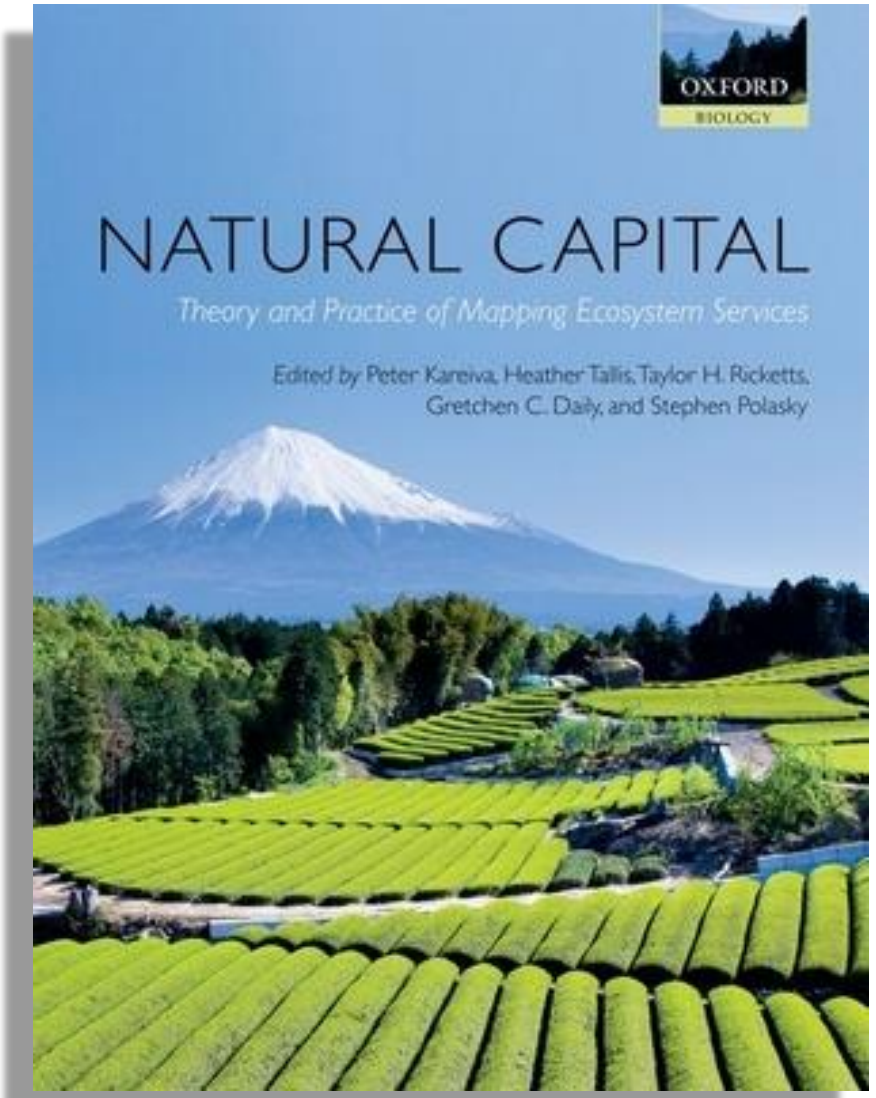
CARIBBEAN CLIMATE-SMART ACCELERATOR

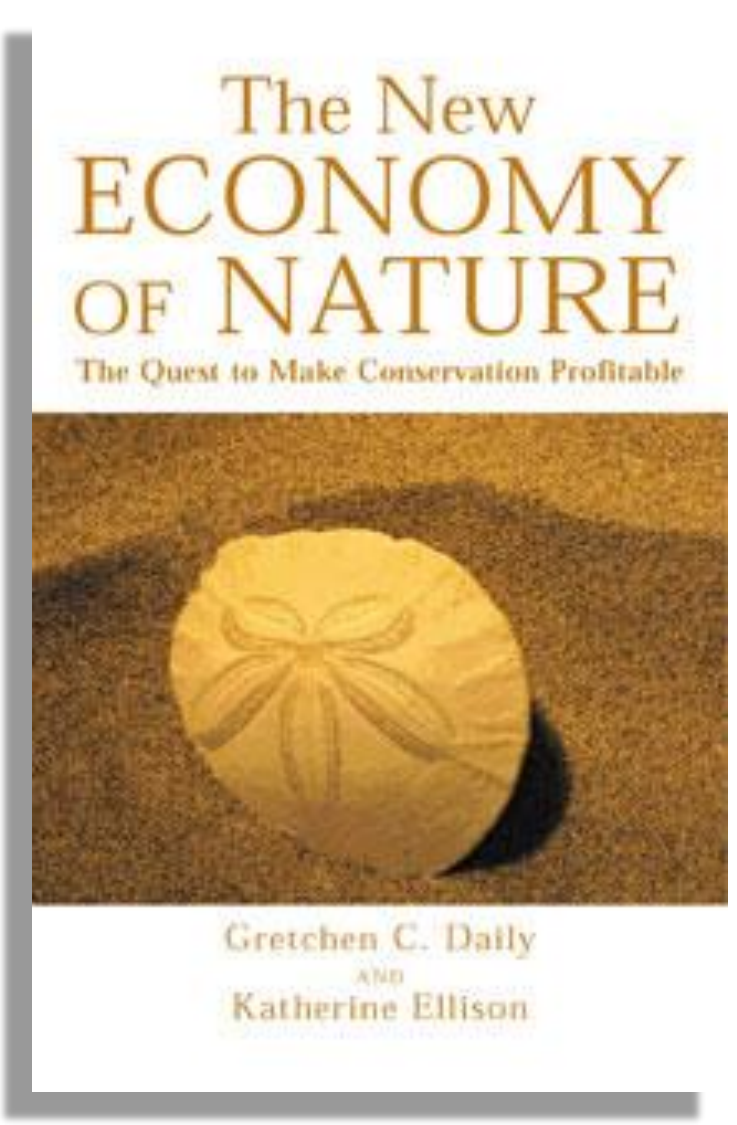
RESOLVE

MINAE Ministerio de Ambiente y Energía

Privatizing nature: A few key enclosure how-to manuals







The Defense of Nature: Resisting the Financializaton of the Earth *by* John Bellamy Foster

“Plans for the expropriation and accumulation of natural capital by global finance are primarily directed today at the Global South.

It is impossible to exaggerate the extent of this natural-capital rush, now being promoted by global speculative finance, which since the Great Financial Crisis of 2007–10 has sought to acquire real assets in the physical environment to underpin continuing debt expansion.

The implications of this rapid financialization of nature, which is promoting a Great Expropriation of the global commons and the dispossession of humanity on a scale exceeding all previous human history, are vast. This Great Expropriation is being justified on the grounds of saving nature by turning it into a market, thereby replacing the laws of nature with the laws of commodity value.

Yet, not only is the logic behind this fallacious, but it is also likely to widen the associated colossal financial bubbles, while accelerating destruction of planetary ecosystems and of the earth as a safe home for humanity.

….The necessary conditions for the defense of the earth in the face of the current financialization juggernaut, [will require] the greatest alliance of workers, peoples, and movements in the history of humanity.”

Daniela Gabor: The Wall Street Consensus

Private finance will provide the credit to finance new asset classes, de-risked by the state, often in PPPs and state-backed new markets:

Nature, Green Infrastructure, SDGs

ABSTRACT

The Wall Street Consensus is an elaborate effort to reorganize development interventions around partnerships with global finance. The UN's Billions to Trillions agenda, the World Bank's Maximizing Finance for Development or the G20's Infrastructure as an Asset Class update the Washington Consensus for the age of the portfolio glut, to 'escort' global (North) institutional investors and the managers of their trillions into development asset classes. Making development investible requires a two-pronged strategy: enlist the state into risk-proofing development assets and accelerate the structural transformation of local financial systems towards market-based finance that better accommodates portfolio investors. Ten policy commandments forge the 'de-risking state'. They create a safety net for investors in development assets, protecting their profits from demand risks attached to commodified infrastructure assets; from political risks attached to (progressive) policies that would threaten cash flows, including nationalization, higher minimum wages and, critically, climate regulation; and from liquidity and currency risks. These risks are transferred to the balance sheet of the state. The new 'development as de-risking' paradigm narrows the scope for a green developmental state that could design a just transition to low-carbon economies.

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World Bank set to take on risk of insuring carbon credits amid market upheaval

Published on 08/06/2023, 2:04pm

As a growing number of developing countries tighten control over carbon markets, MIGA plans to step in to provide political risk insurance and facilitate investments.

A carbon offsetting project aiming to preserve forests in Peru. Photo: Yoly Gutierrez/CIFOR

https://www.climatechangenews.com/2023/06/08/world-bank-set-to-take-on-risk-of-insuring-carbon-credits-amid-market-upheaval/

