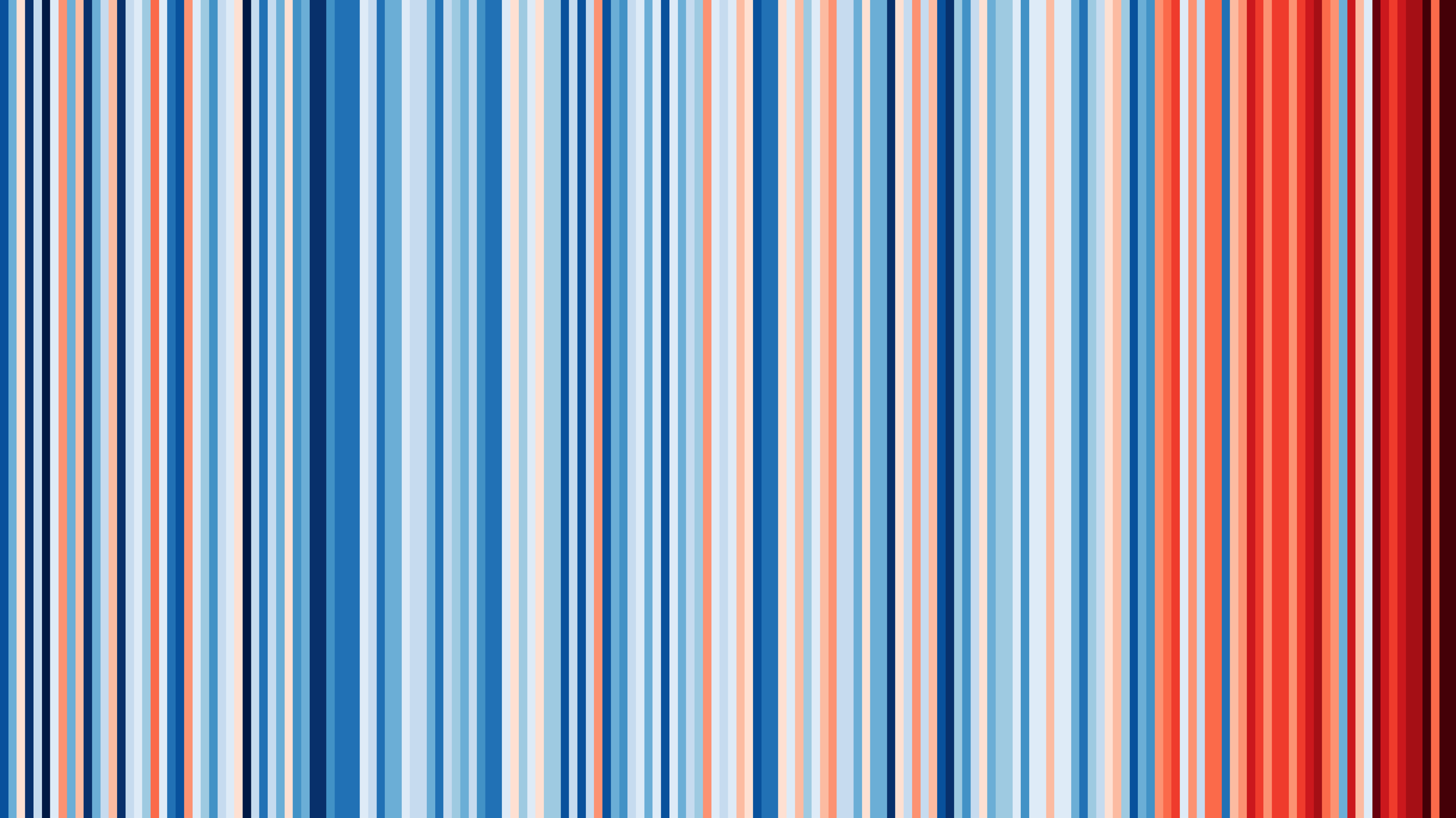
Valuing Extreme Alteration

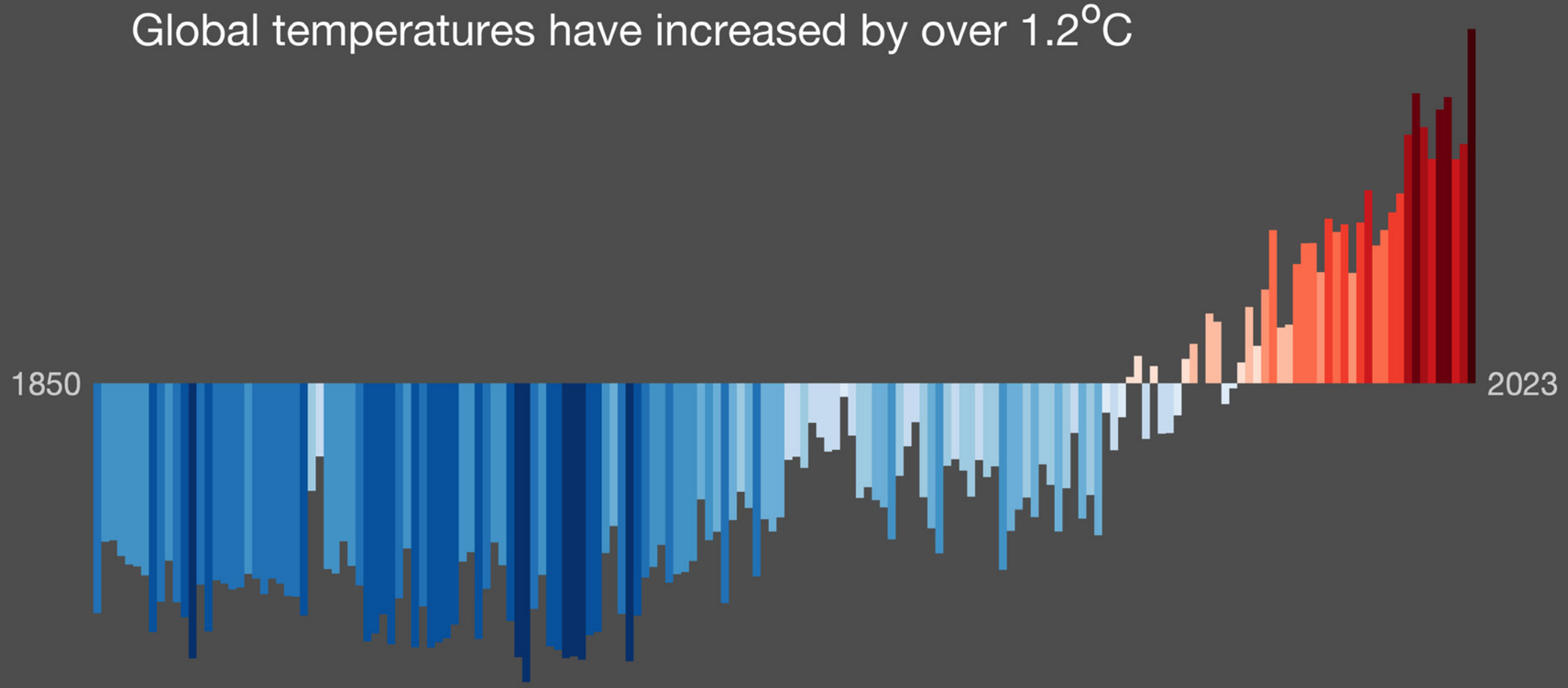
a multi-scalar landscape approach to new narratives for the central Appalachian Coal Region

Delft University of Technology

Master Thesis Landscape Architecture

Martijn Bisschops - 2024

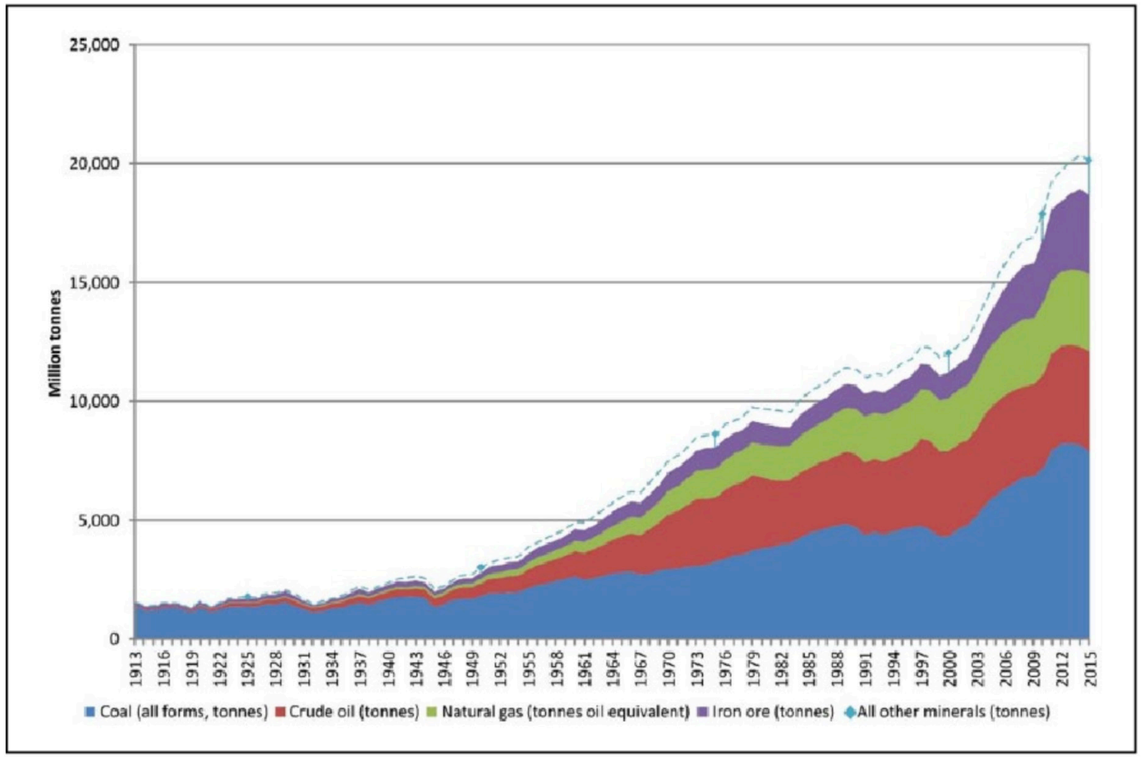




21st of June: Annual “Show Your Stripes ay”

The annual direct **anthropogenic contribution** *to the global production of* **sediment** *in 2015 was conservatively some 316 Gt (150 km3), more than* **24 times greater** *than the* **sediment supplied annually by the world's major rivers** *to the oceans.*

Cooper, A.H., Brown, T.J., Price, S., Ford, J., & Waters, C.N. (2018).
Humans are the most significant global geomorphological driving force of the 21st century. The Anthropocene Review, 5, 222 - 229.



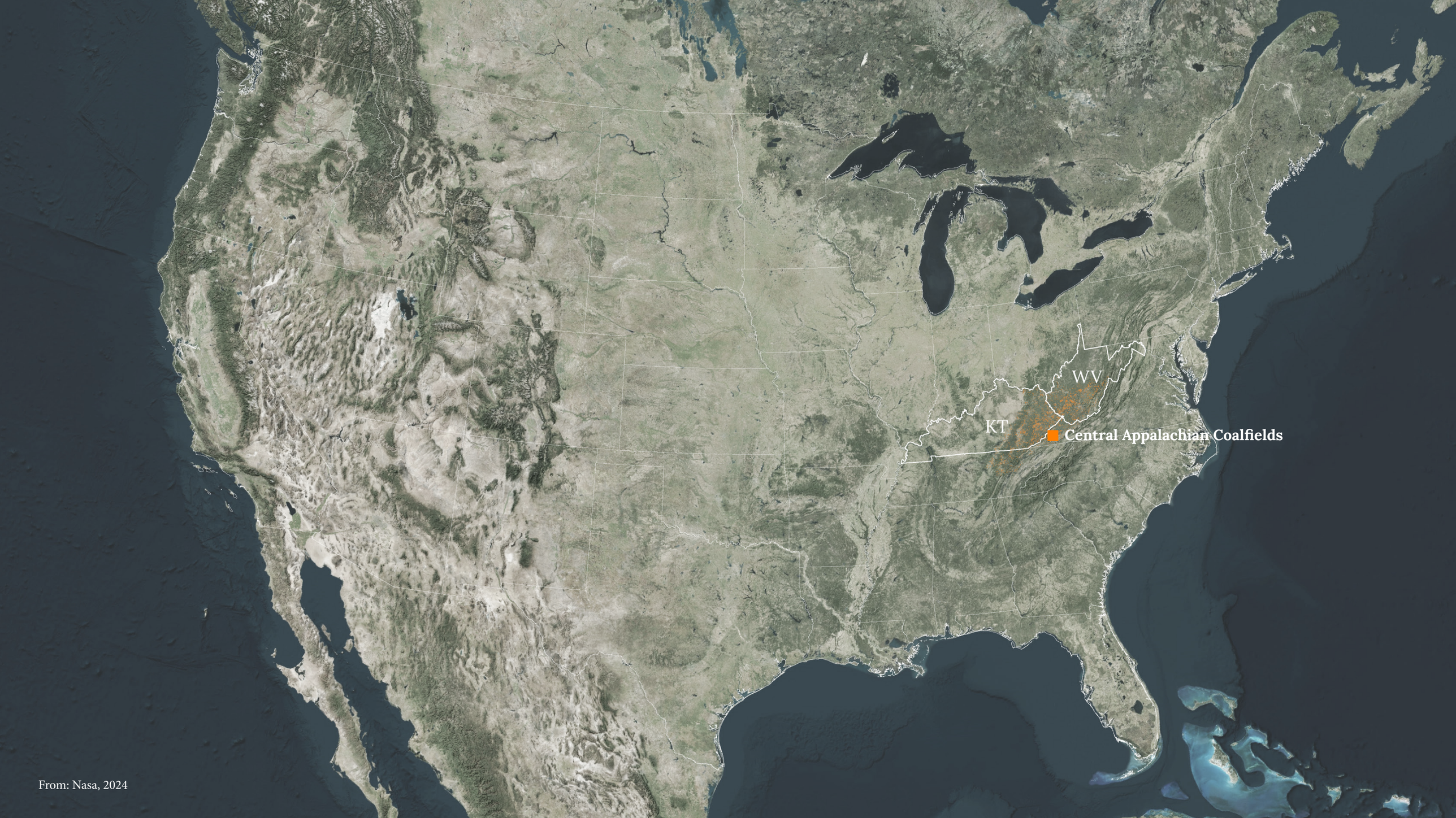
Cooper, A.H., Brown, T.J., Price, S., Ford, J., & Waters, C.N. (2018).
Humans are the most significant global geomorphological driving force of the 21st century. The Anthropocene Review, 5, 222 - 229.