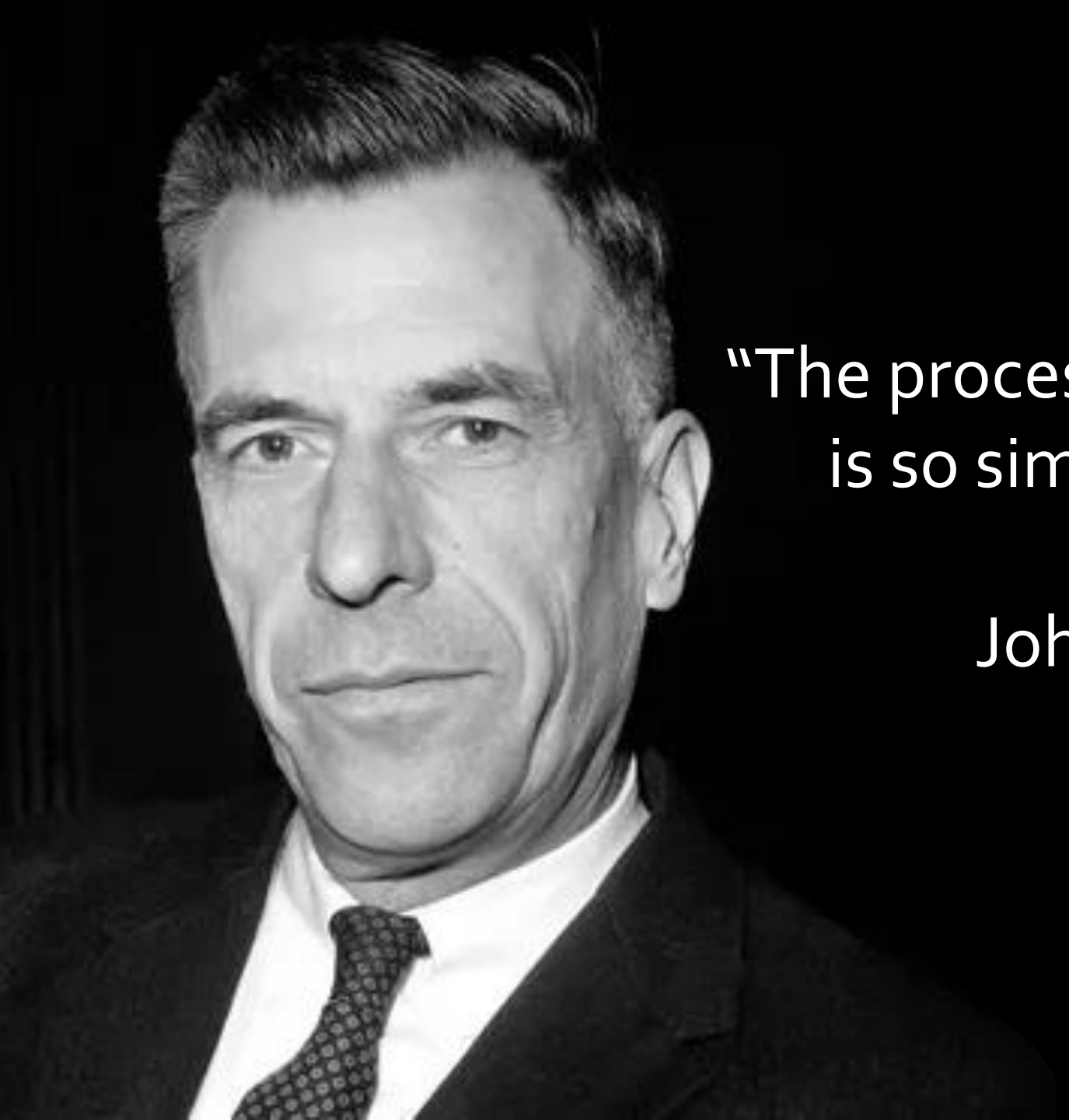
60+ Groups Form Alliance Against Faulty Offsets, Dirty Energy in Farm Bill

Carbon markets, offsets, factory farm gas threaten climate action under the guise of "climate smart agriculture"

WASHINGTON - Today, leading food, farming, Indigenous, faith and climate advocacy groups announced the public launch of the Alliance Against Farm Bill Offsets. The Alliance, convened by Food & Water Watch, was formed in response to a growing trend of promoting flawed climate policies under the guise of "climate smart agriculture." In the last six months alone, while most policies are in gridlock, Congress has passed at least three pieces of legislation that promote carbon offsets and dirty energy, propping up corporate Ag interests and factory farming.

The Alliance is backed by over 60 organizations including Climate Critical, Family Farm Defenders, Friends of the Earth, Indigenous Environmental Network, Institute for Agriculture and Trade Policy, National Family Farm Coalition, and 350 Seattle.

bUT wheRe WILl the MoNEy come frOM?#!?



"The process by which money is created is so simple the mind is repelled."

John Kenneth Galbraith

If the work can be done, and is an existential priority, *the money can be created to finance it, (even without debt)*

- Federal spending
- Public Banks
- Community currencies

Money creation must be coupled to real value and resource creation

Video Link

Alan Greenspan: "…there is nothing to prevent the Federal Government from creating as much money as it wants and paying it to somebody. The question is, how do you set up a system which assures that the real assets are created which those benefits are employed to purchase?…It is a question of the structure of a financial system which assures that the real resources are created… as distinct from the cash. The cash itself is nice to have, but it has got to be in the context of the real resources being created…so that you can purchase real resources with the…cash."

Over the last 100 years

North Dakota farmers showed that we can create public banks,
owned by the people, to responsibly loan money into existence for critical credit,
infrastructure and economic development needs
(Vermonters came close to creating a Vermont state bank 9 years ago)

BND
100 YEARS · 1919-2019

The Birth of the Bank

Nobody is quite sure where the idea of a State Bank of North Dakota came from. League officials, including Governor Lynn J. Frazier, had spoken frequently of "a system of rural credit banks operating at cost," (a kind of rural credit union system), but the idea of a central state bank did not enter the discourse until 1918 and 1919. A booklet published by the League on August 31, 1918, called for a "State Bank which will act in a similar capacity for our state as does the Federal Reserve and Farm Land Banks. . .."

https://bnd.nd.gov/history-of-bnd/

BND
100 YEARS · 1919-2019

"The State of North Dakota does not have any funding issues at all. We in fact are dealing with the largest surplus we've ever had…
We look around and we say, 'Boy, that is unbelievable to see what is going on in the rest of the country and here we are completely countercyclical."

Eric Hardmeyer, CEO of the ***publicly owned*** **Bank of North Dakota**. March, 2009
[shortly following the 2008 financial crisis]

BND history

BND 100 YEARS · 1919-2019

Infrastructure Funding

An emerging need for the state in the 21st century has been the development of infrastructure. The rapid rise of the Bakken oil play, an increasing population in the state and a decrease in federal funding has provided the impetus for BND and the state to become more resourceful in funding road, water, school and housing projects. Being agile and responding to the state's needs, BND has recently increased its role in funding infrastructure for the state.

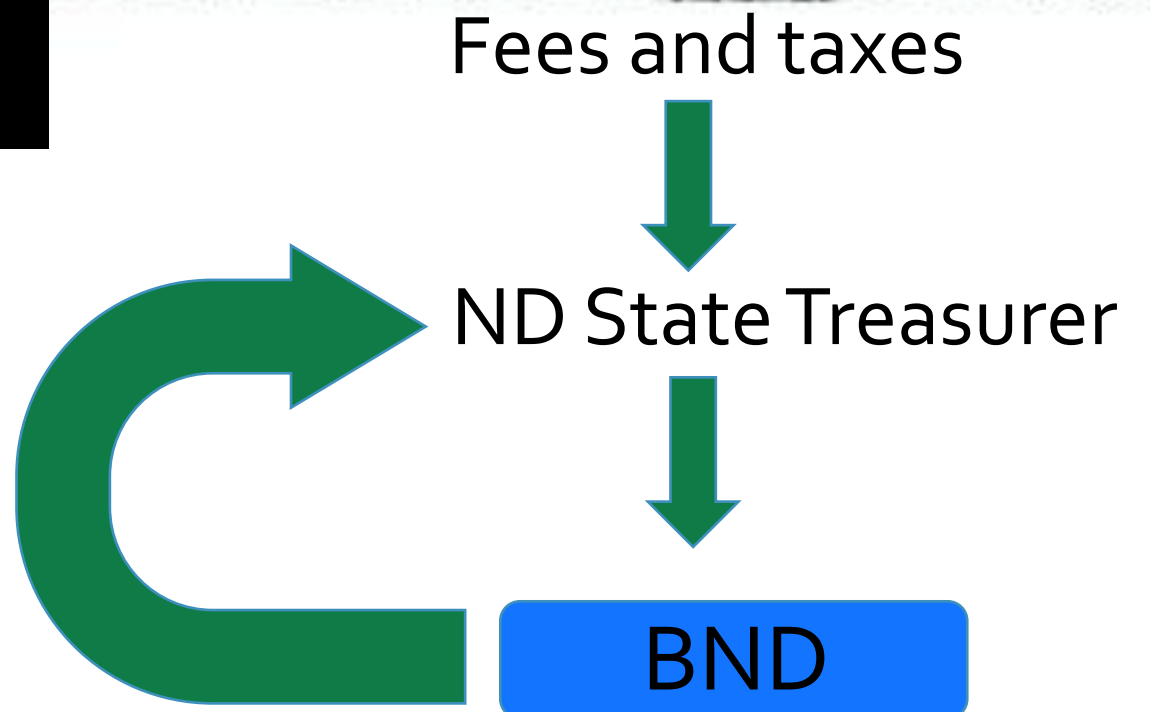
The Bank assists communities and the state by addressing infrastructure needs through programs established by the North Dakota Legislature. Funds repair, replace and build new infrastructure. The Bank works with other state agencies, political subdivisions and healthcare facilities to assess the needs and distribute the funds.

1990-Today

- An Economic Development Bank
- Returns to the General Fund
- Partnering with Local Financial Institutions
- Role in Disaster Relief
- Home Ownership
- Postsecondary Education Funding
- Infrastructure Funding
- Bank Managers
  - John H. Hoeven
  - Eric A. Hardmeyer

https://bnd.nd.gov/history-of-bnd/

BND
100 YEARS · 1919-2019



Fractional reserve money-creation:

Agriculture, Business, Residential, Infrastructure and Student Loans

Investments

Money-flow concept/diagram from BND: https://bnd.nd.gov/history-of-bnd/

The ruling class has enclosed the credit commons

We will need to take it back–
to heal the land, to create a good life in our communities, to leave our kids a livable future and a legacy of deep topsoil watersheds

LOCAL WORKING GROUPS

Conservation
Locally-

LWG Participation Key Considerations

EDirectives M_440_501.12

Local Working Group representation should be diverse and focus on agricultural interests and natural resource issues existing in the local community.

Participation should include individuals from historically underserved groups including but not limited to women, persons with disabilities, socially disadvantaged and limited resource groups.

To become a listed participant of the Local Working Group,

Ready to take your LWG to the next level?

Local Conservation Needs Assessment

Comprehensive evaluation of the condition of the area's natural resource base, and basis for long range plan development. Resource-based, not program-based. Look to the Local Working Group Toolkit for guidance and examples.

Conservation Action Plan

Community stakeholders, with the leadership of the conservation district, plan for the needed programs and services to address the problems identified by their local conservation needs assessment. Review plan elements on the next page.

Value

When you have a strong LWG up and running, develop short and long-term assessments and plans for your county or watershed!

Slides courtesy Jennifer Byrne, WRNRCD

https://www.whiterivernrcd.org/services/community-engagement

Conservation Action Plans

NRCS Programs Manual Title 440, §500.4

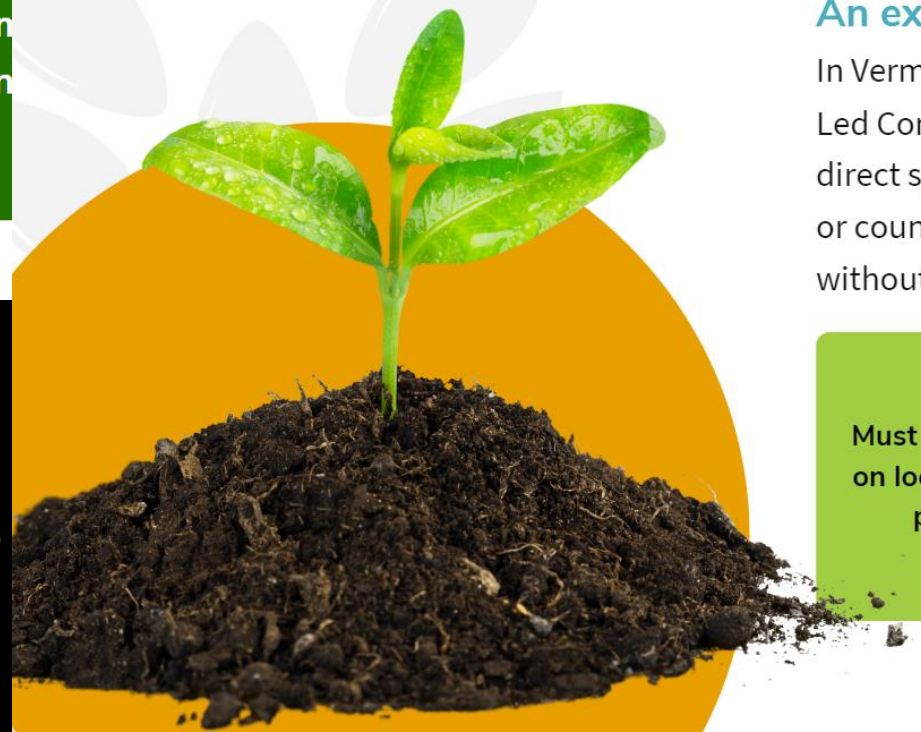
Identify natural resource conservation priorities

Set measurable conservation objectives

Identify technology needed to achieve goals

Identify Federal, State, Tribal, local, and nongovernment programs and services needed to address specific conservation needs

Identify respon
for action and
timeline for con
of elemen



Local Funding Pools

An exciting new opportunity

In Vermont, the USDA-NRCS has rolled out Locally Led Conservation Ranking Pools, an initiative to direct special EQIP funding to a particular watershed or county, allowing for applicants to be ranked without competing in statewide funding pools.

Must be based on local action plans

Local Working Groups propose ranking questions and points, applicable land uses, resource concerns and practice list

Slides courtesy Jennifer Byrne, WRNRCD

United States Department of Agriculture

National Template
November 2022

Conservation Practice Overview

Deep Tillage (Code 324)

Performing tillage operations below the normal tillage depth to modify adverse physical or chemical properties of a soil.

Practice Information

This practice applies to land having adverse soil conditions which inhibit plant growth, such as compacted layers formed by field operations, restrictive layers such as cemented hardpans (duripan) in the root zone, or overwash or deposits from wind and water erosion or flooding. Deep tillage operations will be performed when soil moisture is less than 30–50 percent of field capacity, according to the “feel test” or other acceptable method, at the maximum depth to which the tillage will be done.

Common Associated Practices

NRCS Conservation Practice Standard (CPS) Deep Tillage (Code 324) is commonly applied with CPSs such as Conservation Crop Rotation (Code 328), Contour Farming (Code 330), Cover Crop (Code 340), Residue and Tillage Management, No Till (Code 329), and Residue and Tillage Management, Reduced Till (Code 345).

For further information, contact your local NRCS field office.

United States Department of Agriculture

Conservation Practice Overview

July 2022

Grazing Land Mechanical Treatment (Code 548)

Grazing land mechanical treatment involves treating or modifying soil and plant conditions using mechanical tools to meet the desired purpose.

Practice Information

Mechanical treatments can improve soil permeability, increase infiltration, reduce runoff, and renovate and stimulate the plant community for greater productivity and yield. The benefits are obtained by fracturing compacted soil layers and breaking up root-bound conditions and thatch to increase plant vigor.

This standard may be applied on pastureland, rangeland, grazed forest, and native pastures where the slopes are less than 20 percent and on soils that are not too wet.

Activities that are involved with this practice may include contour furrowing, chiseling, terracing, pitting, ripping, seeding, prescribed burning, flailing, and aerating.

Common Associated Practices

NRCS Conservation Practice Standard (CPS) Grazing Land Mechanical Treatment (Code 548) is commonly used on rangeland and applied with other conservation practices such as NRCS CPSs Range Planting (Code 550), Prescribed Grazing (Code 528), and Herbaceous Weed Treatment (Code 315). On pastureland the practice is used with NRCS CPS Pasture and Hay Planting (Code 512) and Prescribed Grazing (Code 528).

For further information, contact your local NRCS field office.

neighborly economics

neighborly to:

- our nearby neighbors
- neighbors around the world
- future generations
- non-human neighbors

- Credit as a commons – emergent from the cooperation, productive capacity and trust of a community, in ecological context

- Whole-catchment function as a common pool resource – non-excludable, easily damaged

Land Care Trade

A mutual credit clearing network for governing and healing catchment commons

"Mutual credit is a system of accounting for exchange within a trusted network. Simply keeping score of exchanges, in units denominated in the national currency, means that actual currency does not need to change hands in order for people and businesses to trade." *Credit Commons Society*

Unit of Account –
1 grain of pollen
=
$1 USD

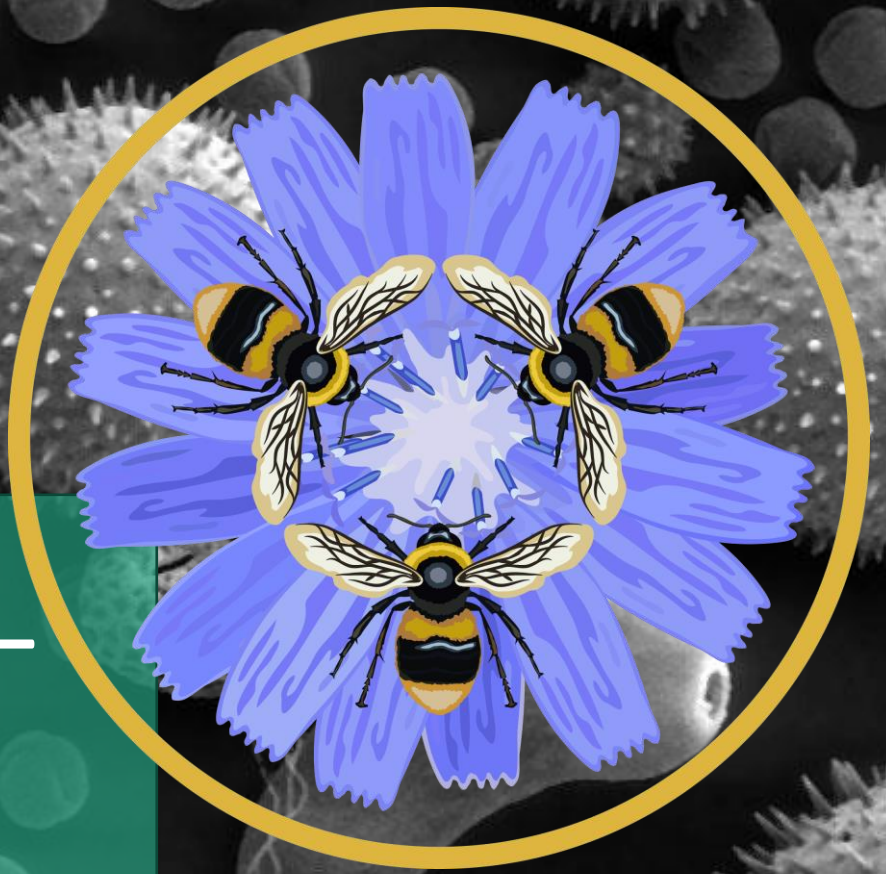


Image: NASA

The Land Care Trade Network

- Food
- Tools, supplies, services for healing land
- Welding
- Legal
- Bookkeeping
- Labor
- Carpentry
- Mechanical
- Healing whole watersheds? Only if necessary
- Federating →

....but how much difference can a shared ledger governed by a community of people who produce and exchange goods and services - and trust each other - make?

Mutual Credit precedents

- Multilateral business trade/barter networks
  - International Reciprocal Trade Association
    - 400,000 businesses, $14 billion in trades in 2019
- WIR Bank in Switzerland
  - ~60,000 businesses, $1 billion Euros/year in trade
    - (Not mutual – centrally issued credit)
- Argentinian Social Money (Trueque) Movement
- Sardex in Sardinia
  - 4,000 business members, almost $50 million Euros/year

Open Access Article

Liquidity-Saving through Obligation-Clearing and Mutual Credit: An Effective Monetary Innovation for SMEs in Times of Crisis

by Tomaž Fleischman [1], Paolo Dini [2,*] and Giuseppe Littera [3]

[1] Be Solutions d.o.o., Bleiweisova cesta 30, 1000 Ljubljana, Slovenia

[2] Department of Media and Communications, London School of Economics and Political Science, London WC2A 2AE, UK

[3] Sardex S.p.A., Viale Sant'Ignazio 16, 09038 Serramanna, Italy

* Author to whom correspondence should be addressed.