Legal Planet, 2014

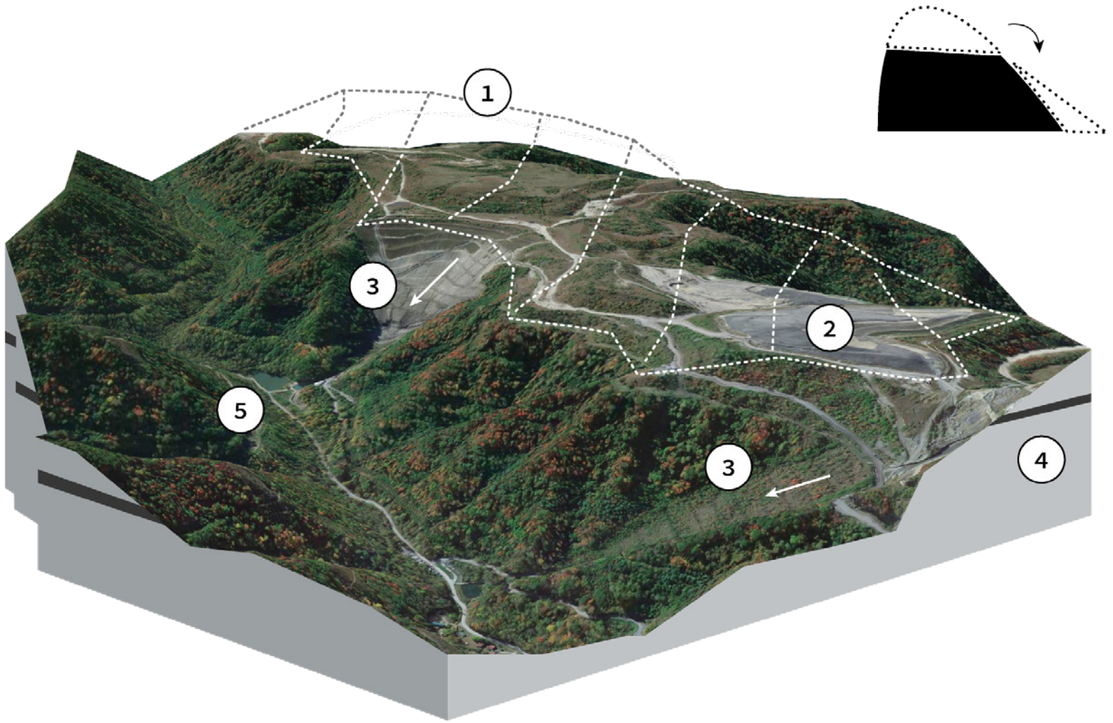

flickr: Biotour13

Photo: Vivian Stockman

flickr: Kate Wellington

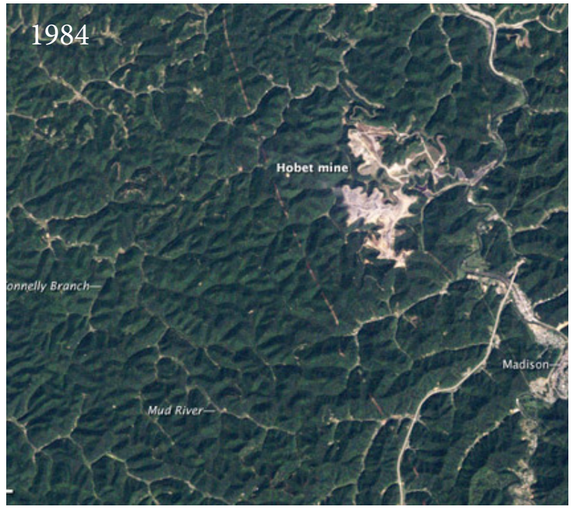


From: Nasa, 2024

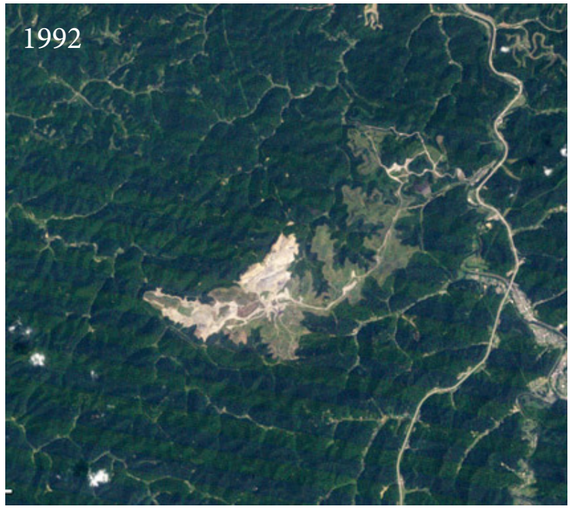


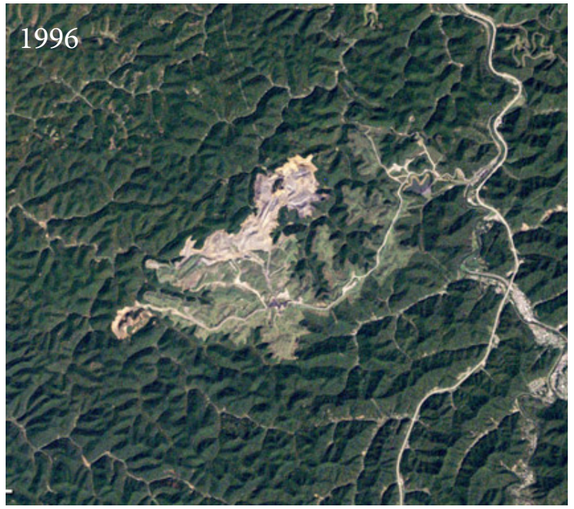
Mountain Top Removal

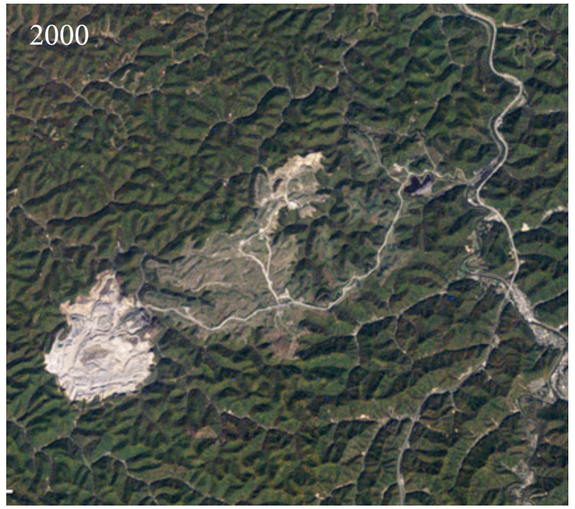
1-Original Contour
2-Blasting the overburden
3-Dumping waste in valleys
4-Extracting the Coal
5-Polution and Reclamation