J. Risk Financial Manag. **2020**, *13*(12), 295; **https://doi.org/10.3390/jrfm13120295**

Received: 2 November 2020 / Revised: 24 November 2020 / Accepted: 26 November 2020 / Published: 27 November 2020

(This article belongs to the Special Issue **Monetary Plurality and Crisis**)

Abstract

During financial crises, liquidity tends to become scarce, a problem that disproportionately affects small companies. This paper shows that obligation-clearing is a very effective liquidity-saving method for providing relief in the trade credit market and, therefore, on the supply-side or productive part of the economy. The paper also demonstrates that when used in conjunction with a complementary currency system such as mutual credit as a liquidity source the effectiveness of obligation-clearing can be doubled. Real data from the Sardex mutual credit system show a reduction of net internal debt of the obligation network of approximately 25% when obligation-clearing is used by itself and of 50% when it is used together with mutual credit. These instruments are also relevant from the point of view of risk mitigation for lenders, based in part on the information on individual companies that the mutual credit circuit manager can provide to banks (upon the circuit member's request) and in part on the relief that liquidity-saving

"Real data from the Sardex mutual credit system show a reduction of net internal debt of the obligation network of approximately 25% when obligation-clearing is used by itself, and of 50% when it is used together with mutual credit. The paper concludes by outlining recommendations for how even greater savings could be achieved by including the tax authority as another node in the obligation network."

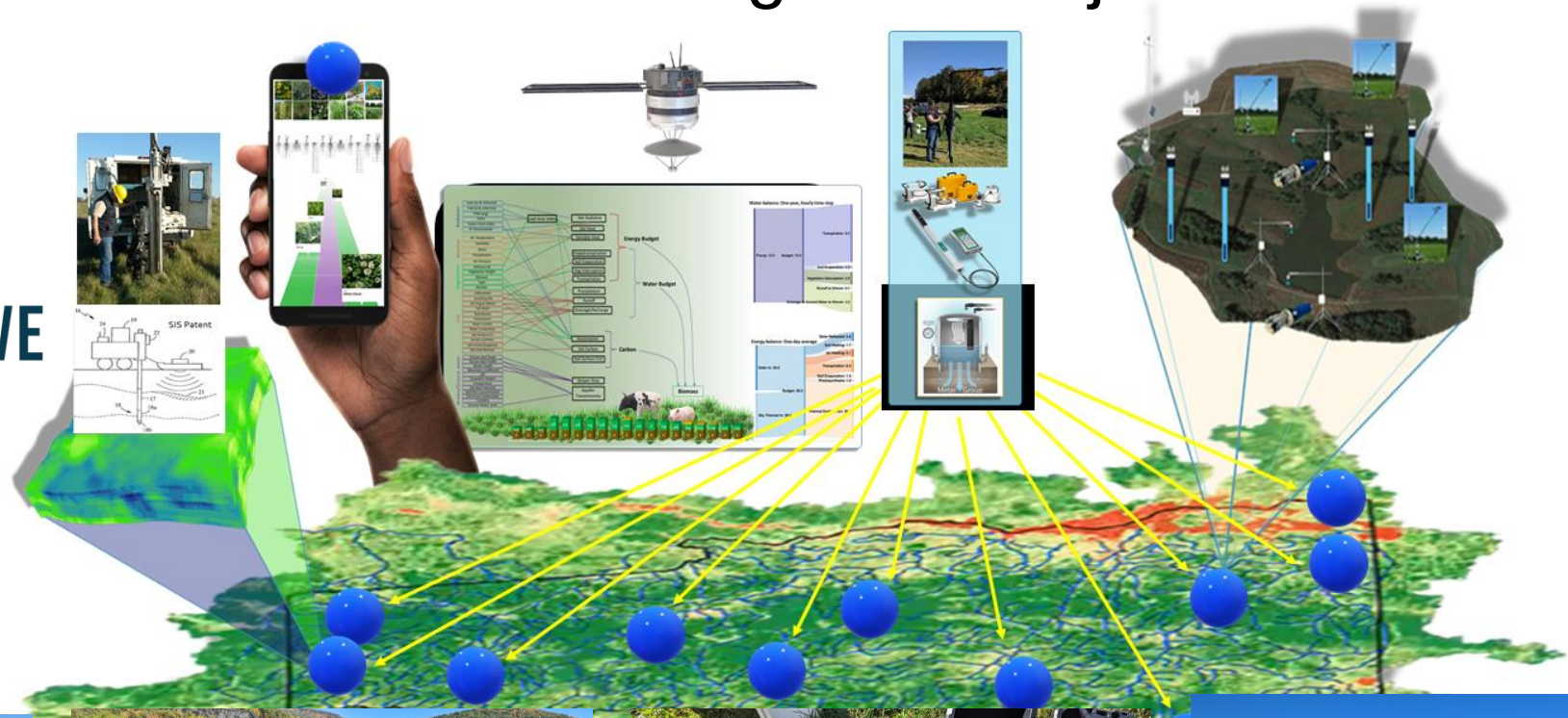
https://www.mdpi.com/1911-8074/13/12/295

Reclaiming the credit commons is key to

- Hiring catchment contractors to heal the land community
- Building water-secure infrastructure for adaptation
- *Operationalizing a scientific revolution to provide landscape feedback to land stewards and their community to heal the land…*

2023
Introducing the Land Care Cooperative Watershed Contracting Pilot Project

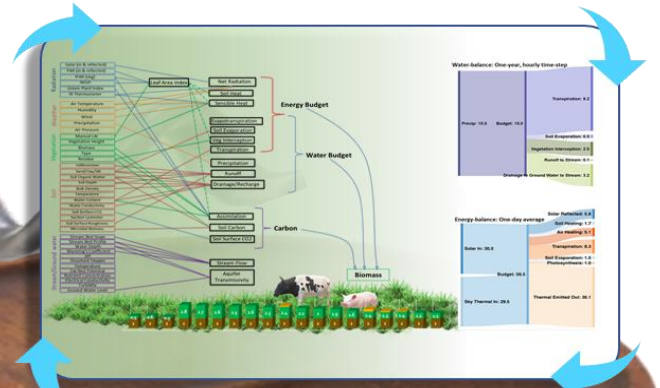
LAND CARE COOPERATIVE



LAND CARE COOPERATIVE

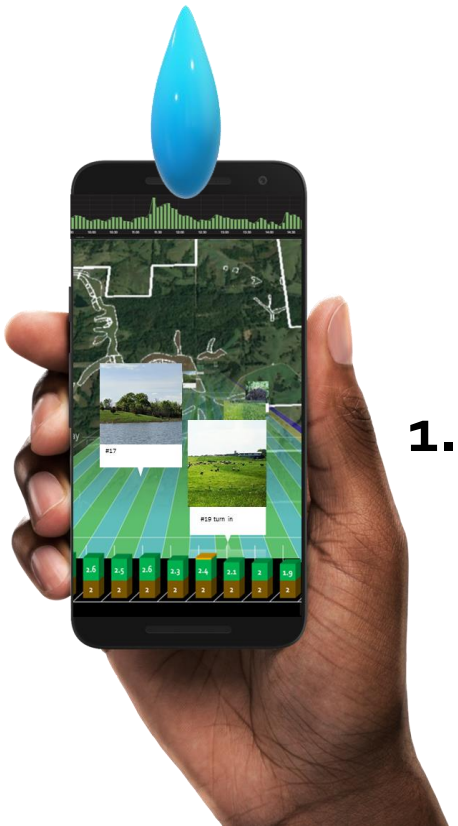
Real-time landscape-feedback to learning communities for healing land

Landscape feedback: energy, water, biomass, carbon, nutrients, biodiversity

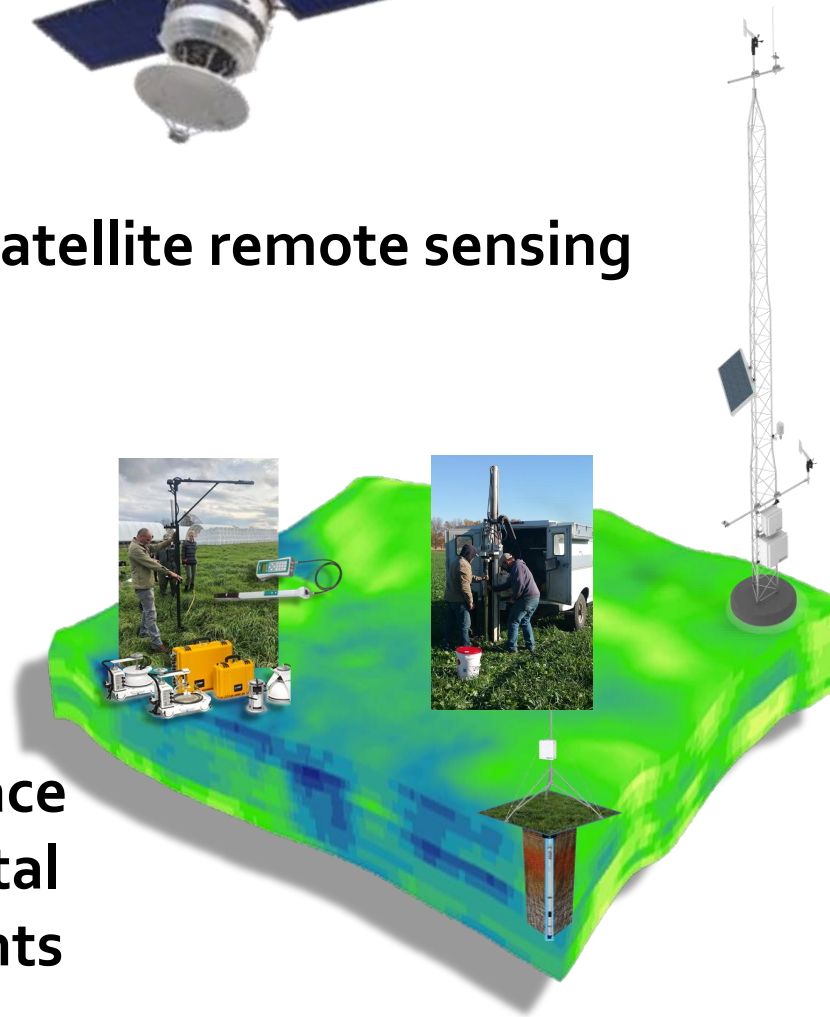


4. Measurement Synthesis

3. Satellite remote sensing

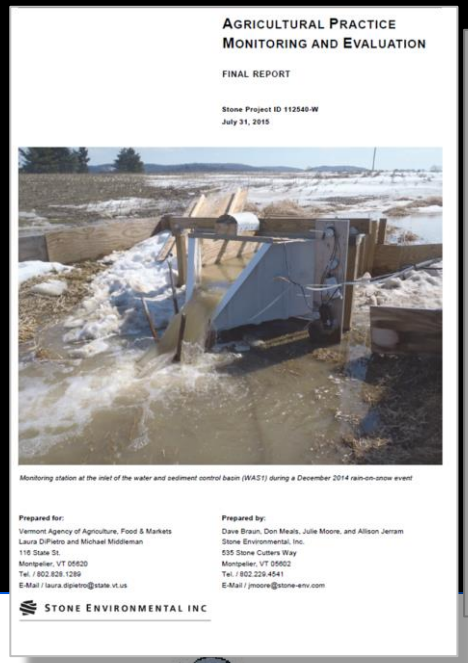


1. Stewards' observations, judgements and management records



2. Near-surface environmental measurements

Catchment Contracting necessary condition: Graduating from statistical environmental modeling that estimates the probability of environmental effects of Practices….


AGRICULTURAL PRACTICE MONITORING AND EVALUATION

FINAL REPORT

Stone Project ID 112540-W

July 31, 2015

Monitoring station at the inlet of the water and sediment control basin (WAS1) during a December 2014 rain-on-snow event

Prepared for:
Vermont Agency of Agriculture, Food & Markets
Laura DiPietro and Michael Middleman
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Prepared by:
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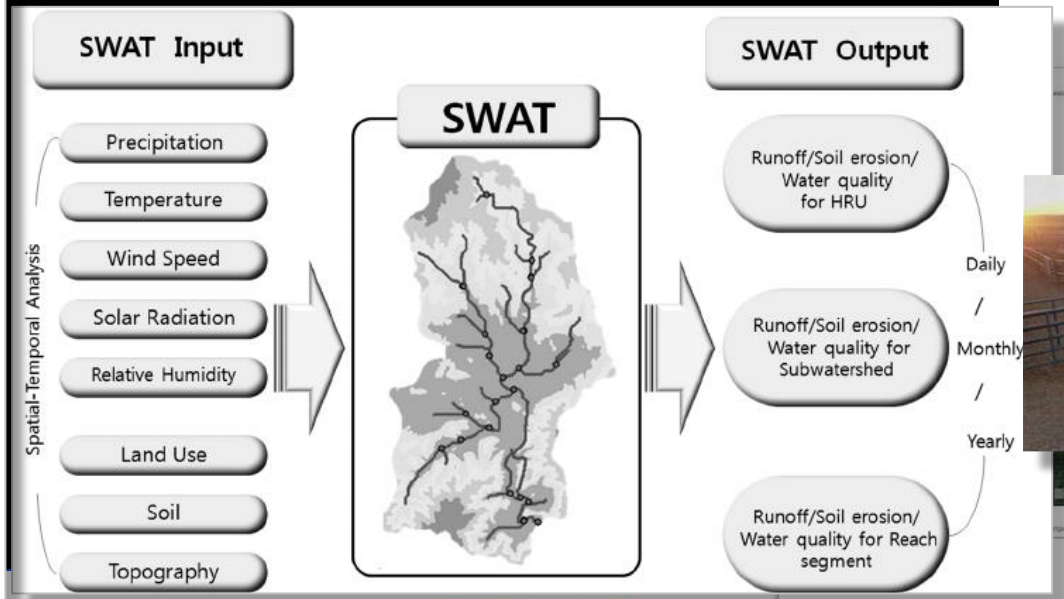
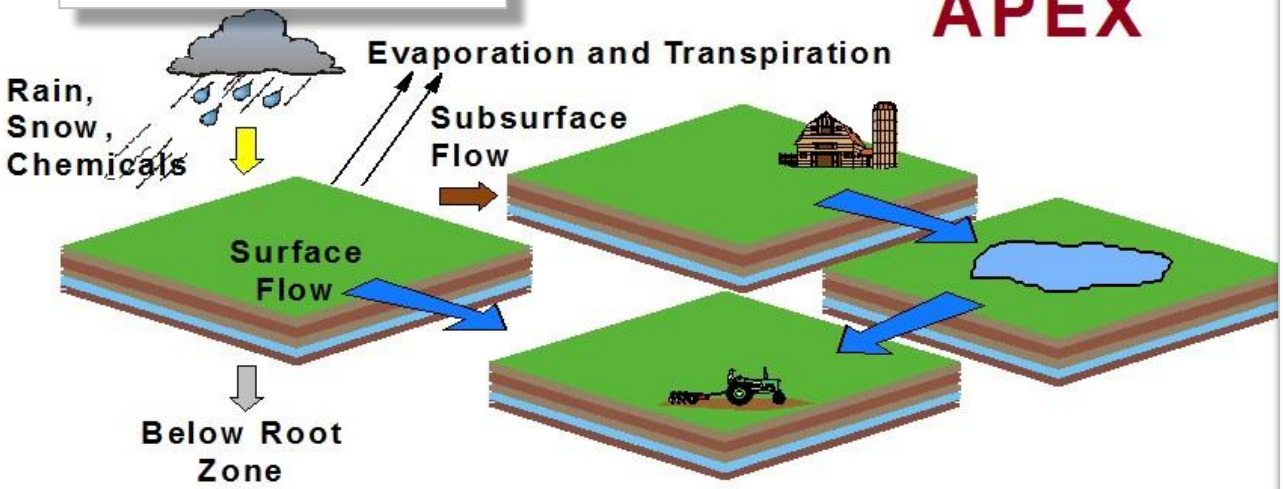
STONE ENVIRONMENTAL INC



RSET East Field Alternative

APEX



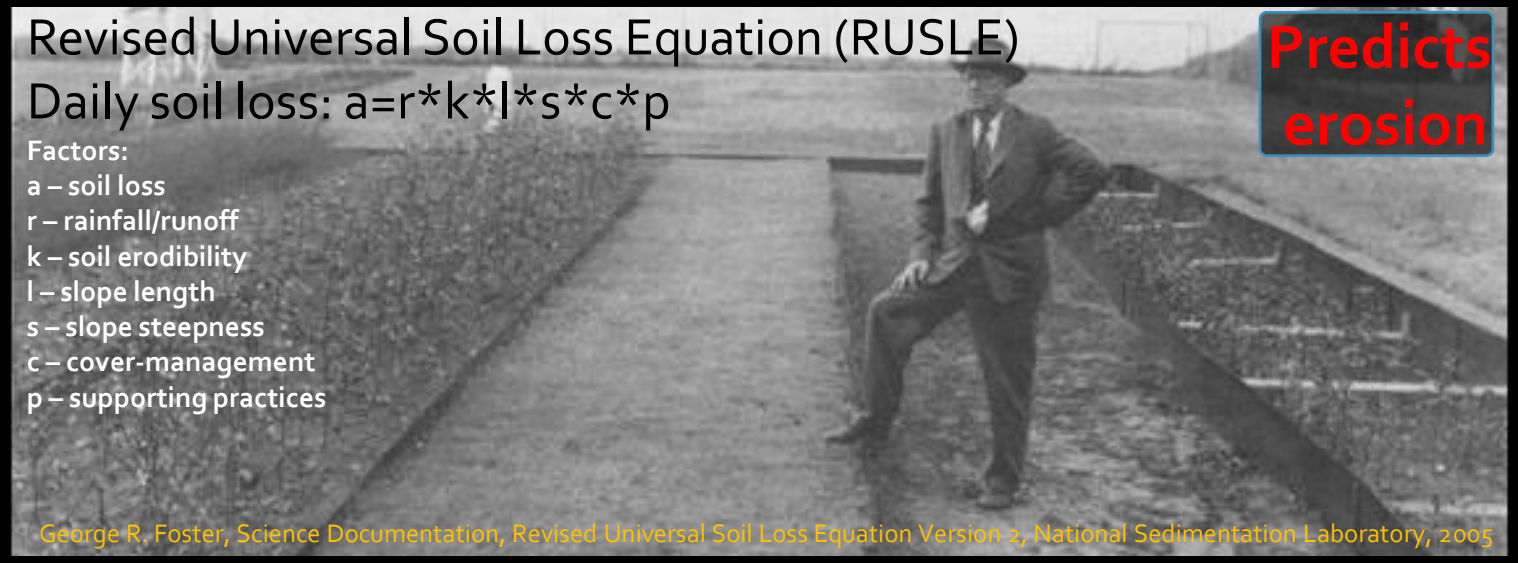
Vermont Phosphorus Index User Guide

version 6.0 – October 2017

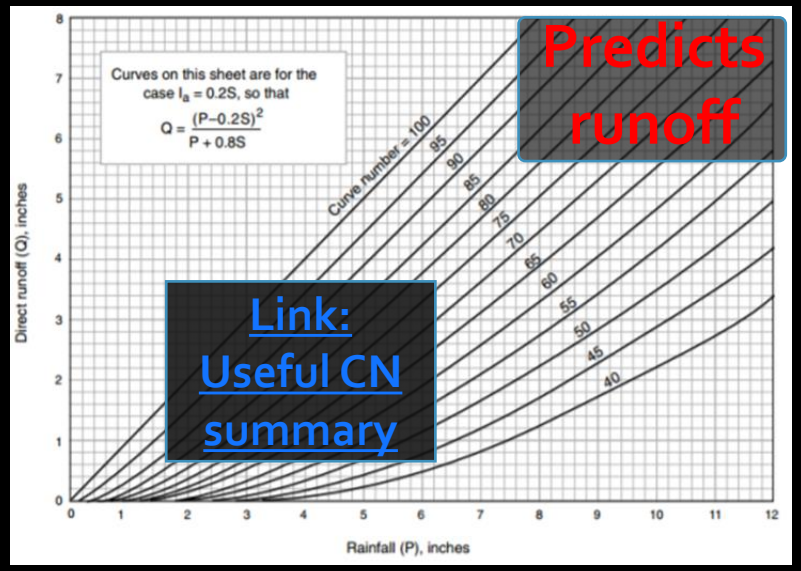
The Phosphorus Index is a tool developed to assess the potential for phosphorus runoff from individual fields based on soil and field characteristics and on management practices. The P Index is much more comprehensive than relying only on a soil test value because it considers the likelihood that phosphorus present on the field will actually reach a surface water body. The P Index provides a relative rating of the risk of P runoff from individual fields, which can be used to prioritize fields for nutrient and soil management practices.