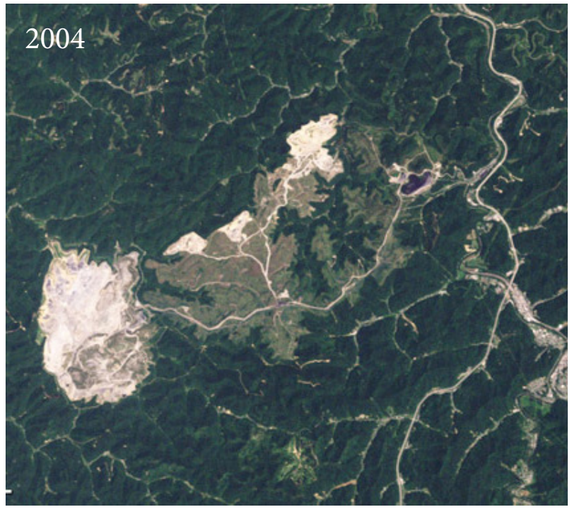

1984
Hobet mine
onnelly Branch
Madison
Mud River

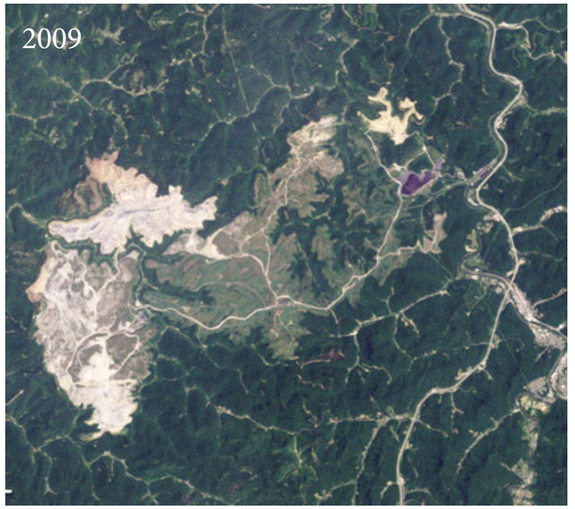

1988


1992

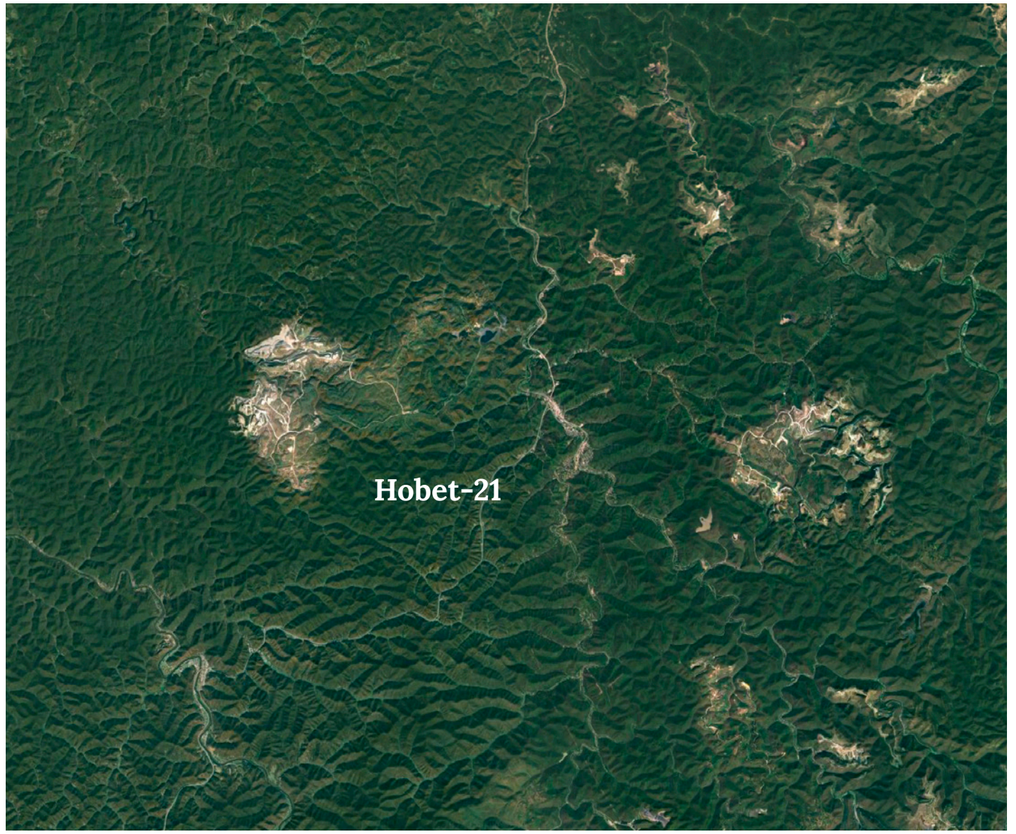

1996


2000

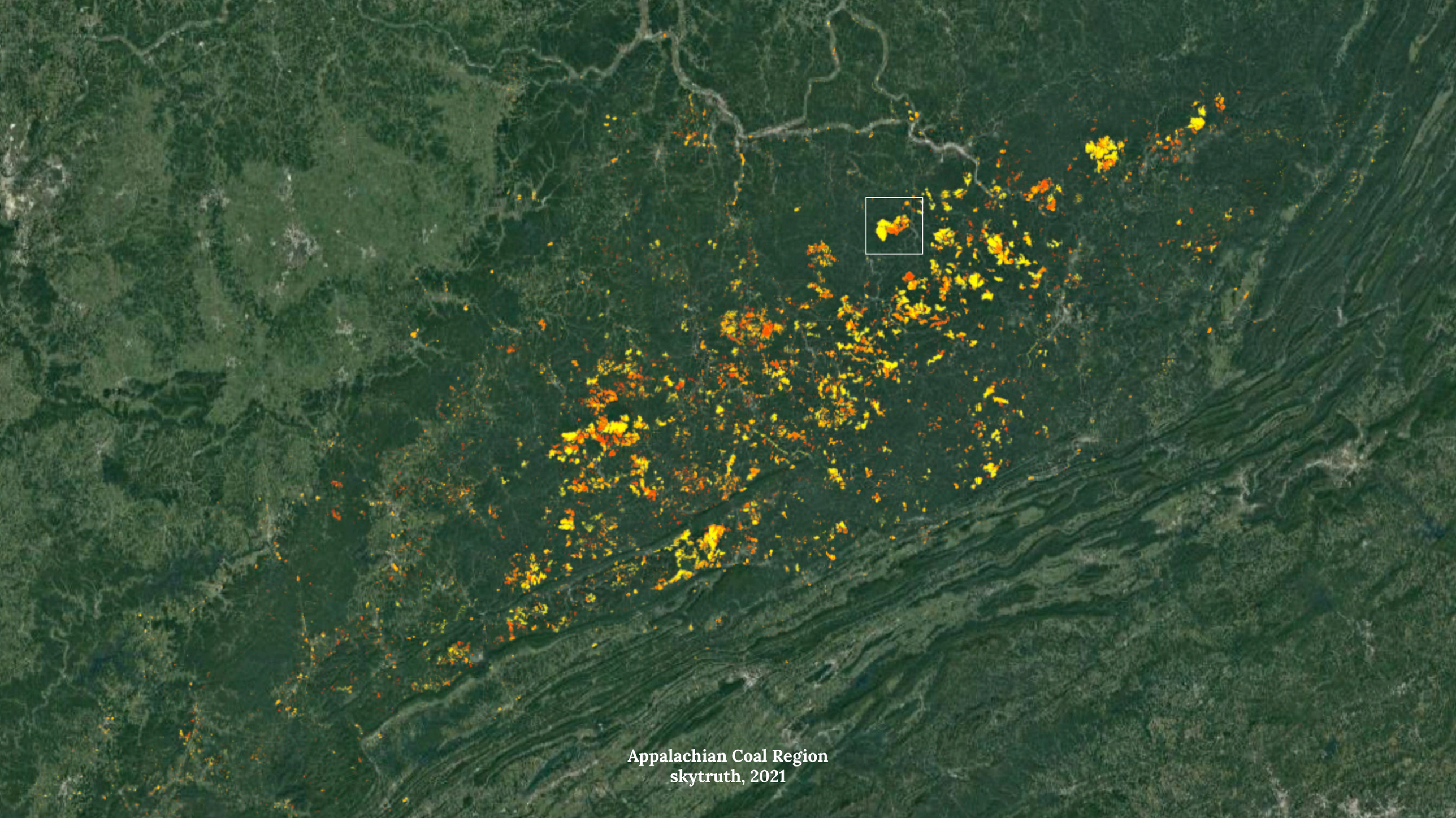

2004


2009

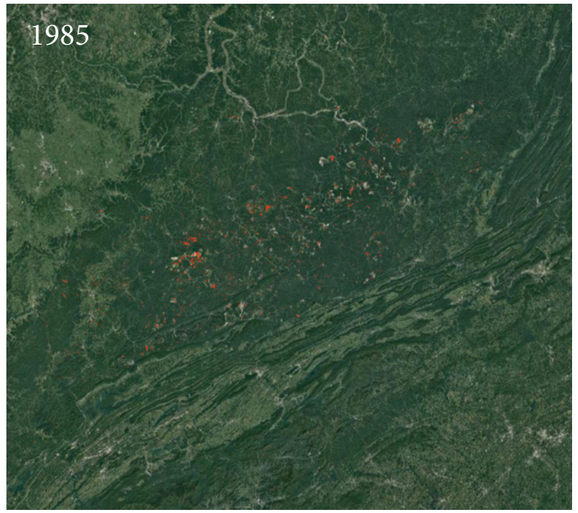

2019

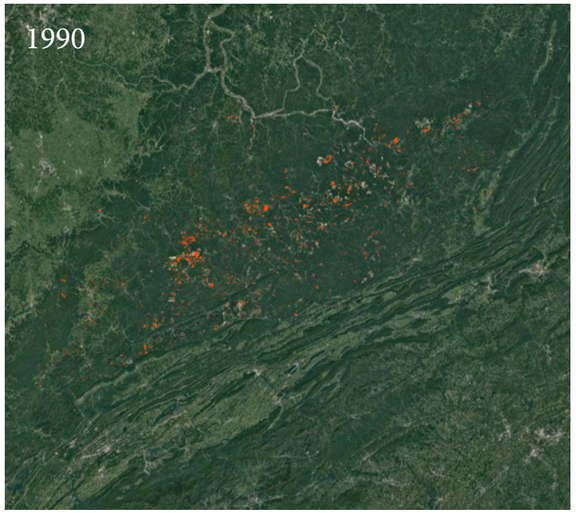


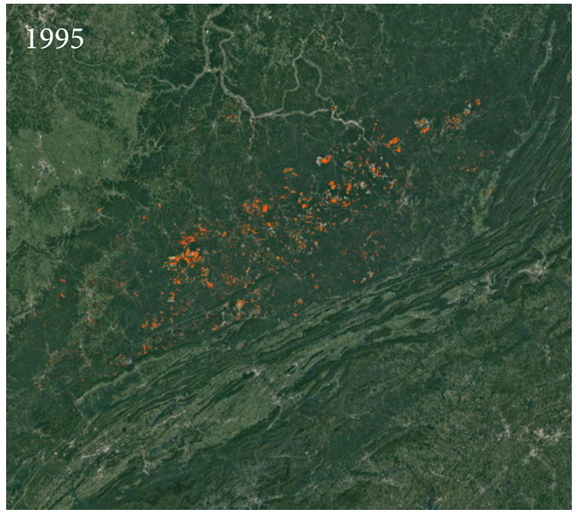
5km

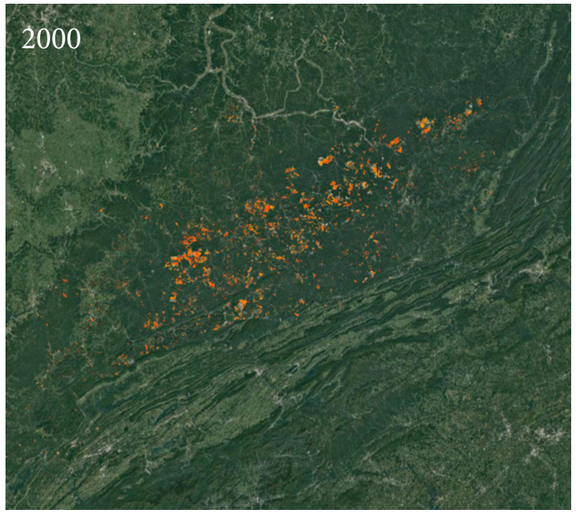


Appalachian Coal Region
skytruth, 2021


1985


1990


1995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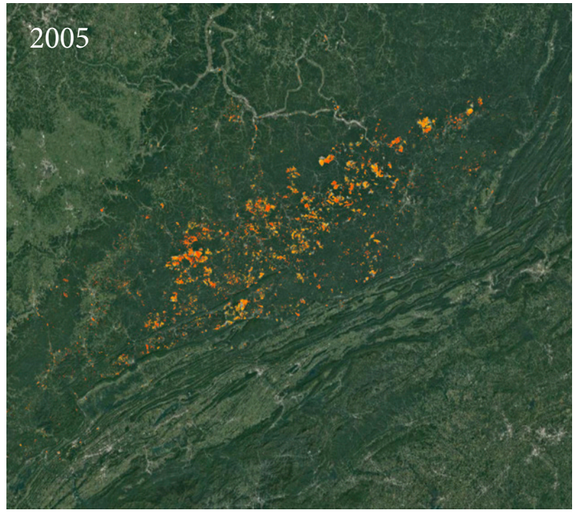
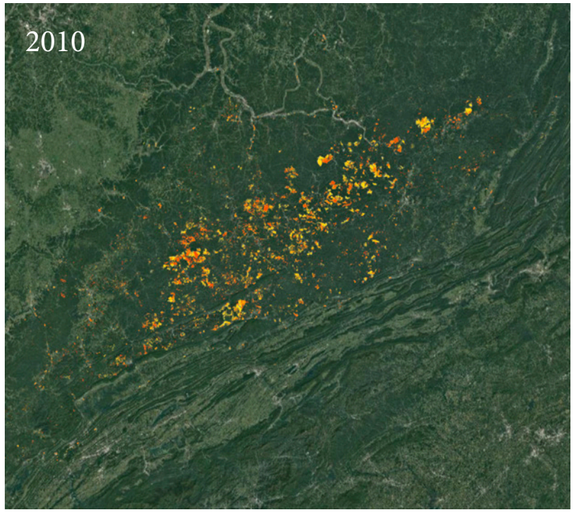
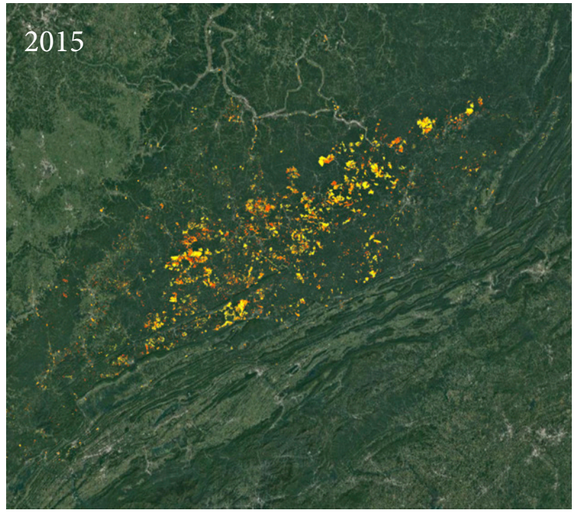

2005

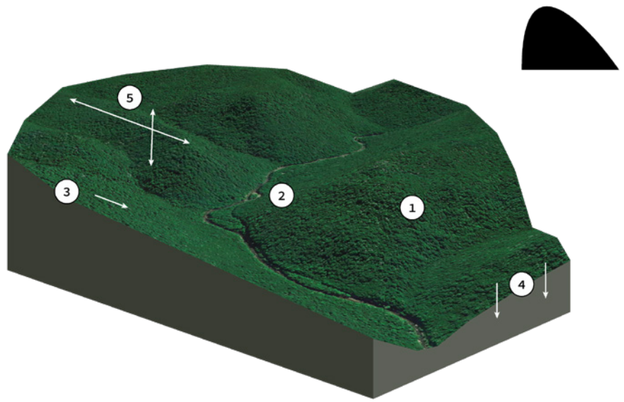

2010


2015

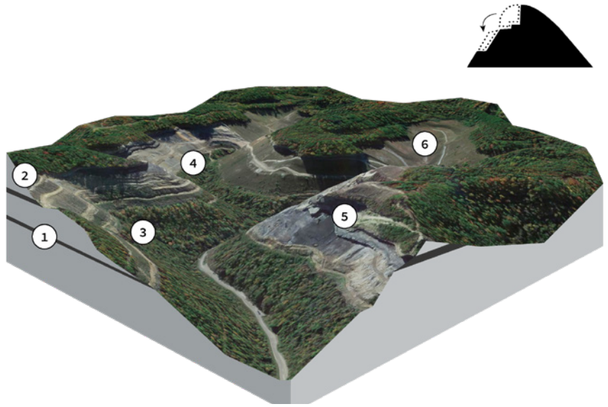
Flickr: IloveMoutains.org

‘Cherokee Trees’

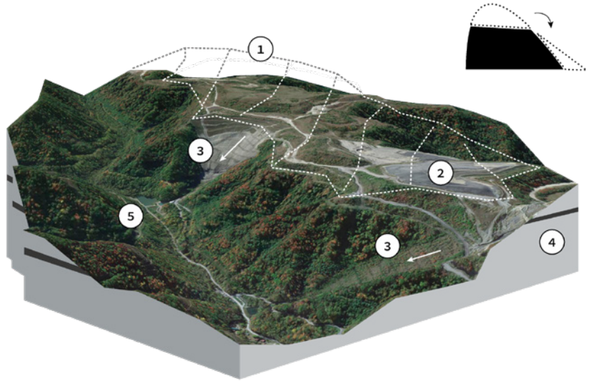
American Chestnut



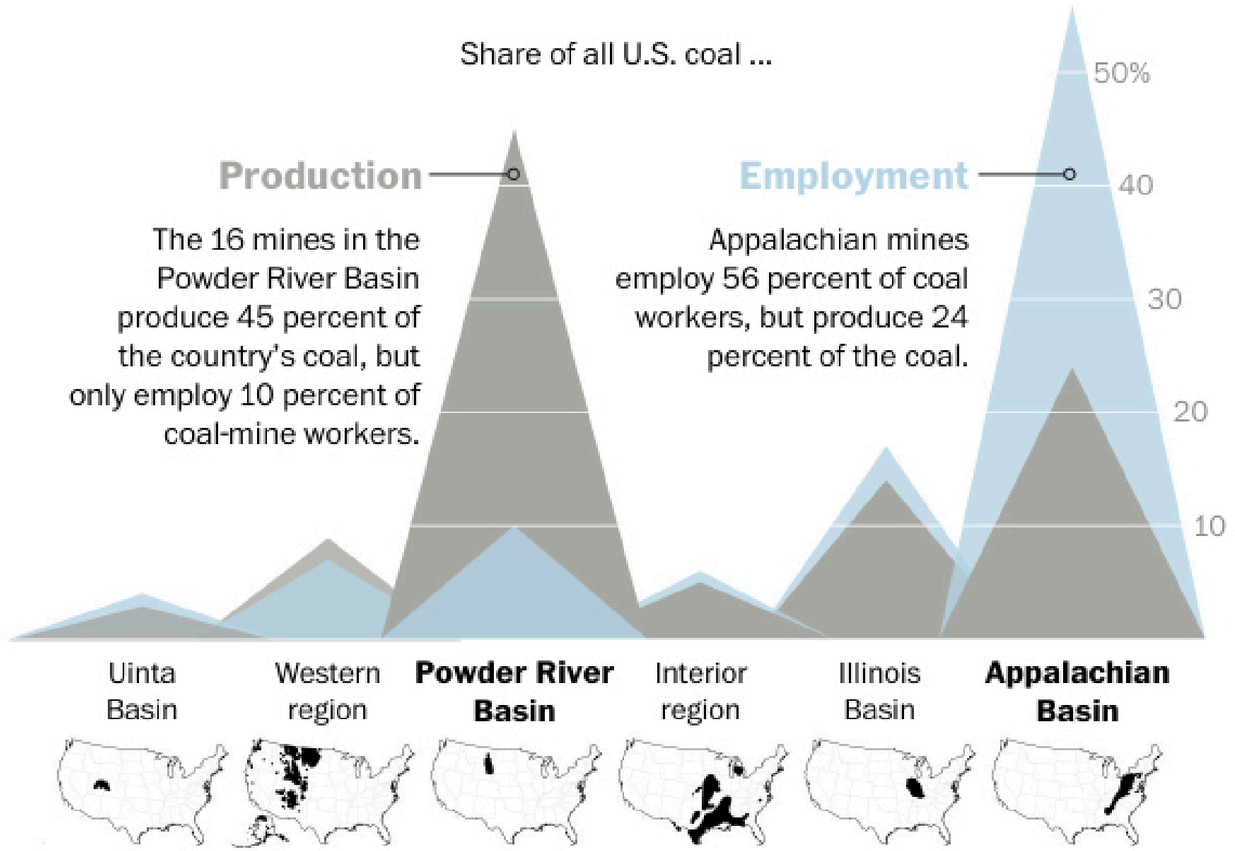
Late 1800s - Underground Mining



>1960s - Contour (Strip) Mine



>1990s - Mountain Top Removal



Washington Post, 2022

Kristian Thacker For Bloomberg Green / Flyover Courtesy Southwings.Org

Jill Frank, 2023

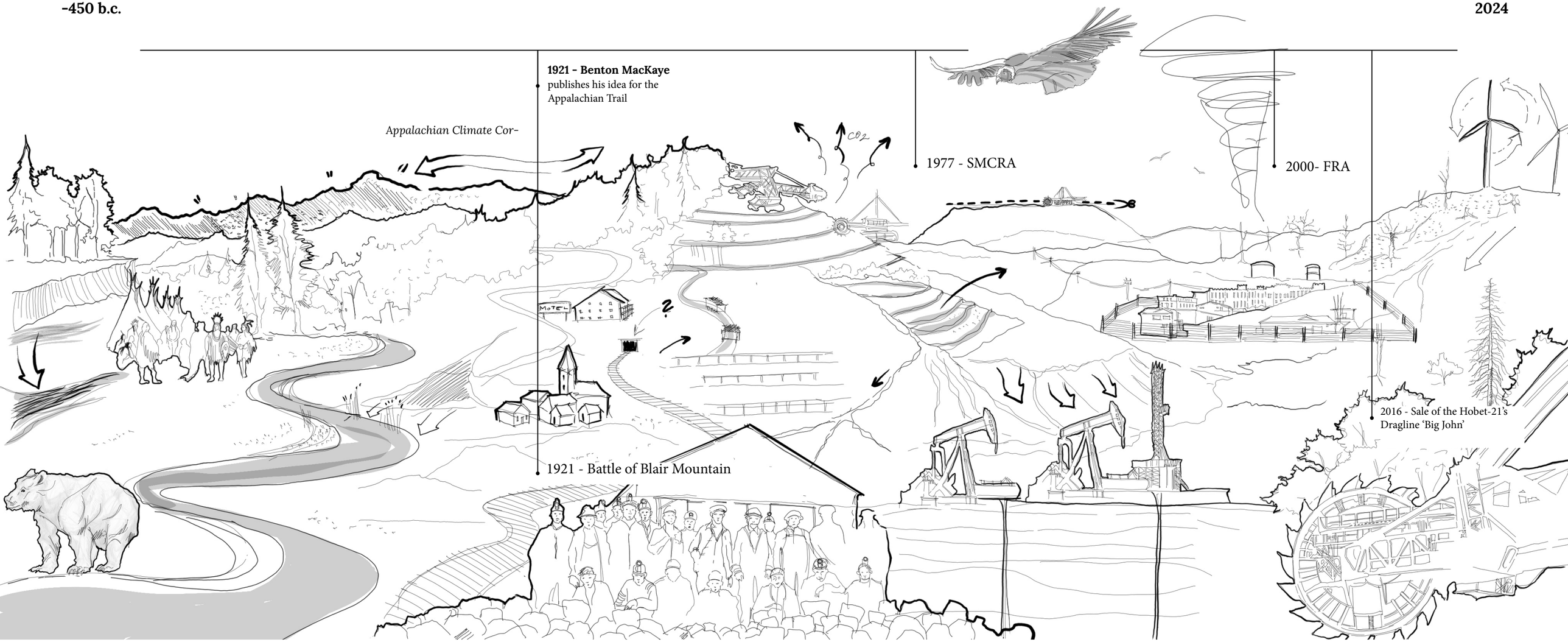
National Sacrifice Zone:

an area permanently impaired by environmental damage or economic disinvestment

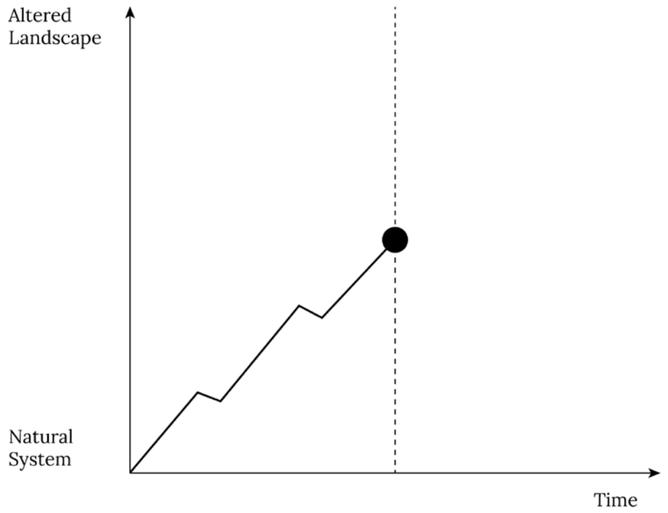
Goodell, 2006

-450 b.c.