This version of the Vermont Phosphorus Index traces phosphorus losses from field to water body along surface and subsurface pathways, accounting for both particulate and dissolved forms. While it is not a complete quantitative model, we have attempted to estimate relative P losses from several distinct sources (soil, fertilizer, and manure) as well as the effects of soil type, topography, and management practices. In each pathway, an estimate of the amount of phosphorus mobilized from a variety of sources (e.g., applied manure or fertilizer, erosion) is modified by one or more multipliers for soil, crop, or management factors that reduce or increase P loss relative to a base amount. P losses from all sources are then added, and multiplied by a scaling factor to produce a P Index. Interpretations and management recommendations are given in the chart below.

History and status quo: empirical, calibrated models



1954 SCS Runoff Curve Number (CN). This "interagency tool" was not peer-reviewed



Paul Schiariti, P.e., CPESC Basic Hydrology –Runoff Curve Numbers

USLE History, National Soil Erosion Research: West Lafayette, IN

- Statistical prediction tools to guide natural resource policy formation, program implementation and regulatory enforcement
- Simple statistical models use coefficients derived from past field-research to predict the probability of runoff, erosion, nutrient transport (and soil carbon change) associated with management practices
- The past is used to predict the future
- Modeled landscapes are minimally or not measured

SHAKY GROUND

A company called Indigo is paying farmers to trap carbon in their soils. Some researchers say the climate benefits are dubious

By **Gabriel Popkin**

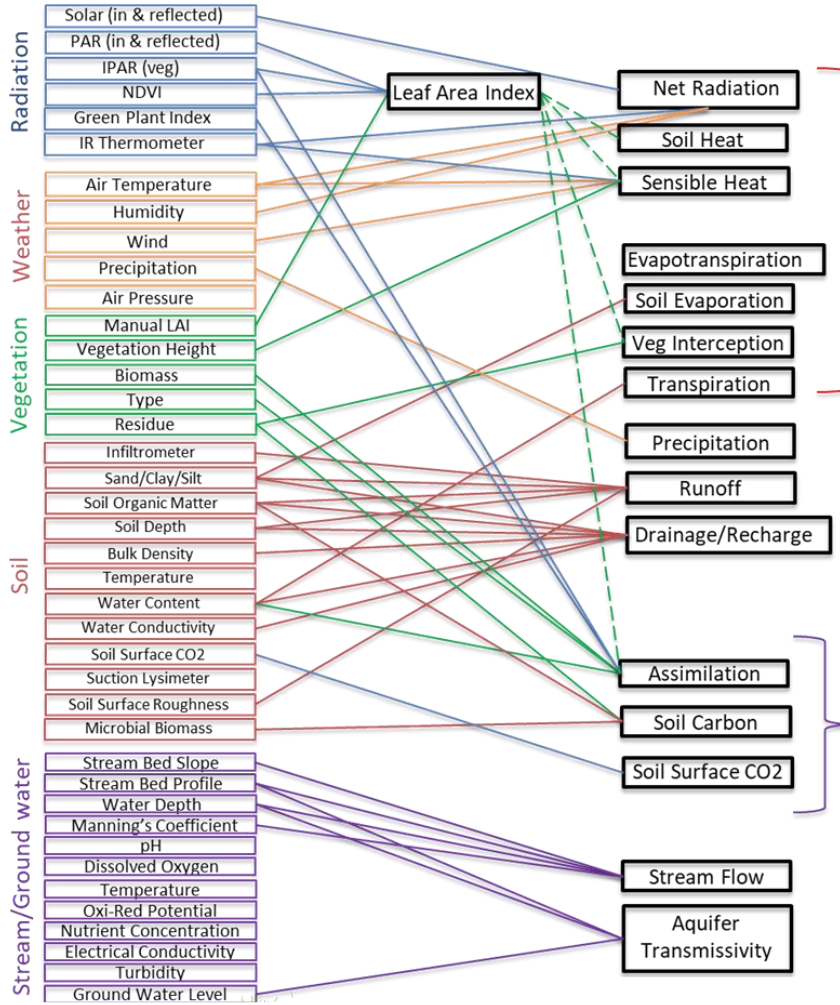
PHOTO: CAPELLE.R/GETTY IMAGES

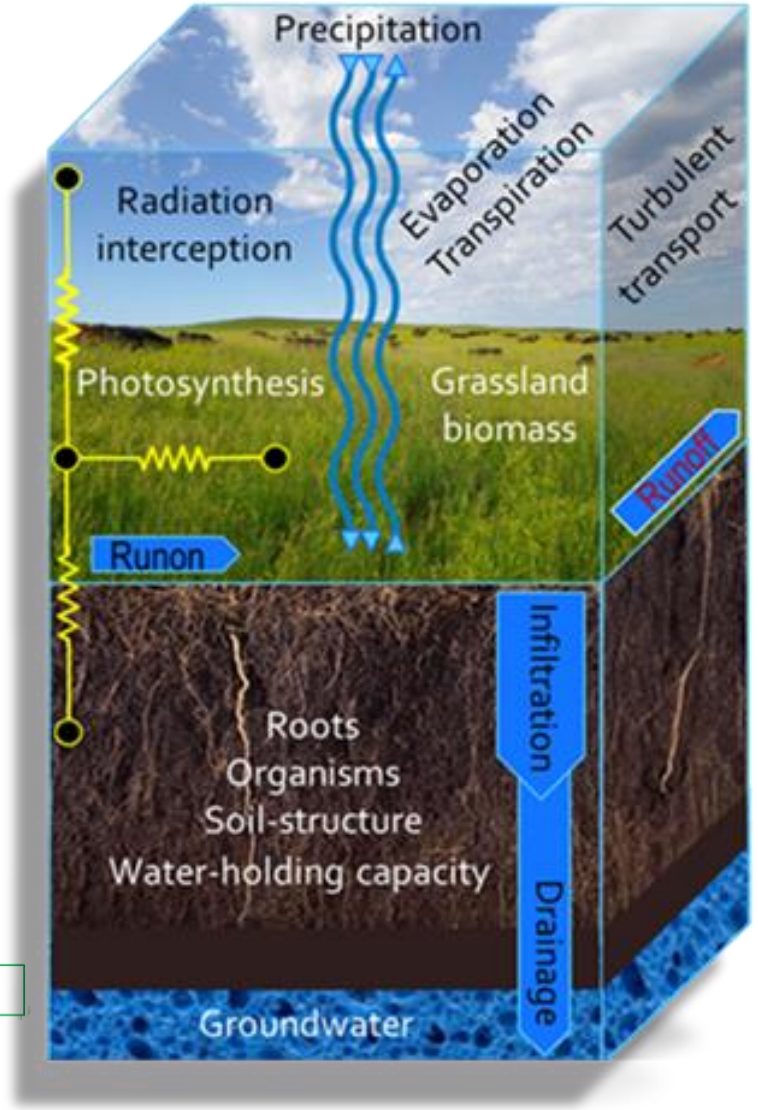
Corrected 1 August 2023. See full text.