2024



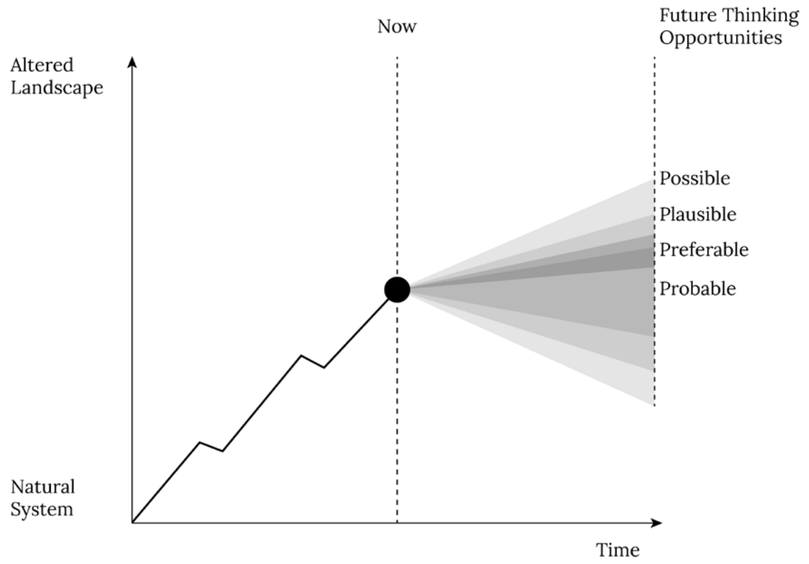
(The Becoming of a...) **„ NATIONAL SACRIFICE ZONE “**



Landscape Narrative

New Geological Era?! The Anthropocene

Image: Richard Weller, 2024



Future Narrative(s)

Pittsburgh

Fallingwater

Morgantown

New York

Philadelphia

Monongahela Nat. Forest

Washington DC

Huntington

Charleston

Hobet-21

Summersville

Logan

Appalachian Trail McAfee Knob

Roanoke

Blue Ridge Parkway

Cherokee Nation

Asheville

Smokey Mts. NP

ca. 5000km roundtrip

21 days
10 states
2 universities
12 national parks
1 earthquake
1 solar eclipse

Pittsburg “Steel City”

Smokey Mountains NP

Bear Run Nature Reserve (Fallingwater)


Freshkills Park, Staten Island

Pittsburgh Botanical Garden

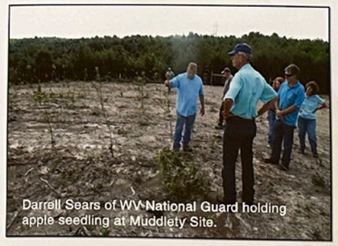

Agricultural
Sciences
Building


Stuart
Weitzman
School of
Design

Income Opportunities on Reclaimed Mine Lands

WestVirginiaUniversity. EXTENSION SERVICE

Jeff Skousen, Professor of Soil Science and Land Reclamation Specialist

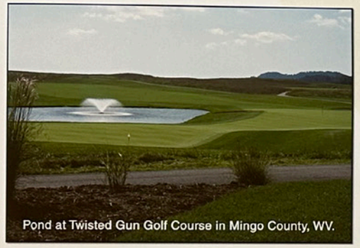


Darrell Sears of WV National Guard holding apple seedling at Muddlety Site.

Surface coal mines prior to 1950 in the U.S. were generally left without any reclamation, but on today's American surface coal mines reclamation is fully integrated with the mining operation. Post-mining land uses that are permitted in Appalachia are 1) hay land and pasture, 2) agriculture, 3) biofuel crops, 4) forestry, 5) wildlife habitat, and 6) building site development.

While about 6% of the land area of West Virginia has been surface mined (about 900,000 acres), the use of reclaimed land for agriculture and crop growth has only been practiced on a few sites and on relatively small acreages. But, it is estimated that as much as 25% of this reclaimed land area may be suitable for agricultural crops such as livestock production, vegetables, grains, and specialty crops. Specialty crops include lavender, hemp, apples and other tree fruits, Christmas tree plantations, and horticultural crop production in greenhouses. Soils are a key component and are necessary for site quality and productivity of the crop grown.

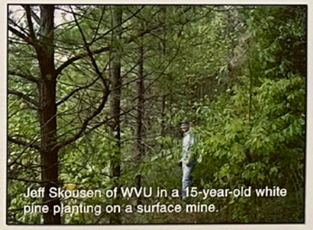
Students enrolled in the Green Mining Model Business Program at a Lavender site near Charleston, WV.



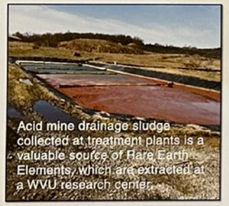
Pond at Twisted Gun Golf Course in Mingo County, WV.

Two photos Mylan Park near Morgantown in 1993 during mining and after development in 2017.

Refresh Appalachia Agriculture Project at Mine 22 is demonstrating livestock production with 60 hogs, 200 chickens and 20 goats.

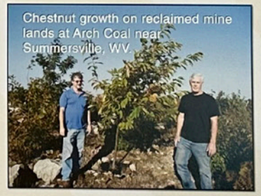


Jeff Skousen of WVU in a 15-year-old white pine planting on a surface mine.

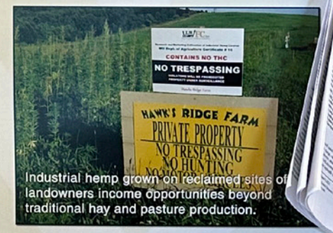


Acid mine drainage sludge collected at treatment plants is a valuable source of Rare Earth Elements, which are extracted at a WVU research center.

Jeff Skousen standing in giant miscanthus, a biofuel crop, growing in mine soils near Buckhannon, WV.

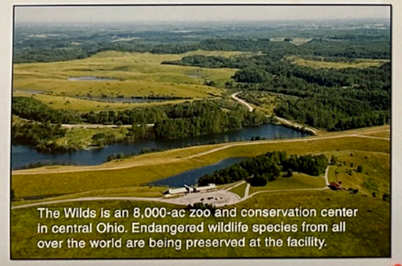


Chestnut growth on reclaimed mine lands at Arch Coal near Summersville, WV.

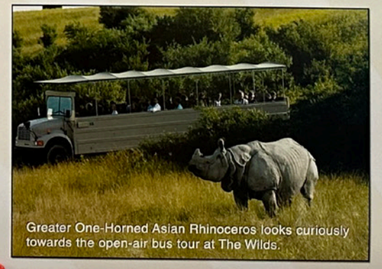


Industrial hemp grown on reclaimed sites offers landowners income opportunities beyond traditional hay and pasture production.

Greenhouses and high tunnels are being built on reclaimed sites to provide vegetables and fruits to sell at farm markets.



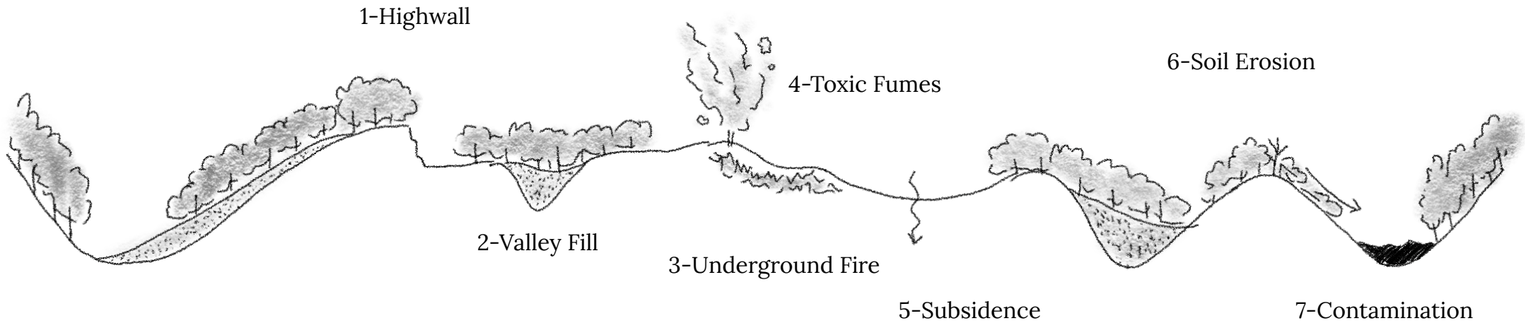
The Wilds is an 8,000-ac zoo and conservation center in central Ohio. Endangered wildlife species from all over the world are being preserved at the facility.



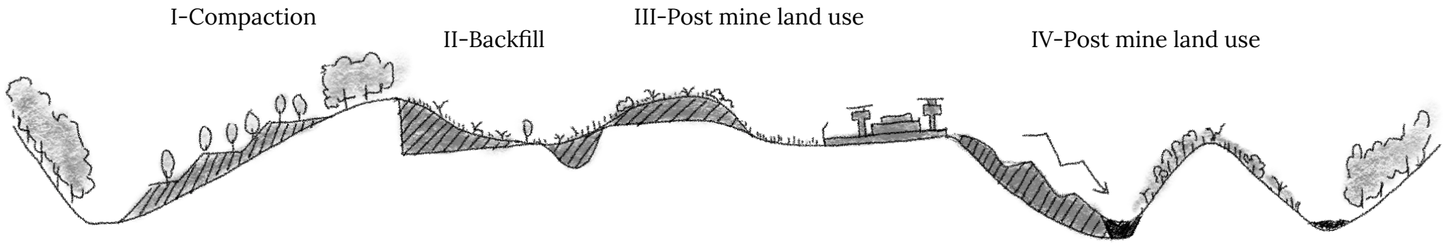
Greater One-Horned Asian Rhinoceros looks curiously towards the open-air bus tour at The Wilds.

Stone Crusher Demonstration at Mine 22 to make mine soils for agriculture.

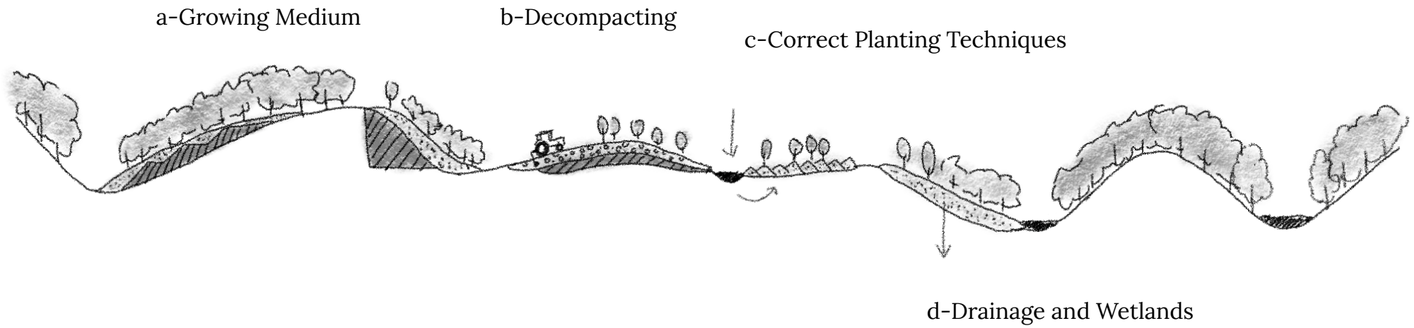
Title IV
Abandonned Mine Land /
Legacy Mines pre-1977

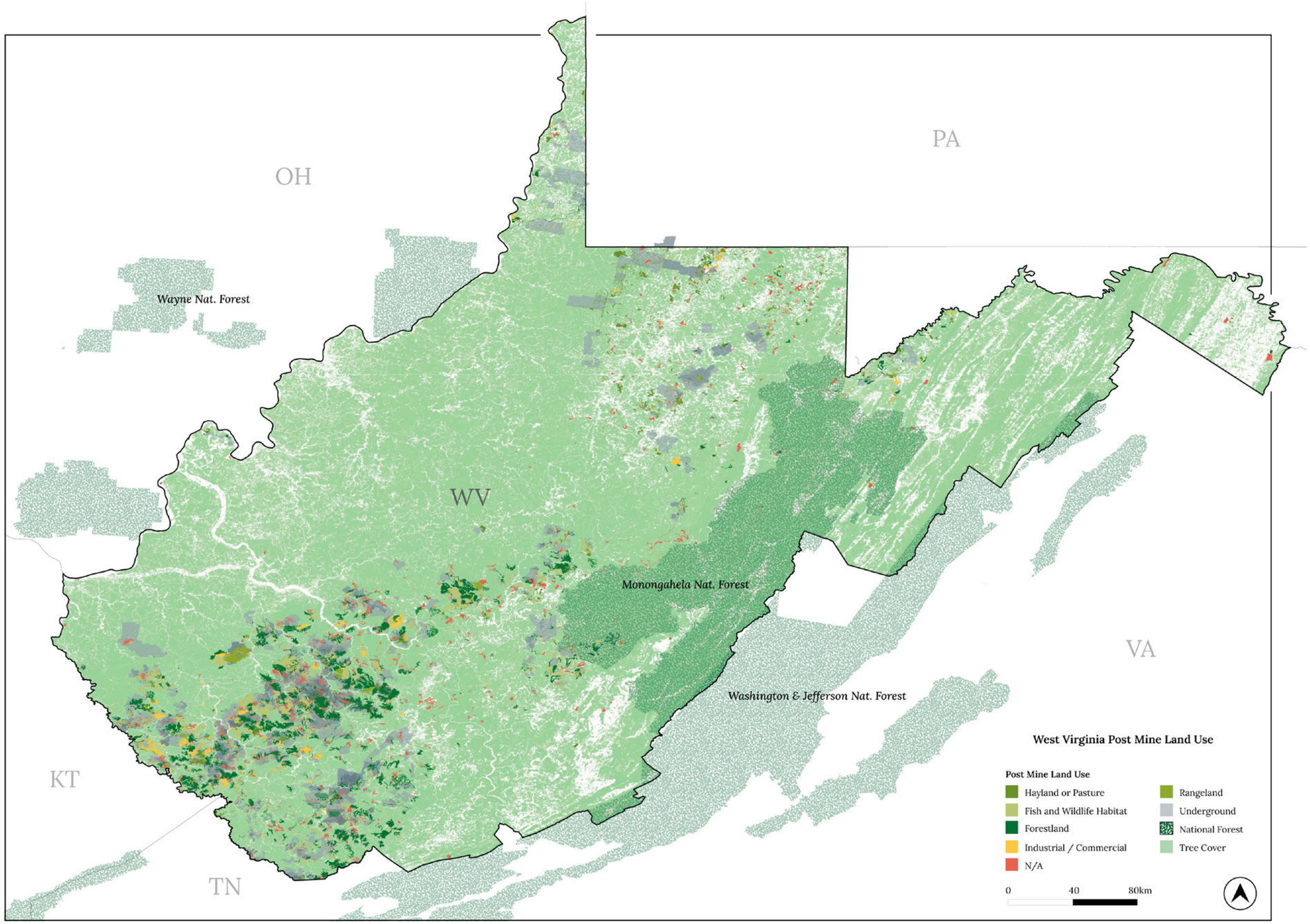


Title V
Surface Mine Control and Reinforcement Act
SMCRA post-1977



Forestry Reclamation Approach
FRA 2007




OH
PA
WV
VA
KT
TN
Wayne Nat. Forest
Monongahela Nat. Forest
Washington & Jefferson Nat. Forest
West Virginia Post Mine Land Use
Post Mine Land Use
Hayland or Pasture
Fish and Wildlife Habitat
Forestland
Industrial / Commercial
N/A
Rangeland
Underground
National Forest
Tree Cover
0
40
80km


Hayland or Pasture
Forestland
Fish and Wildlife Habitat


AEP 275
AEP 122
AEP 238
AEP 275
AEP 122
AEP 238


JOIN THE TEAM
BLACKHAWK MINING, LLC
Kroger
TRUIST
gomart
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REGULAR
3.76
PLUS
KFC
Pizza Hut
EXXON
CAR WASH


EXXON
EXXON

Solastagia

"the homesickness you have when you are still at home, or
the lived experience of negatively perceived environmental change."

(Albrecht, 2005)

National Sacrifice Zone

Ecological Grief

Addiction

Incarceration

Unemployment

Health crisis

Water polution

Soil degradation

Identity Crisis

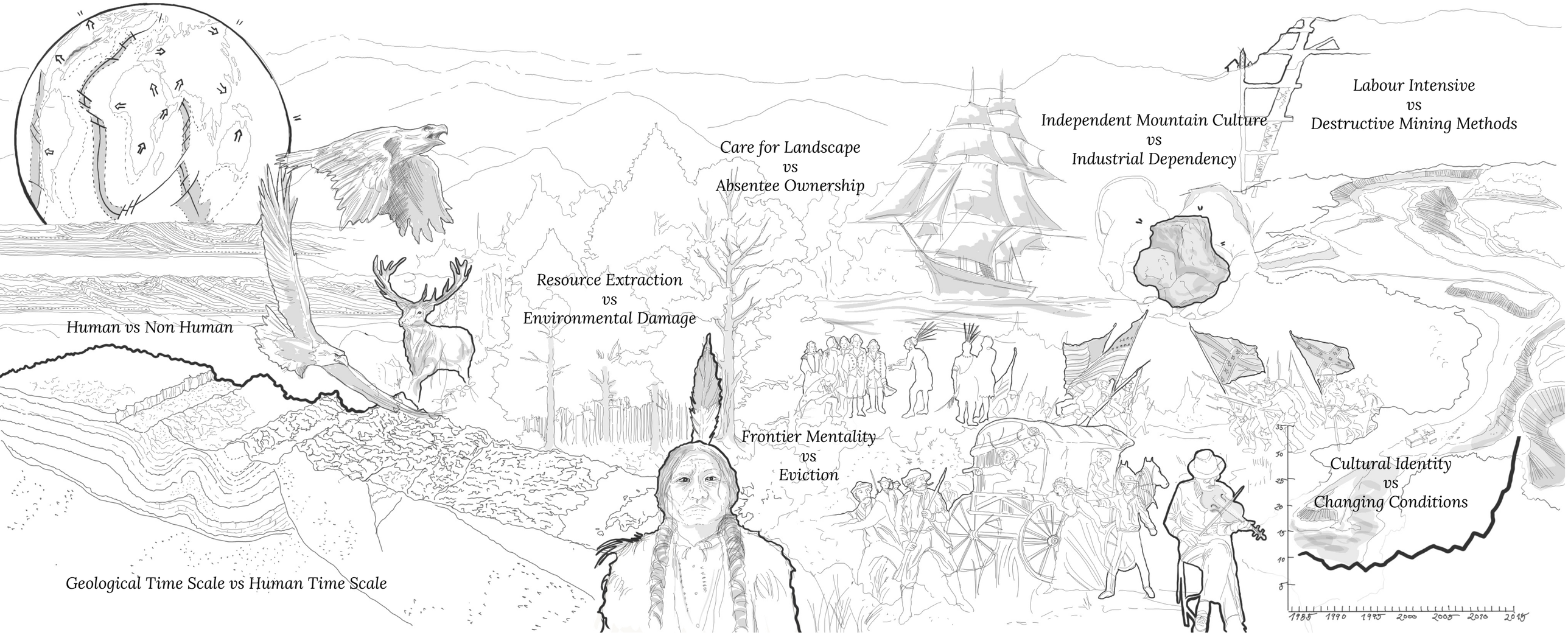
Biodiversity Loss

Fracking

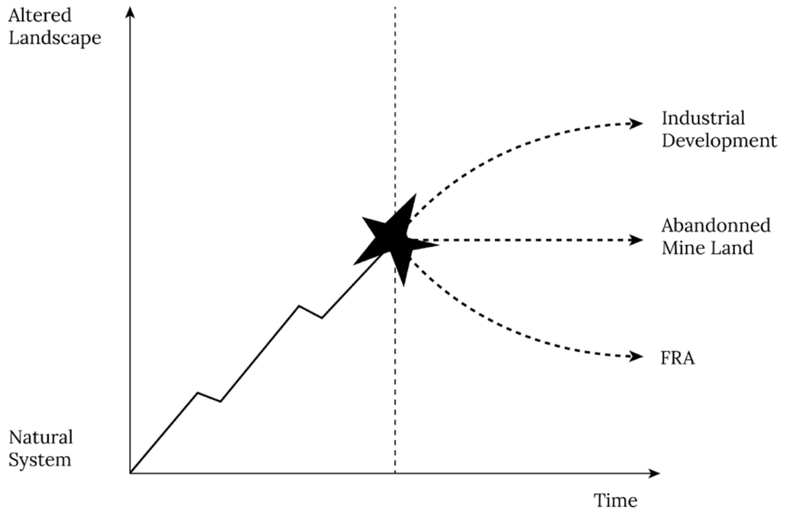
Mountain Top Removal

Energy Transition(s)

Climate change



Conflicting Narratives of Loss and Restoration



Conflicting Narratives

Extreme Alteration

Scale of the Problem

Loss of mountain culture

Identity Crisis

Negative Stereotypes

Conflicting Narratives

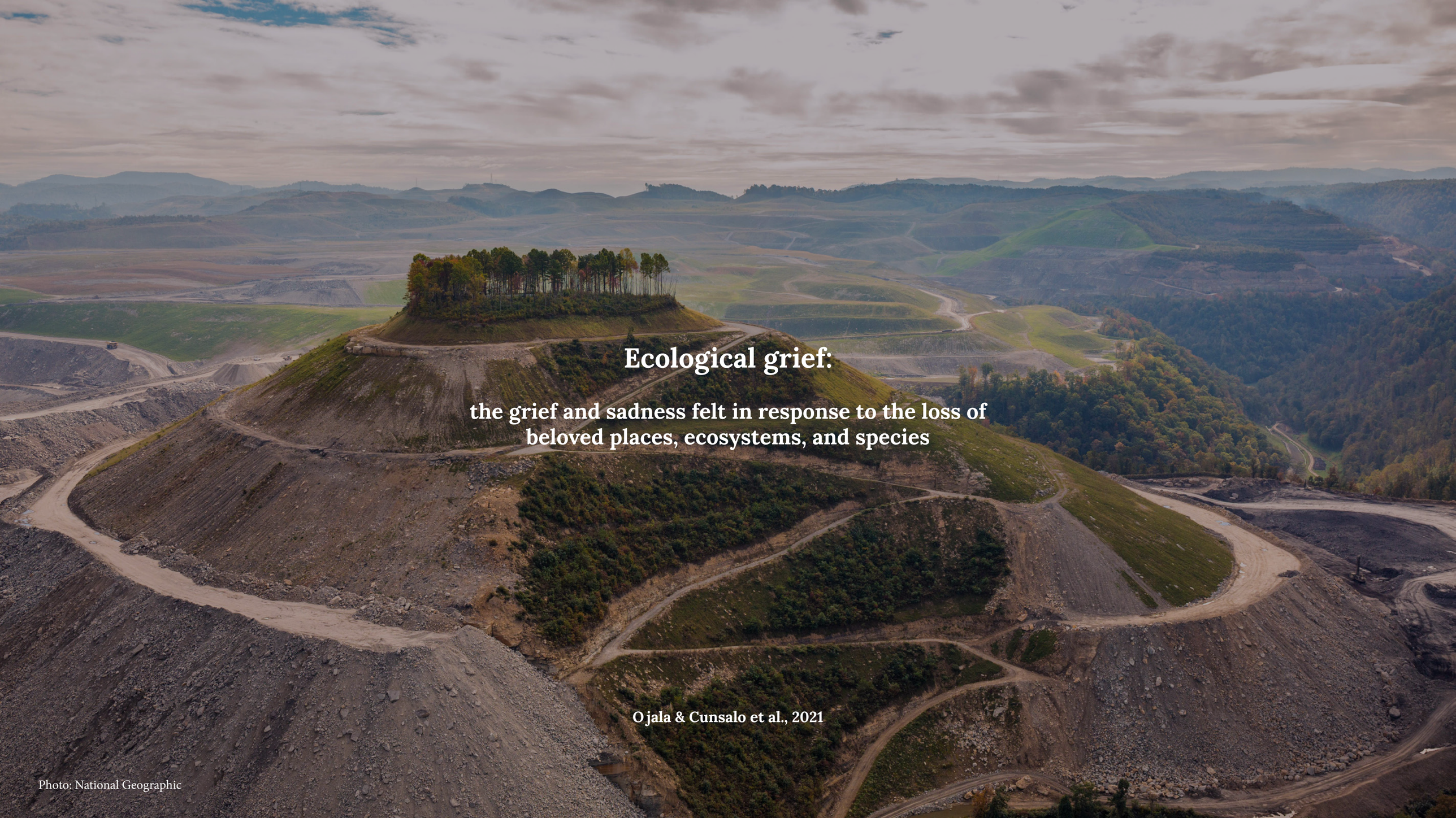
Obfuscation

Absentee Land owners

Lack of Responsability

Deeper underlying Problems

Photo: National Geographic

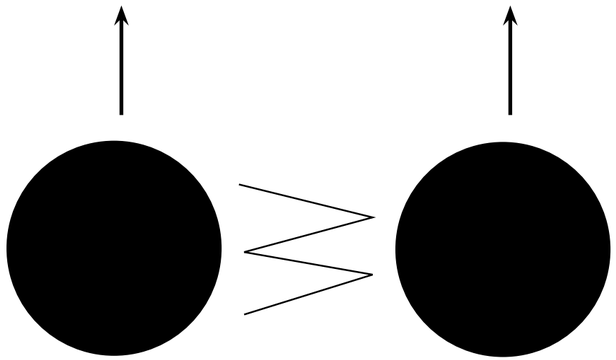


Ecological grief:

the grief and sadness felt in response to the loss of beloved places, ecosystems, and species

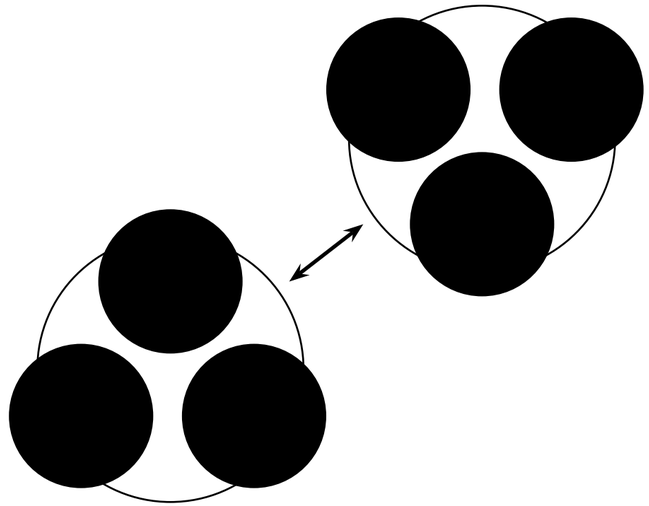
Ojala & Cunsalo et al., 2021

Photo: National Geographic



Loss-oriented **Restoration-oriented**

From → **To**



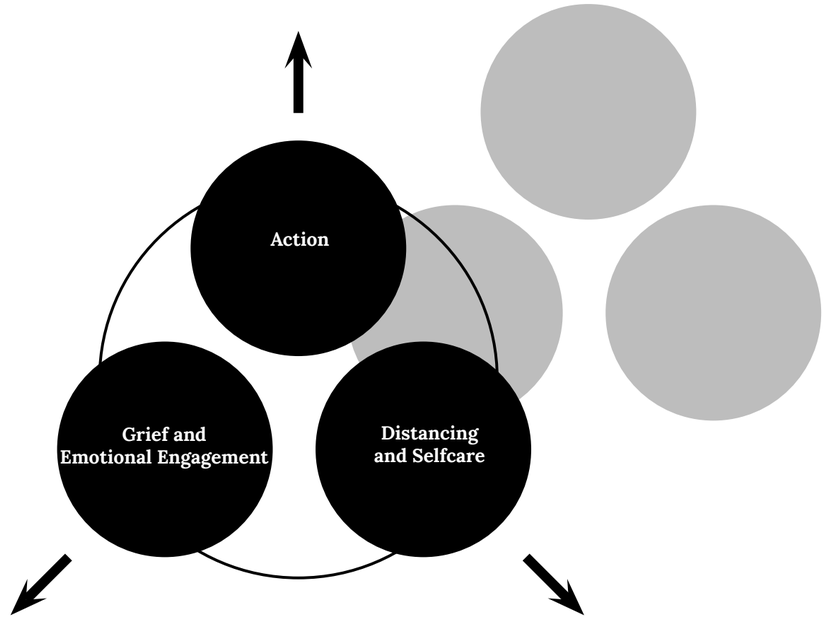
Coping and Changing **Living with**

Transformation and Adjustment

Pihkala, 2022

Environmental Action
Flexibility and Adaptability
Serendipity and Participation

Open-Ended

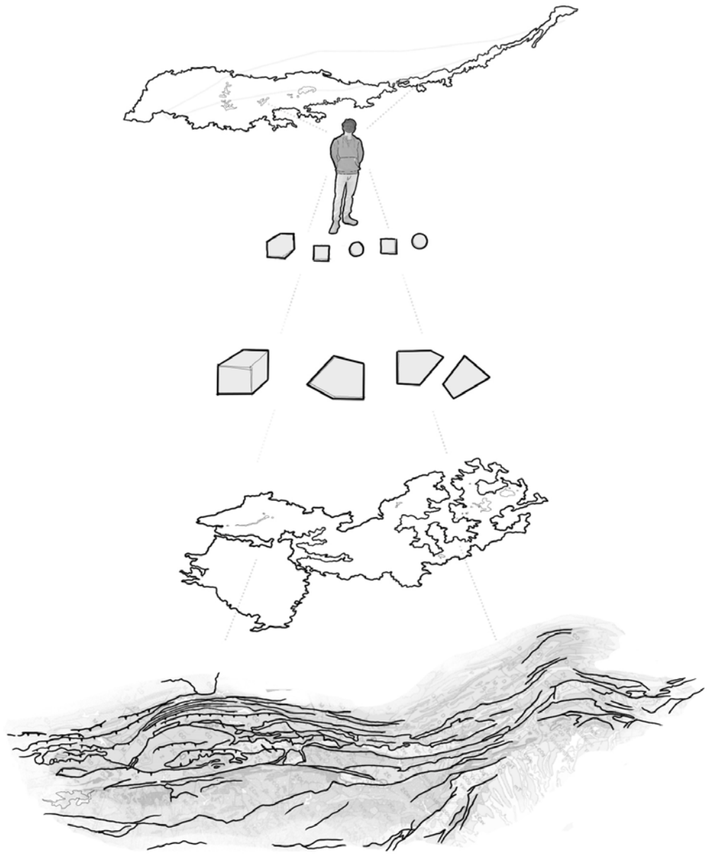


Open-Minded

Awareness and Remembrance
Embracing different aesthetics
Search for new forms of appreciation