Quantified landscape-function feedback to stewards and our communities

Measurements
Observations
Records

Measurement-synthesis





LANDSTREAM

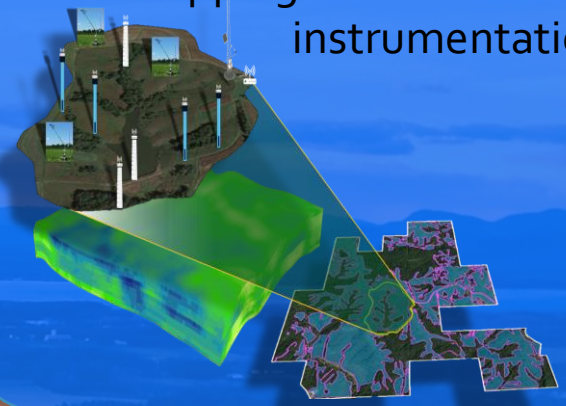
GROW STRONG LAND

Measurement for the Model of the Commons
Landscape Feedback

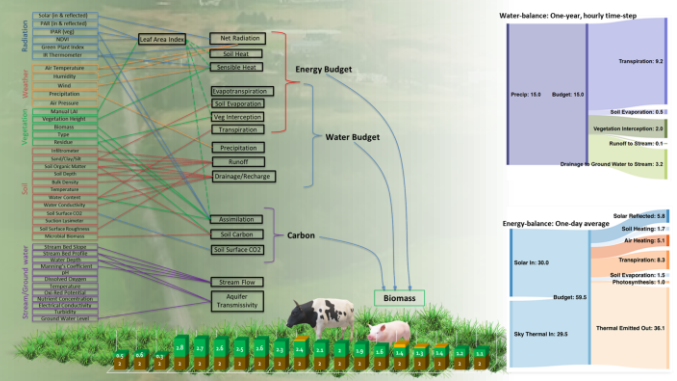
Handheld ground-truthing instruments

Satellite tracking

Soil mapping and farm instrumentation



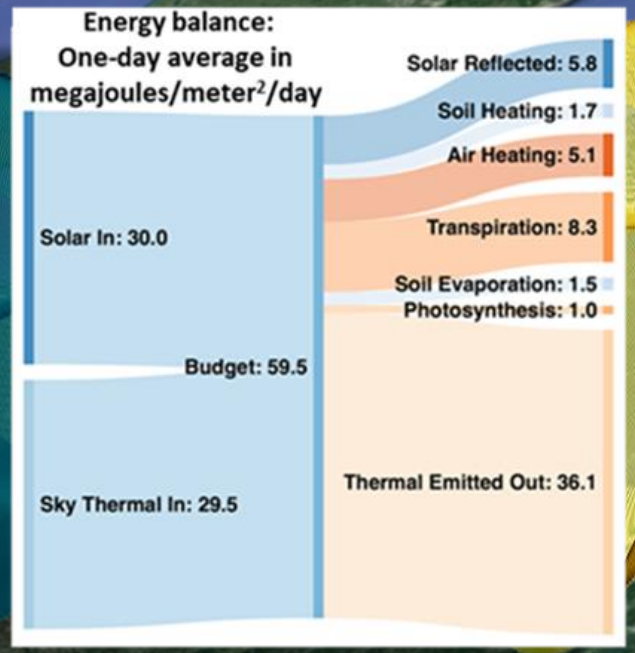
Measurement-Synthesis



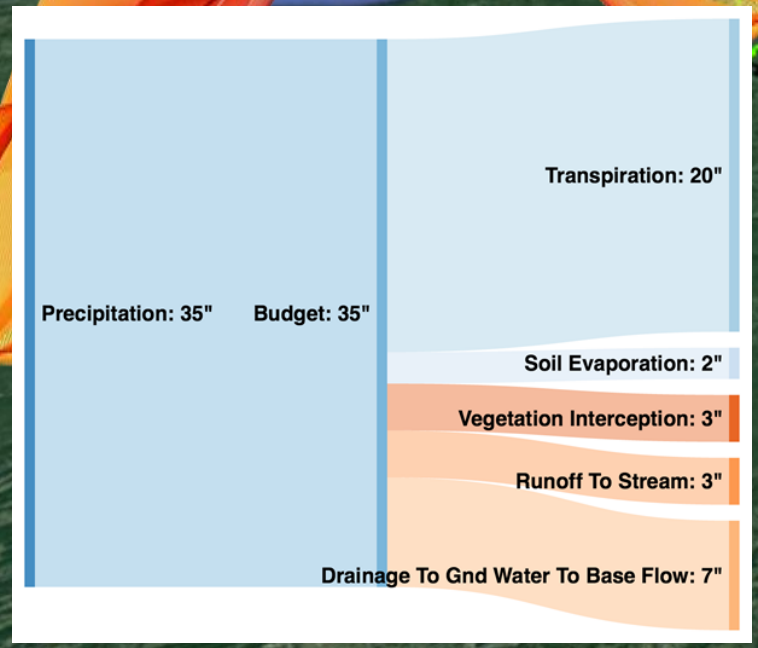
Decision support software

First order variables -
Tracking energy and water through the landscape

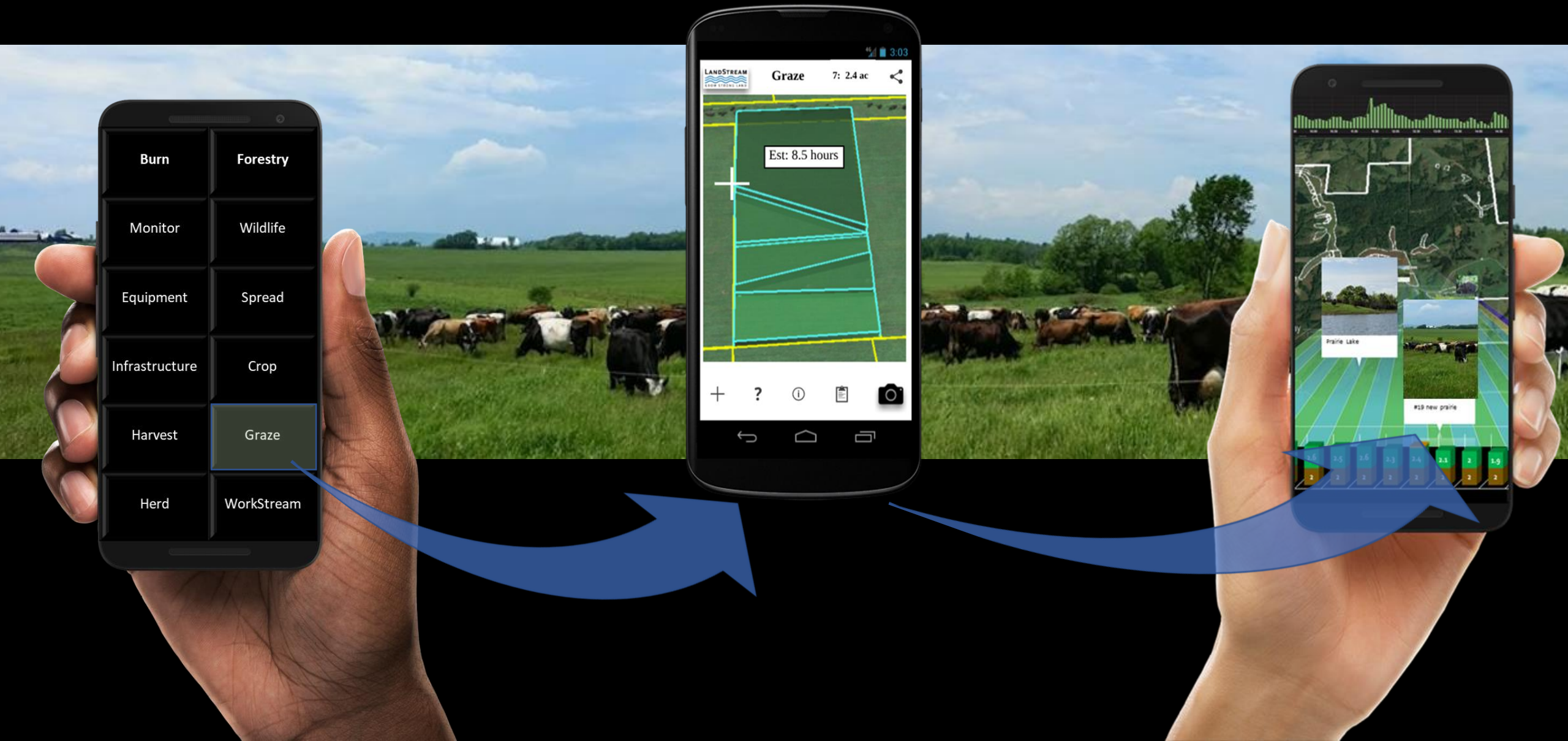
Energy



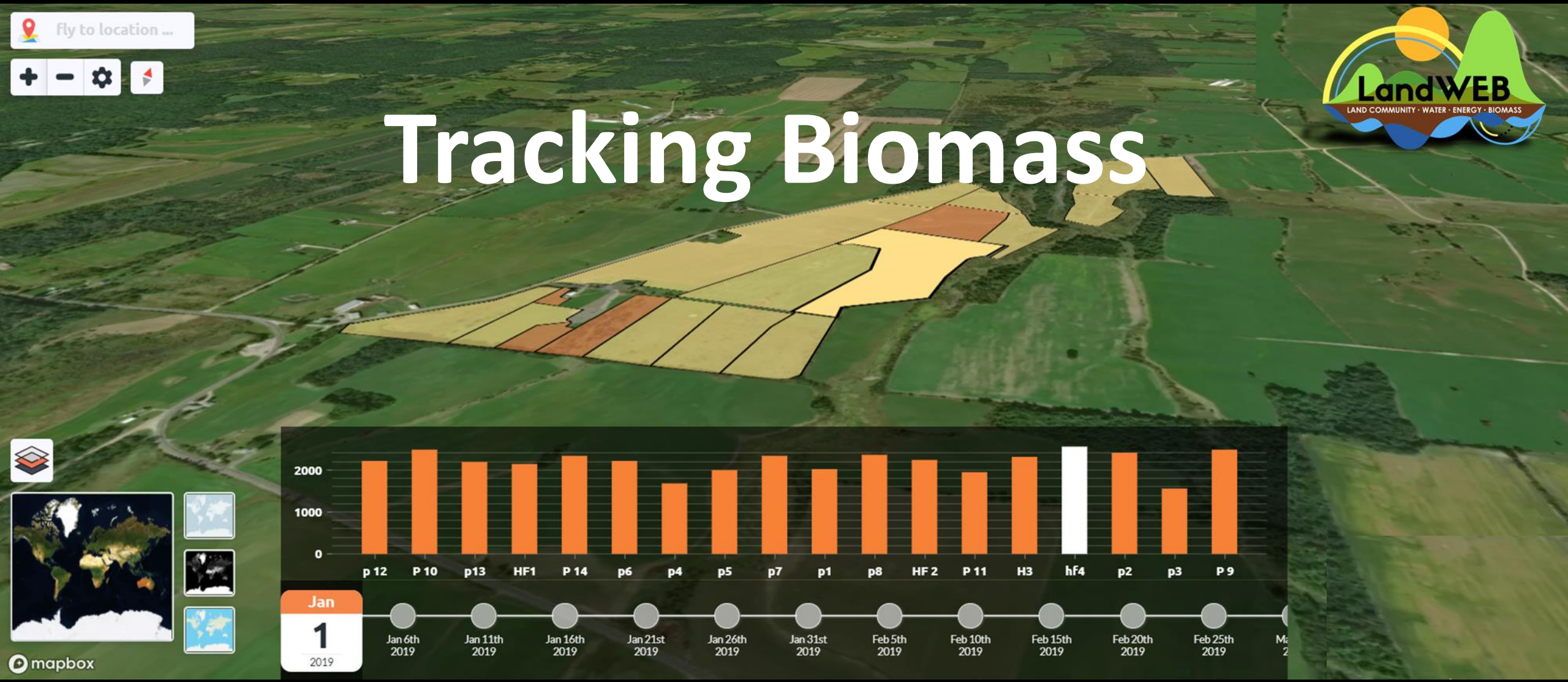
Water



Quantified management



Tracking Biomass



Modern soil mapping - The Soil Information System™ (SIS)

Radiation
- Solar (in & reflected)
- PAR (in & reflected)
- IPAR (veg)
- NDVI
- Green Plant Index
- IR Thermometer