Open-Access

Transparency
Sense of ownership and responsibility
Community Engagement



In search for a new identity

Wider appreciation

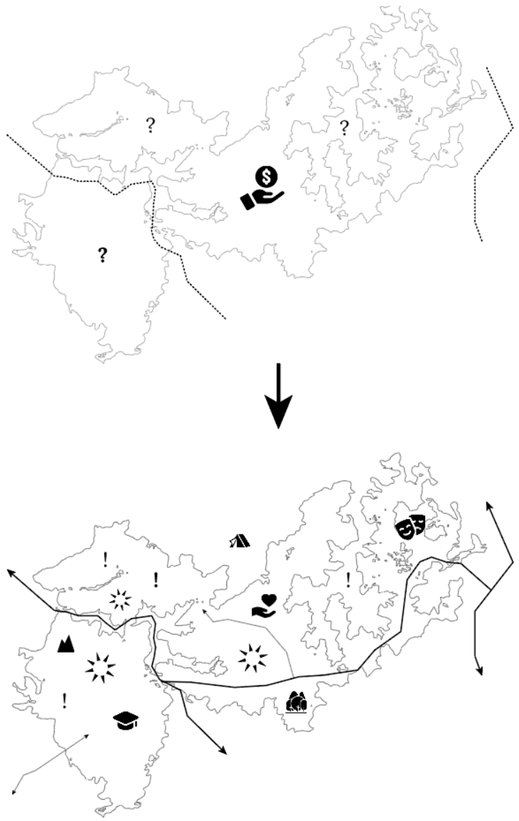
Collective Memory

One Symbolic Location

Marking Time

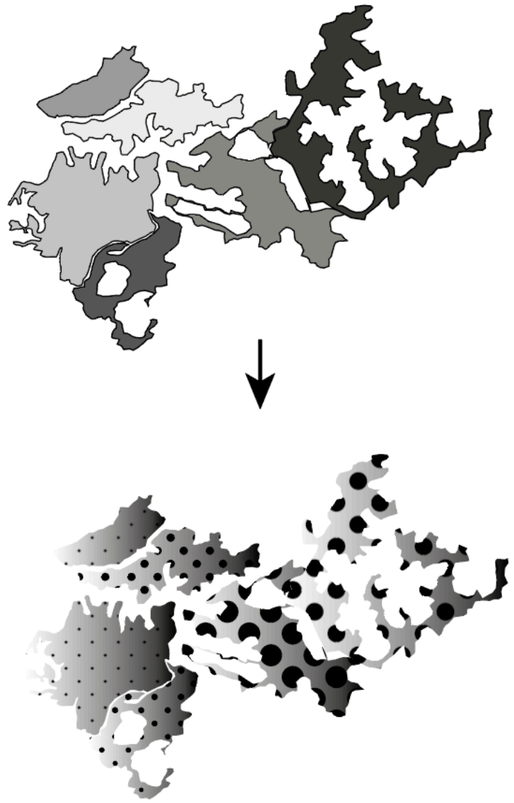
Altered landscape

Appalachian Memorial of the Mined Landscape



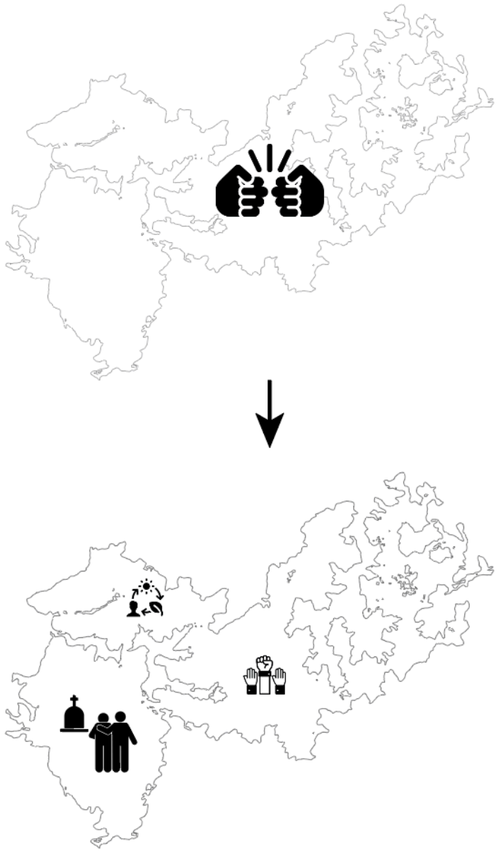
1. Open Access

From Obfuscation
To Transparency and Awe



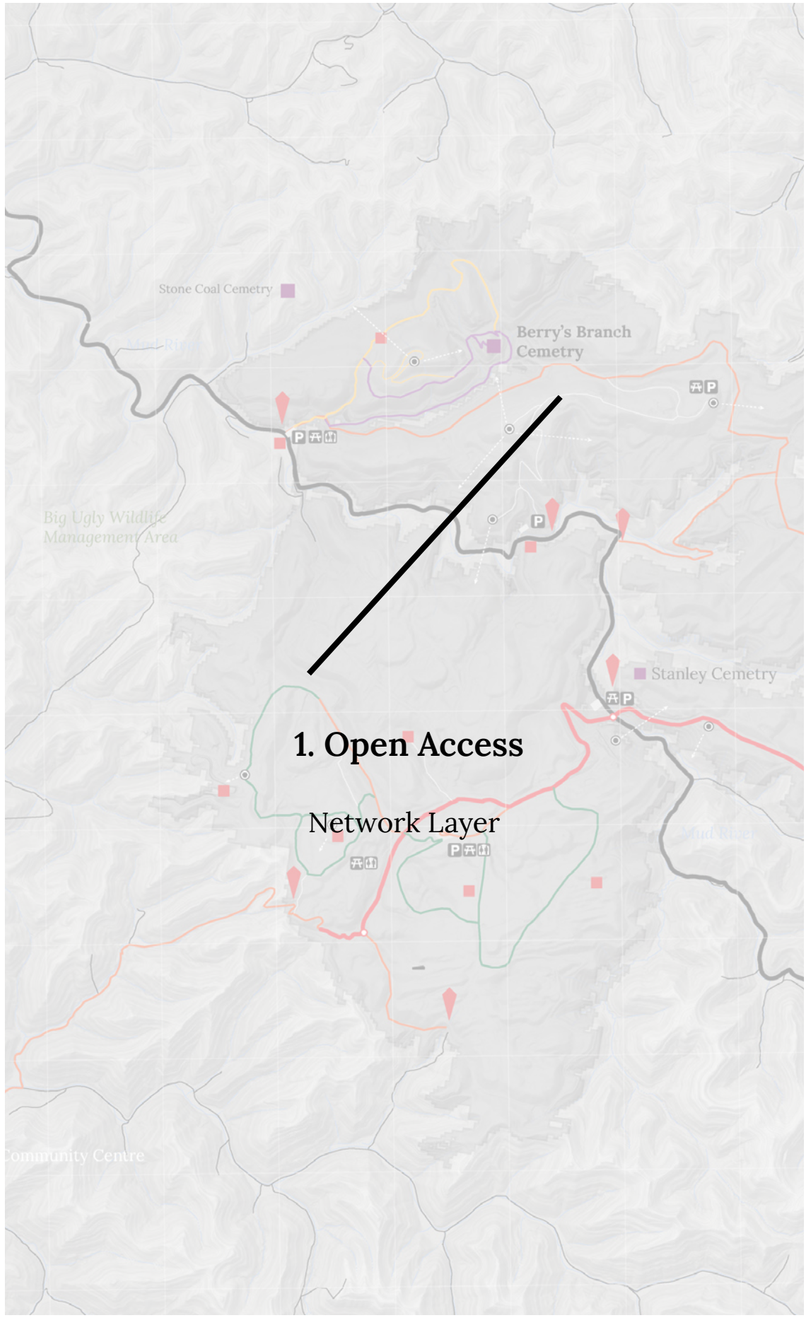
2. Open Ended

From Forced Zoning
To Ongoing Experimentation



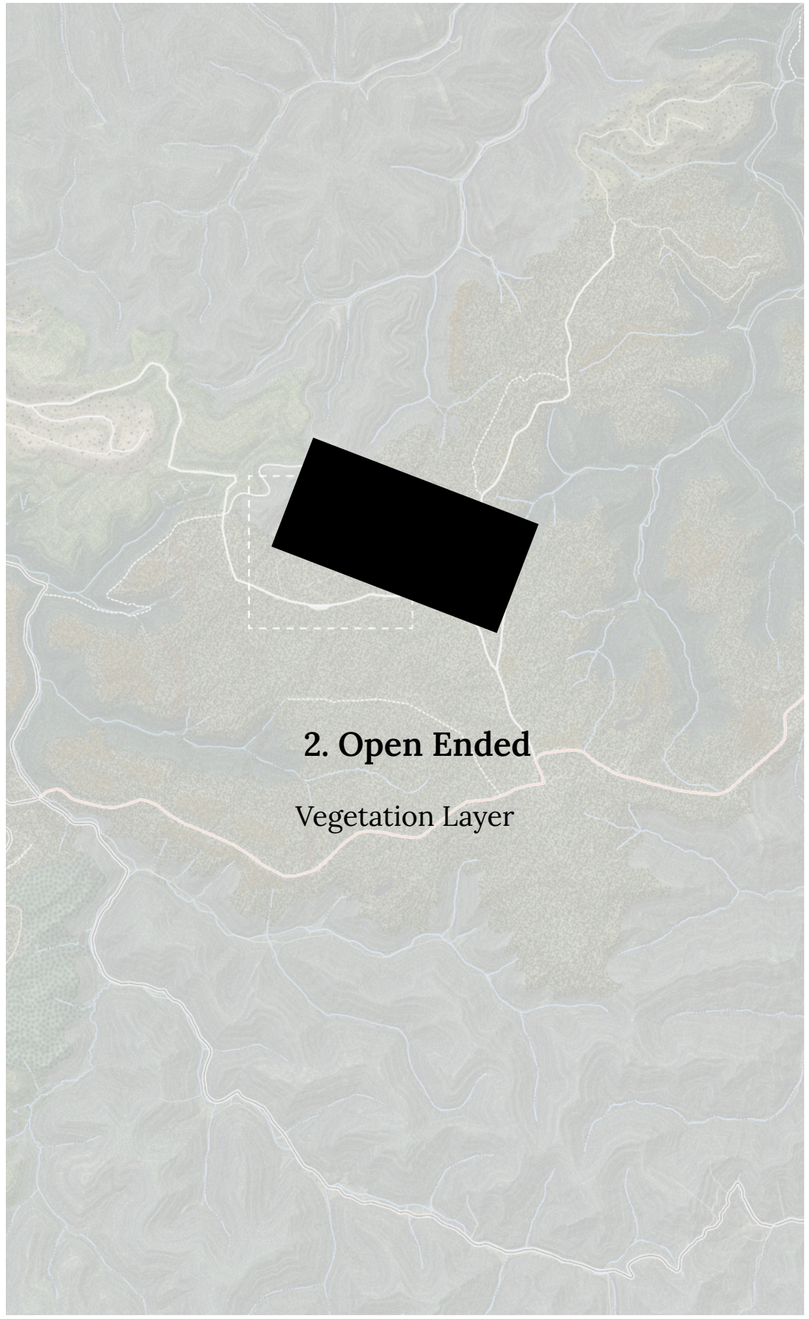
3. Open Minded

From Conflicting Narratives
To Post-Traumatic Growth



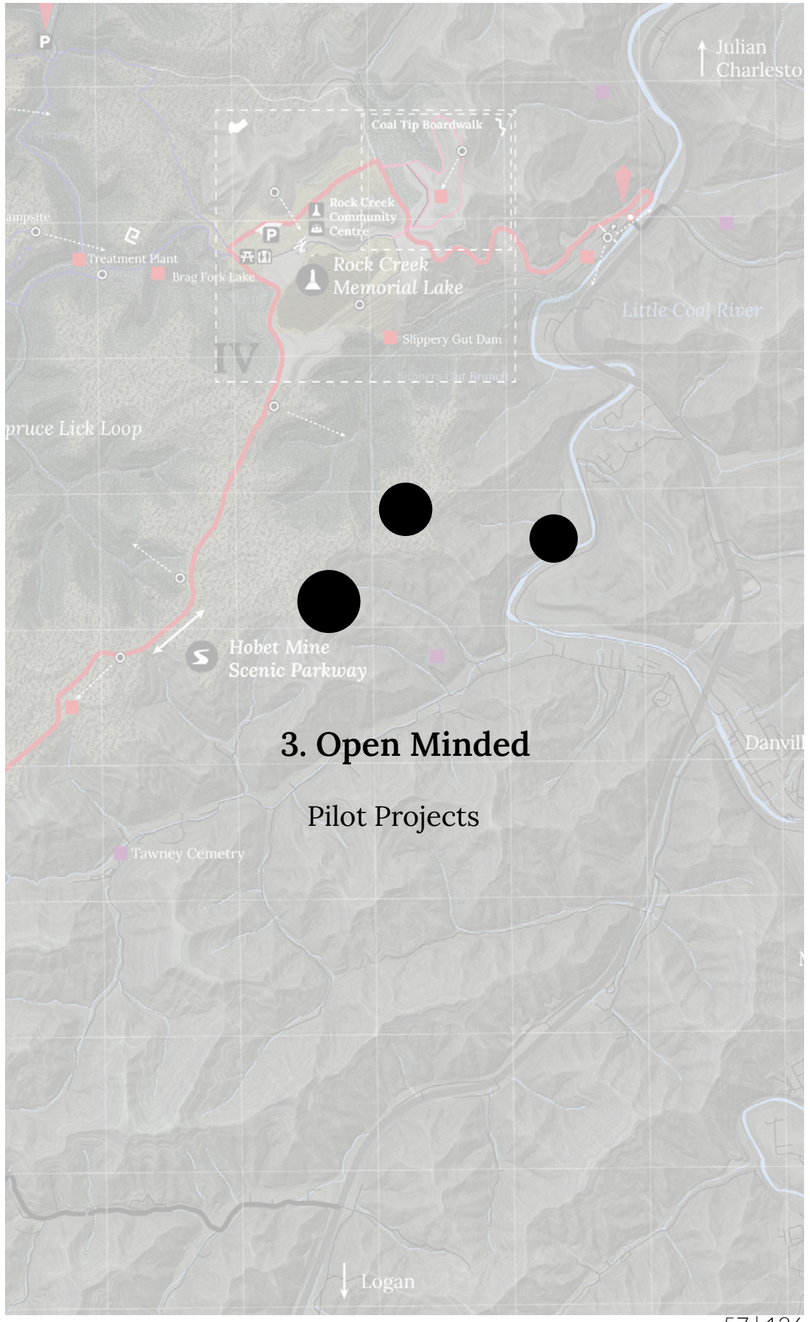
1. Open Access

Network Layer



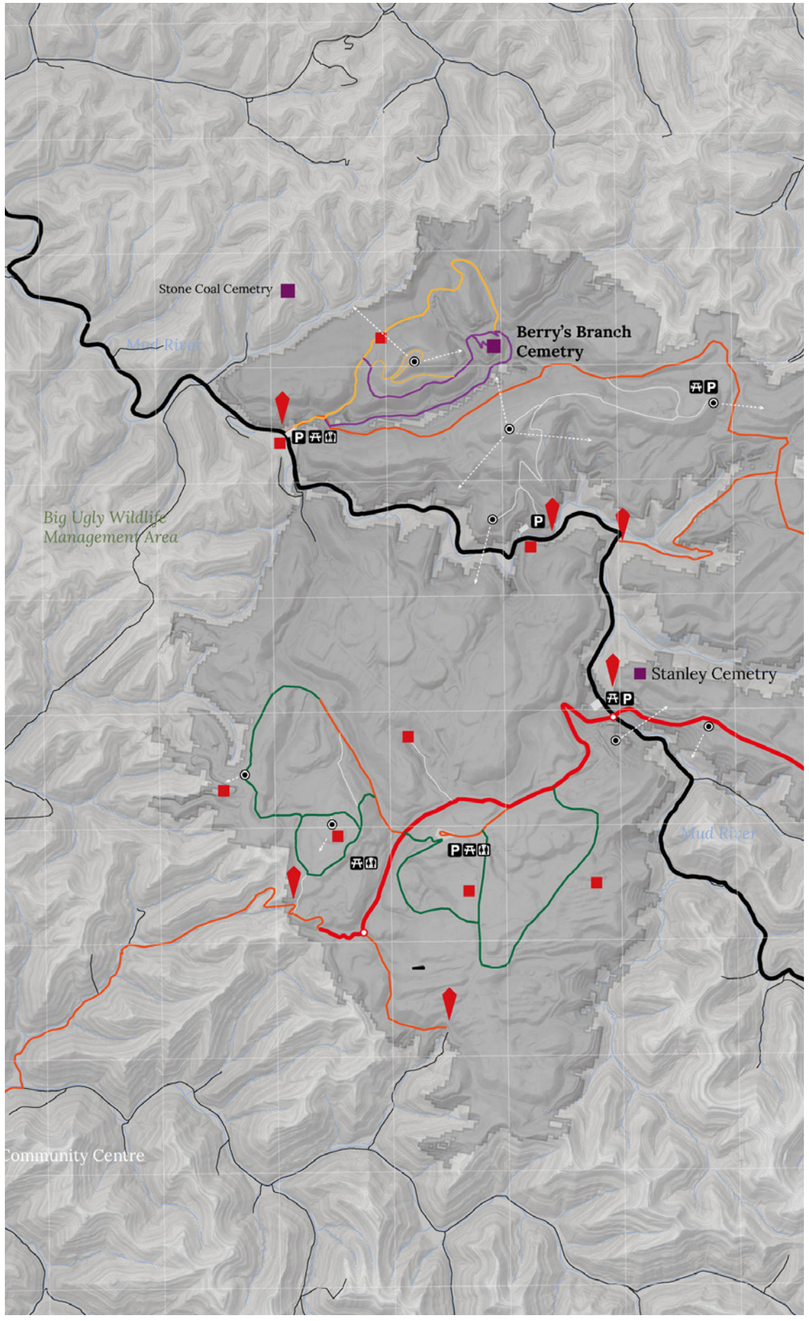
2. Open Ended

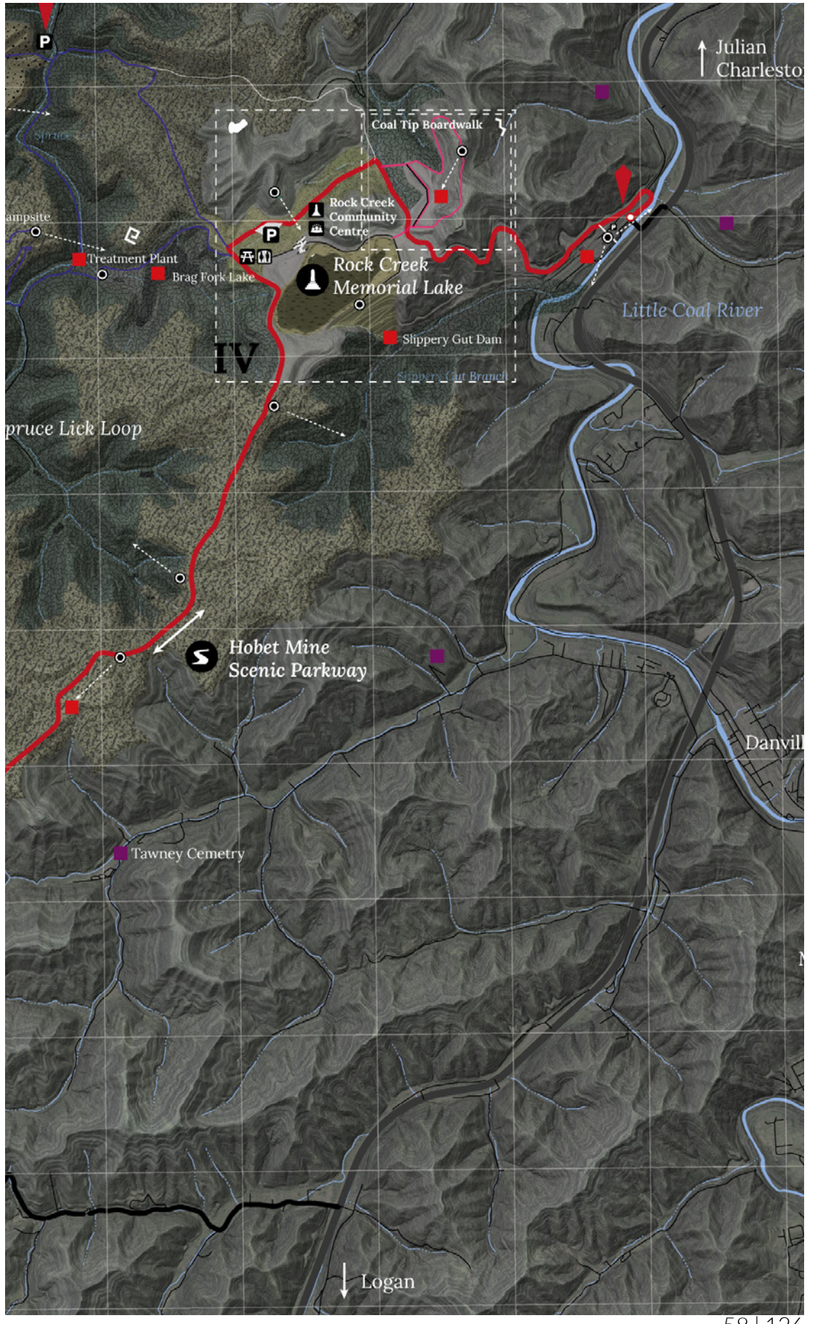
Vegetation Layer

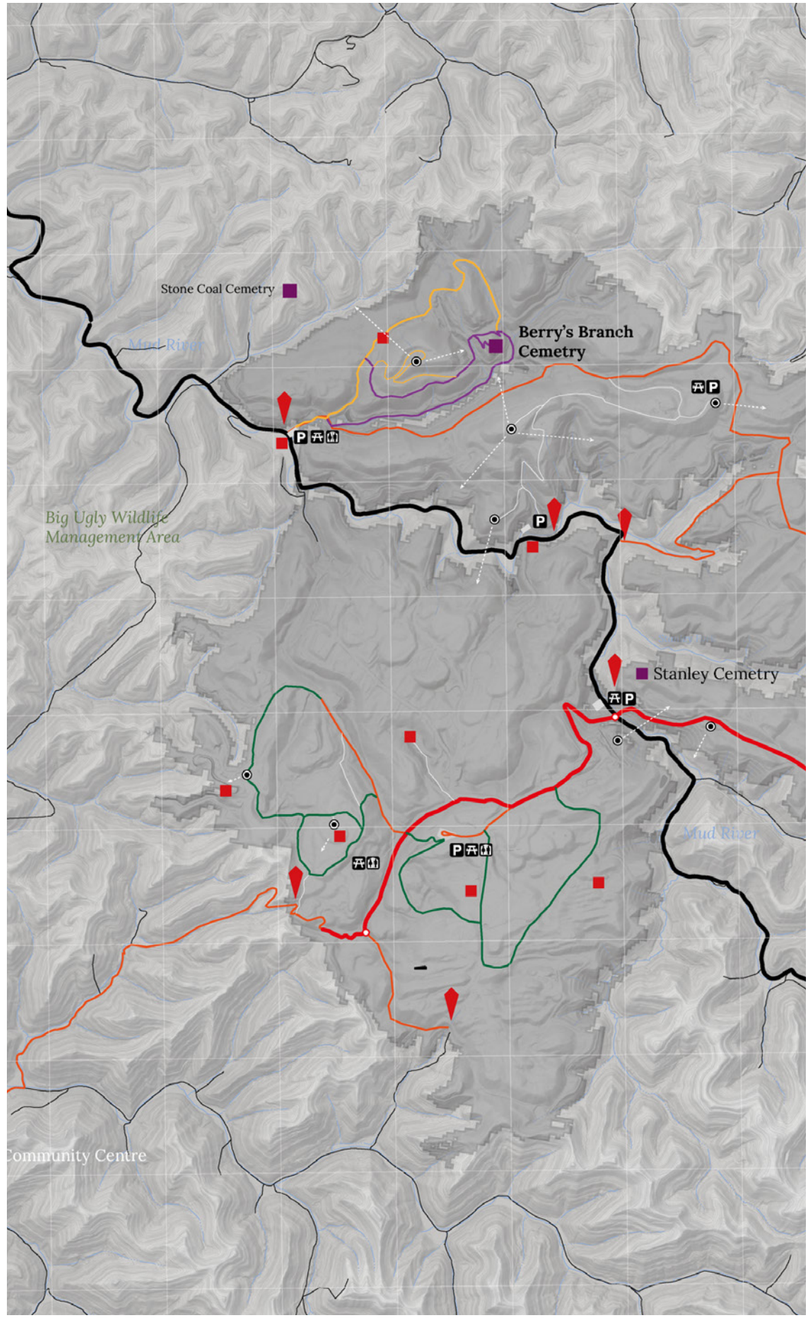


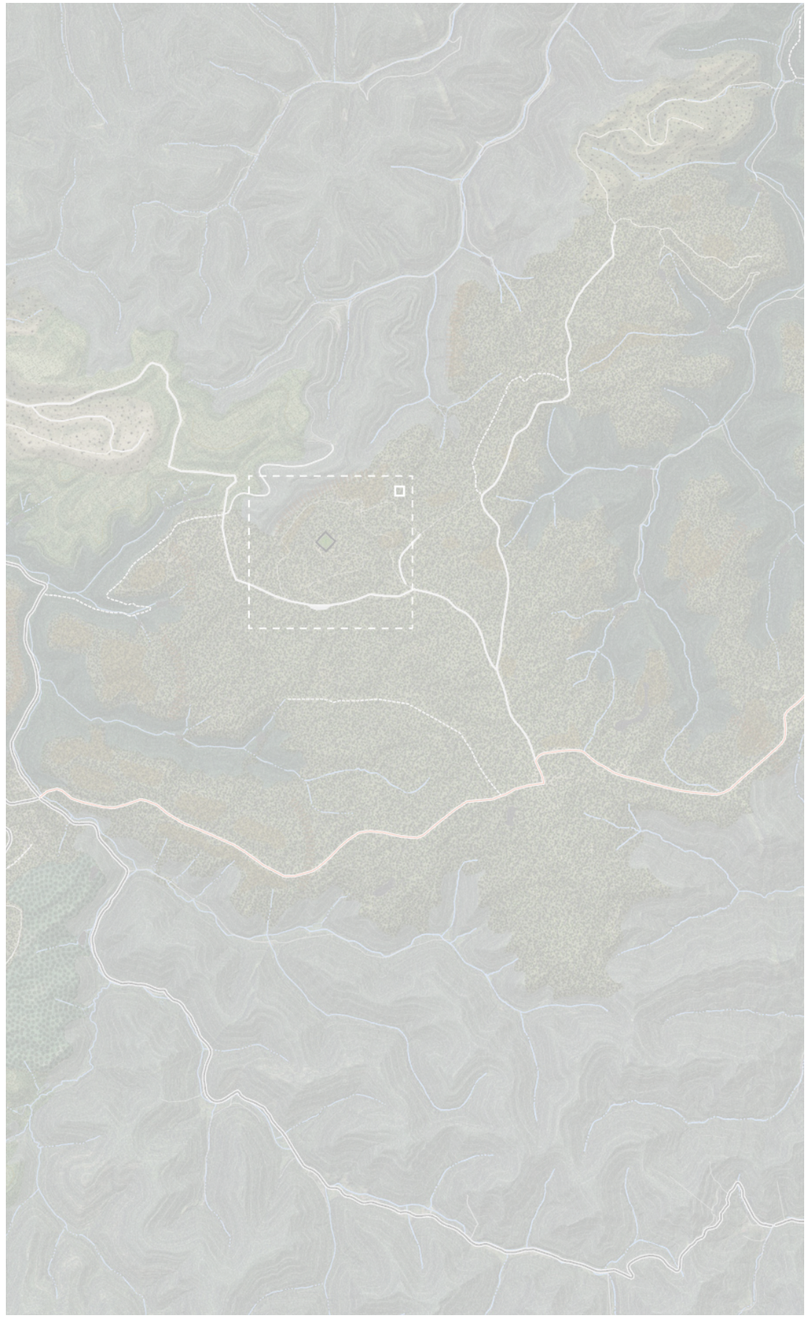
3. Open Minded

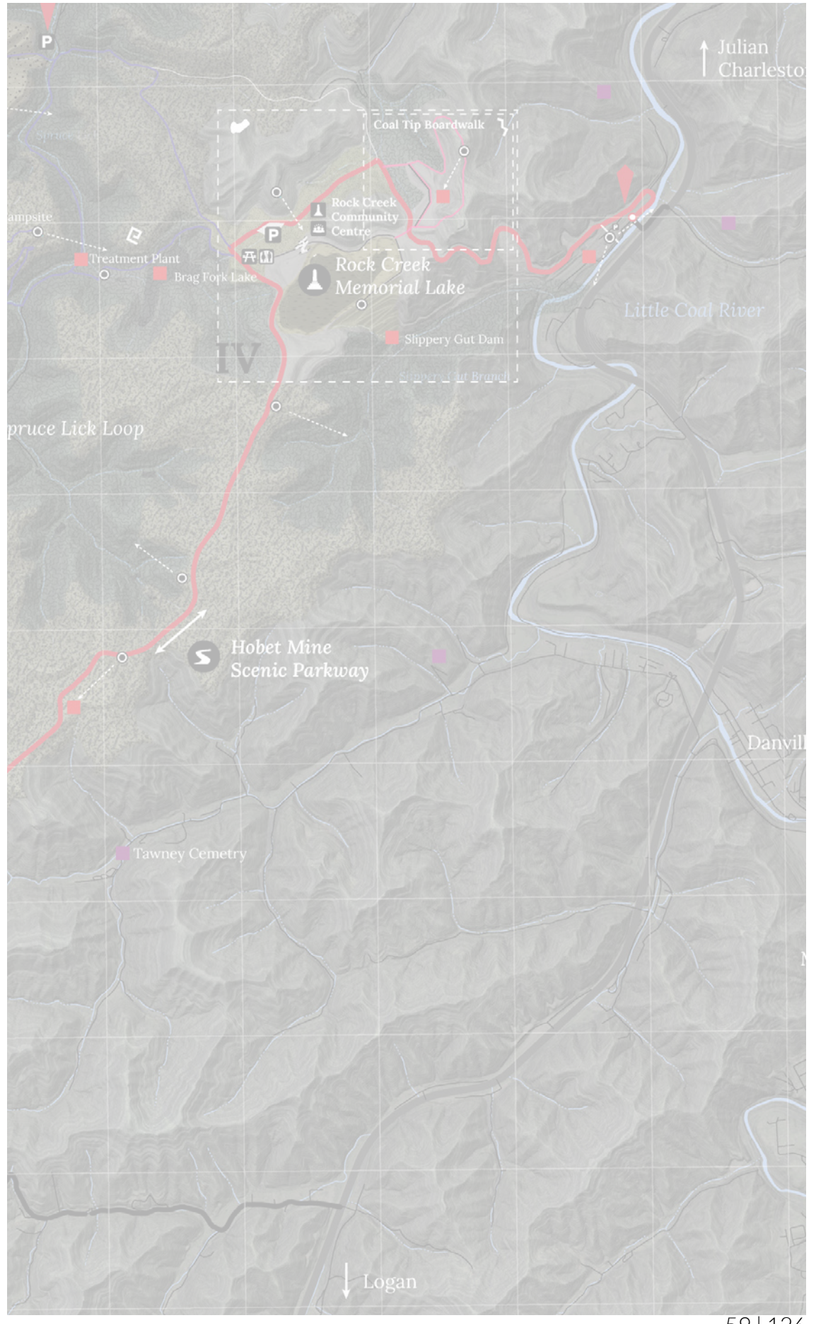
Pilot Projects


Stone Coal Cemetry
Berry's Branch Cemetry
Big Ugly Wildlife Management Area
Stanley Cemetry
Mud River
Community Centre