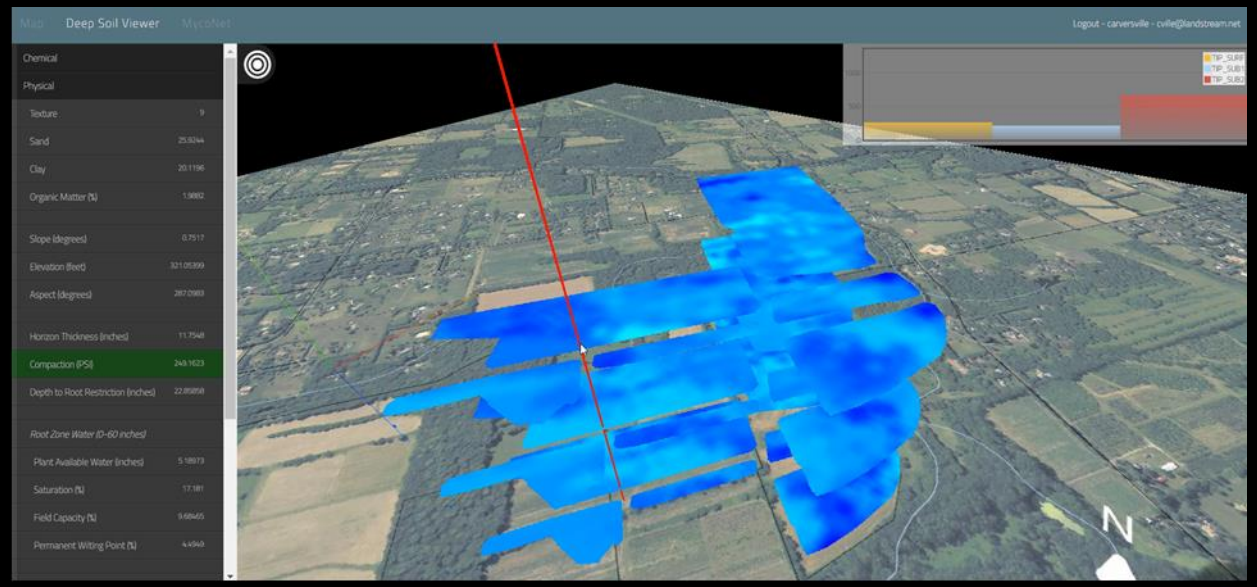
Weather
- Air Temperature
- Humidity
- Wind
- Precipitation
- Air Pressure

Vegetation
- Manual LAI
- Vegetation Height
- Biomass
- Type
- Residue

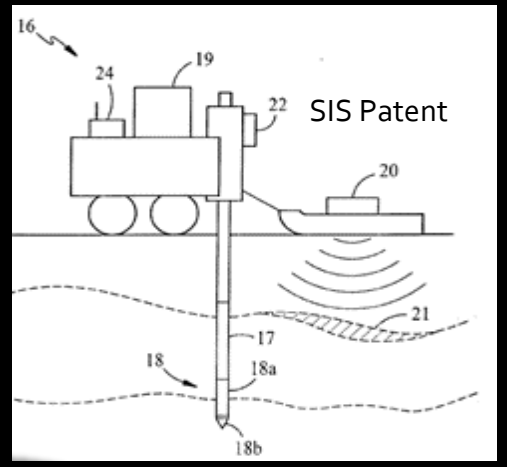
- Infiltrometer

Soil
- Sand/Clay/Silt
- Soil Organic Matter
- Soil Depth
- Bulk Density
- Temperature
- Water Content
- Water Conductivity
- Soil Surface CO2
- Suction Lysimeter
- Soil Surface Roughness
- Microbial Biomass

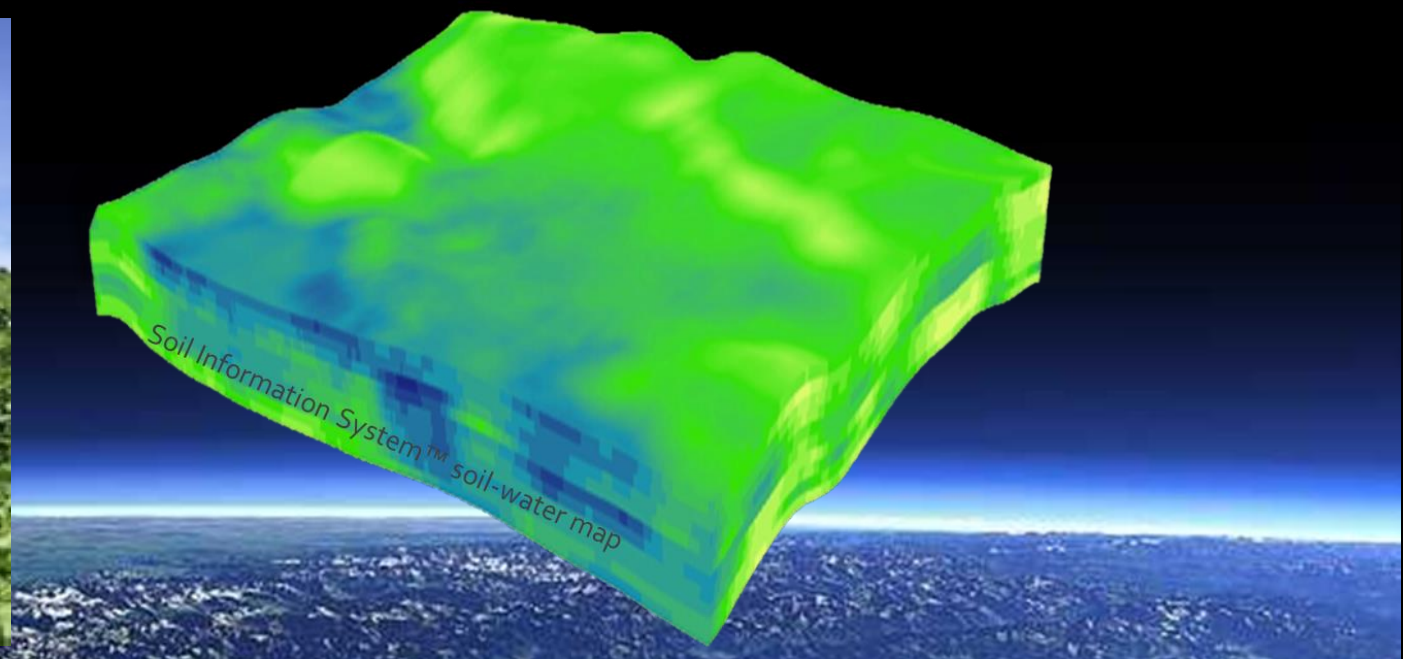
Stream/Ground water
- Stream Bed Slope
- Stream Bed Profile
- Water Depth
- Manning's Coefficient
- pH
- Dissolved Oxygen
- Temperature
- ORP(Oxi-Red Potential)
- Nutrient Concentration
- Electrical Conductivity
- Turbidity
- Ground Water Level



3D soil maps, 4' deep



SIS Patent



LANDSTREAM
GROW STRONG LAND

Soil maps for 21st century management and decision-support

Radiation
- Solar (in & reflected)
- PAR (in & reflected)
- IPAR (veg)
- NDVI
- Green Plant Index
- IR Thermometer

Weather
- Air Temperature
- Humidity
- Wind
- Precipitation
- Air Pressure

Vegetation
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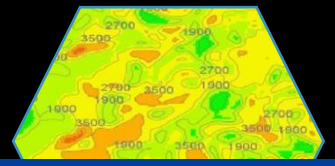
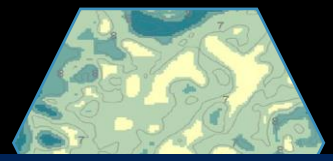


Physical

- Continuous vertical profile
- Horizon thicknesses and depths
- Sand %
- Clay %
- Textural class
- Compaction
- Depth to root restriction
- Plant available water
- Field capacity
- Permanent wilting point
- Saturated Hydraulic Conductivity (Redistribution)

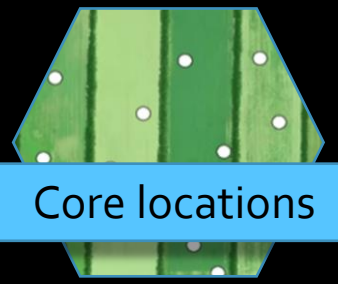


Chemical

- **Carbon**
- Ph
- CEC
- Organic matter
- Nitrogen
- Phosphorus
- Potassium
- Calcium
- Magnesium
- Boron
- Copper
- Iron
- Manganese
- Zinc

Biological

- Multiple analyses available

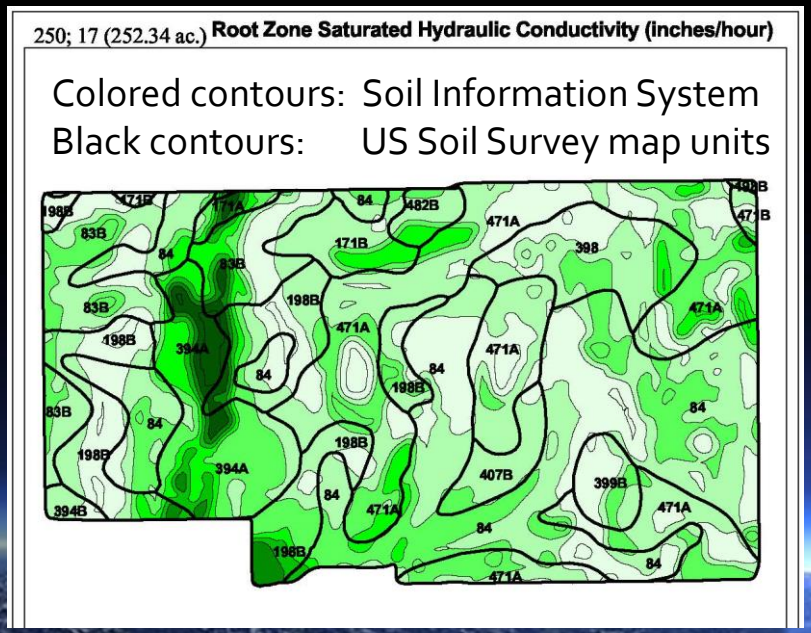


Core locations

Topography

- Elevation
- Slope
- Aspect

High ROI. 20-30 year utility



SIS 3D soil-mapping on the farm Surf – Dive – Core – Map

LANDSTREAM
GROW STRONG LAND

Radiation
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- NDVI
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- Temperature
- ORP(Oxi-Red Potential)
- Nutrient Concentration
- Electrical Conductivity
- Turbidity
- Ground Water Level

Mobile Ground Truthing Crew

Let’s cooperate to heal our watershed homes, starting now
It will be local. It will be holistic
We will be neighborly between working class people, peasants, Indigenous peoples, and all true allies
We will not enclose nature as ecosystem services, or let the ruling class co-opt our work
Real, competent land stewards organized as catchment contractors are the key operators
We will reclaim credit-creation
We will work with existing institutions where they can help. We will build new institutions as necessary
We will work with Conservation District local working groups and local funding pools
We will operate our own quantified landscape-function feedback and learning systems for healing land
We will leave our kids deep topsoil watersheds and economic democracy

Stay engaged and let’s launch a catchment contracting pilot project in community

Abe Collins
Land Care Cooperative Chair and CEO
abenewsoil@gmail.com (802) 782-1883