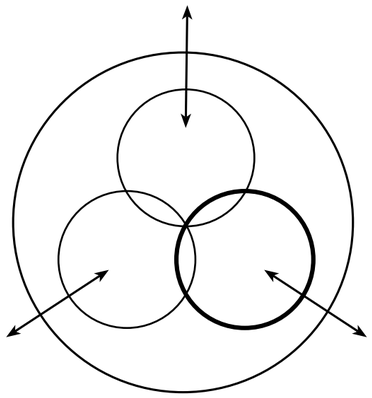

Julian
Charlesto
Coal Tip Boardwalk
Rock Creek Community Centre
Treatment Plant
Brag Fork Lake
Rock Creek Memorial Lake
Little Coal River
Slippery Gut Dam
TV
pruce Lick Loop
Hobet Mine Scenic Parkway
Danvil
Tawney Cemetry
Logan

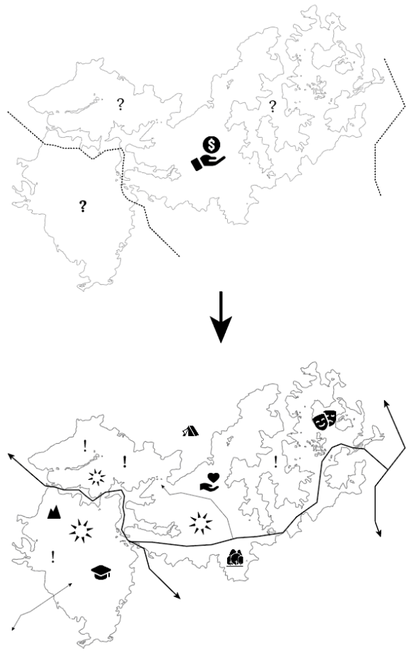

Stone Coal Cemetry
Berry's Branch Cemetry
Big Ugly Wildlife Management Area
Stanley Cemetry
Mud River
Community Centre



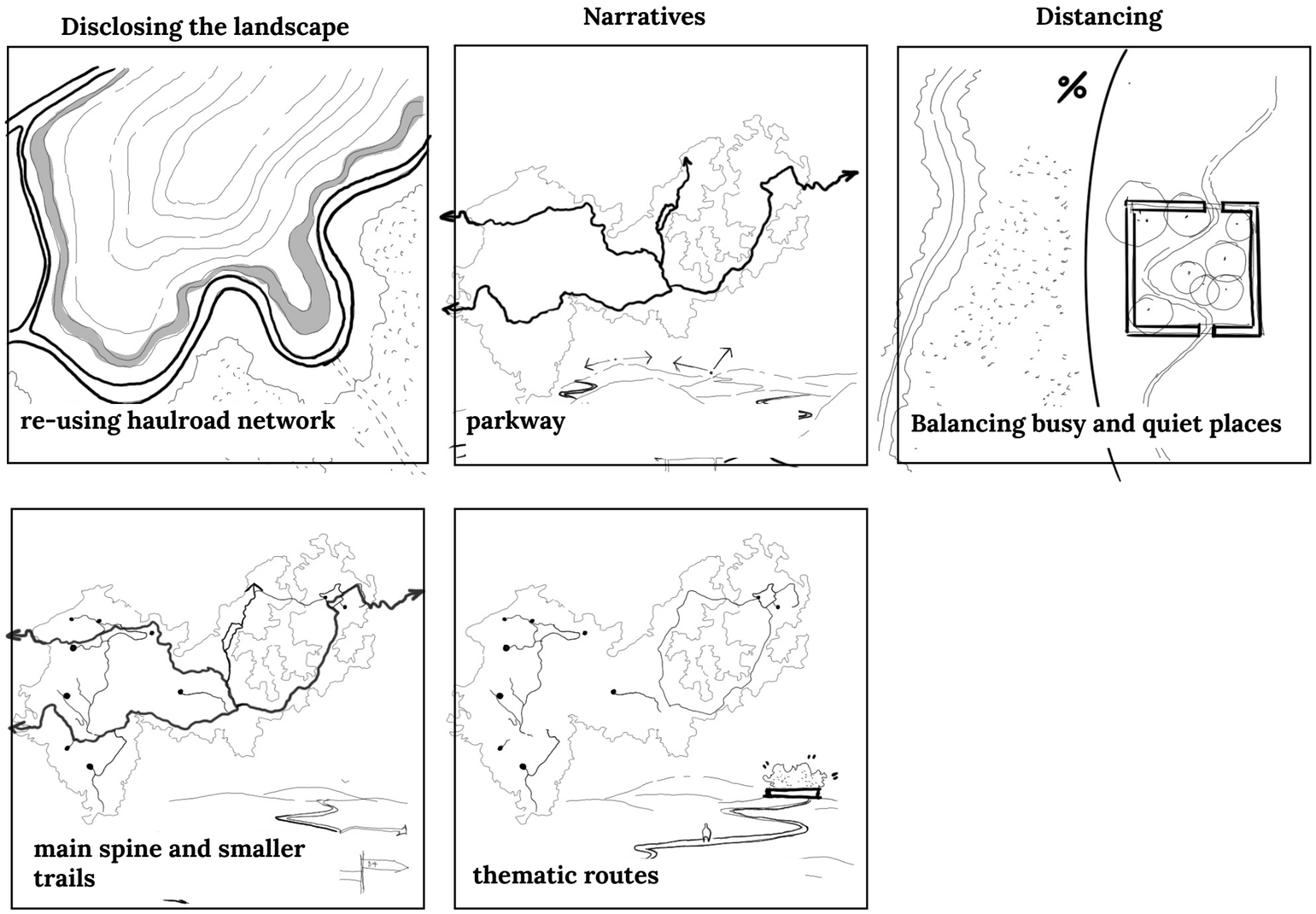

Julian
Charlesto
Coal Tip Boardwalk
Rock Creek Community Centre
Treatment Plant
Brag Fork Lake
Rock Creek Memorial Lake
Slippery Gut Dam
Little Coal River
pruce Lick Loop
Hobet Mine Scenic Parkway
Tawney Cemetry
Logan

Strategy 1. Open-Access





Design Principles for Disclosing the Landscape



Reclaiming the property

Recreation

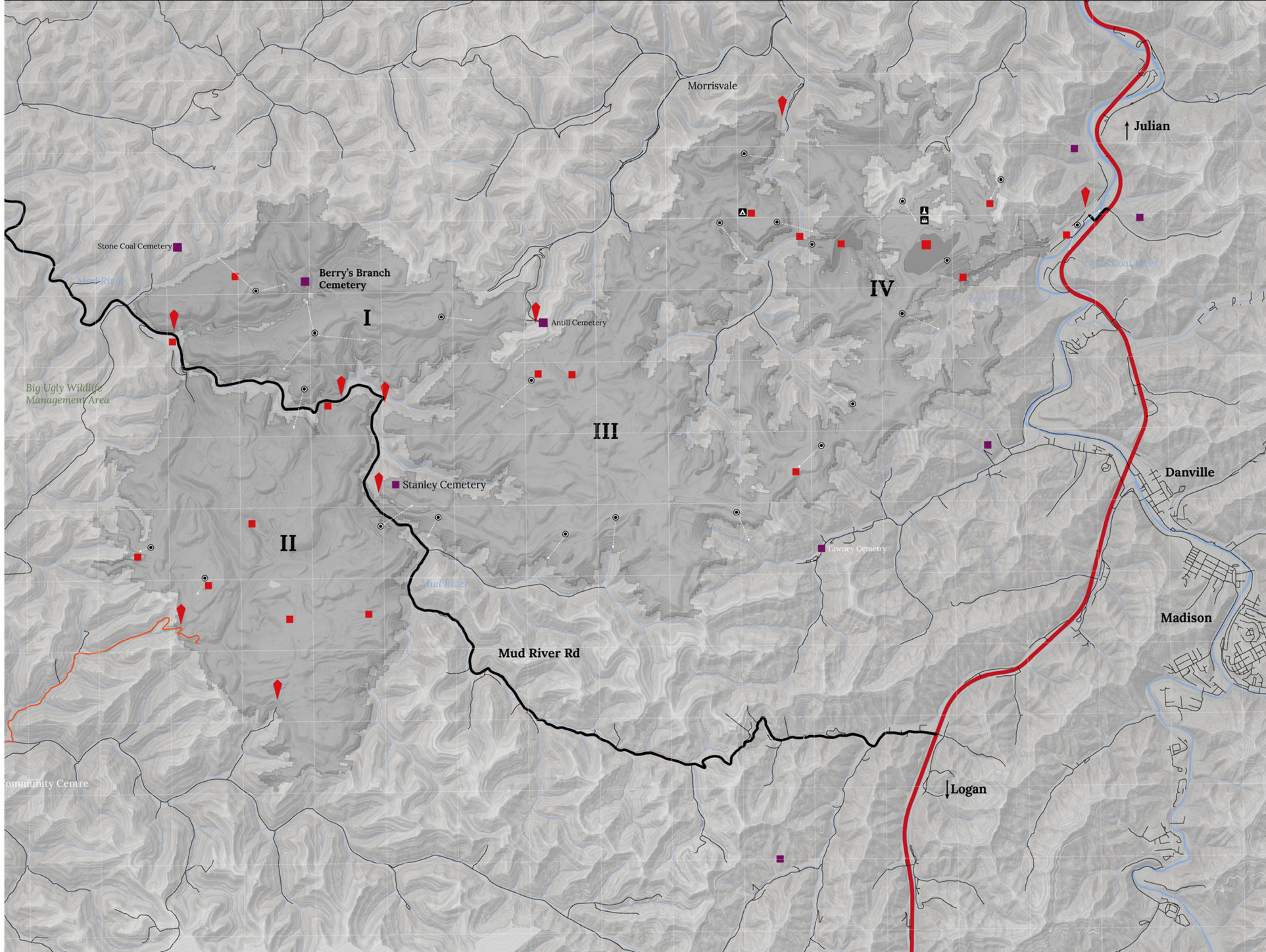
Dark-Tourism

Eco-Tourism

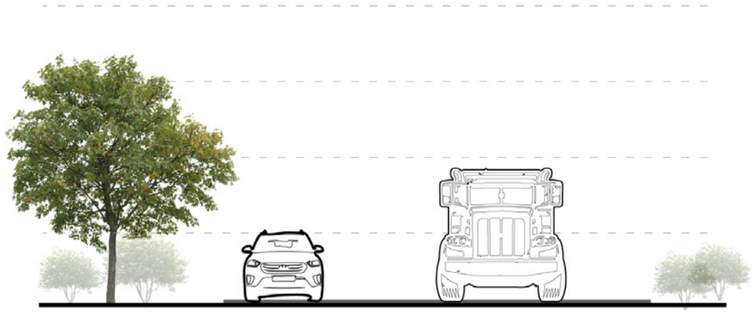
Cultural Heritage Site

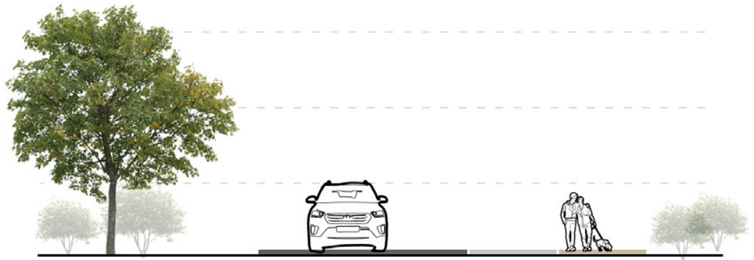
Target Groups

Highlights



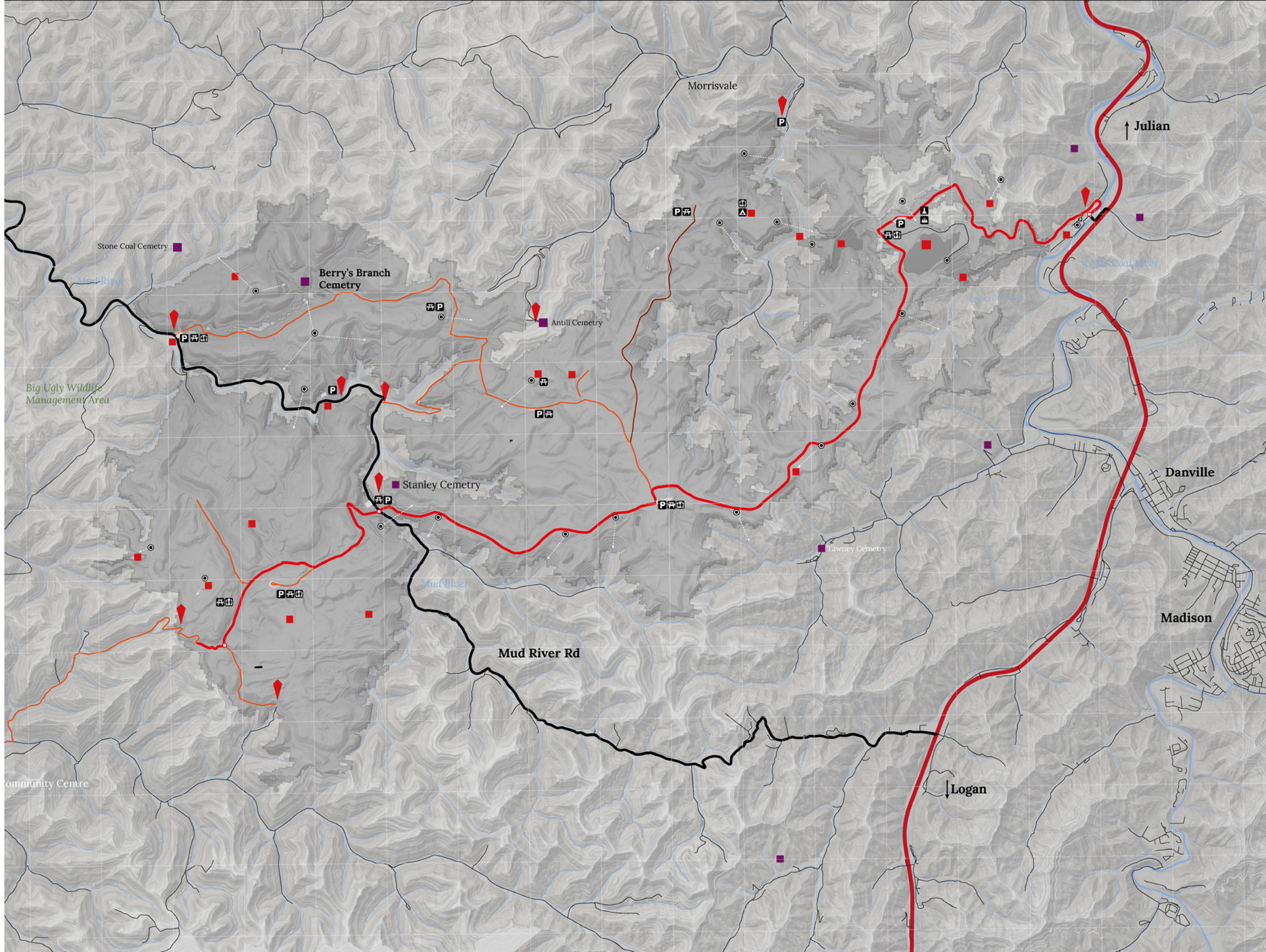
- Point of Interest
- Cemetery
- Entrance Point
- Viewpoint
- Vista





Reclaim Cars Mixed Walking

Connector Road Network



Accessibility

- Memorial
- Community Centre
- Parking / Trailhead
- Rest Area
- Comfort Area
- Campsite

- Parkway
- Main Access Roads
- Serviced Haulroad
- Decommissioned Haulroad
- Trail
- Road
- River / Stream

- Point of Interest
- Cemetery
- Entrance Point
- Viewpoint
- Vista

Trails

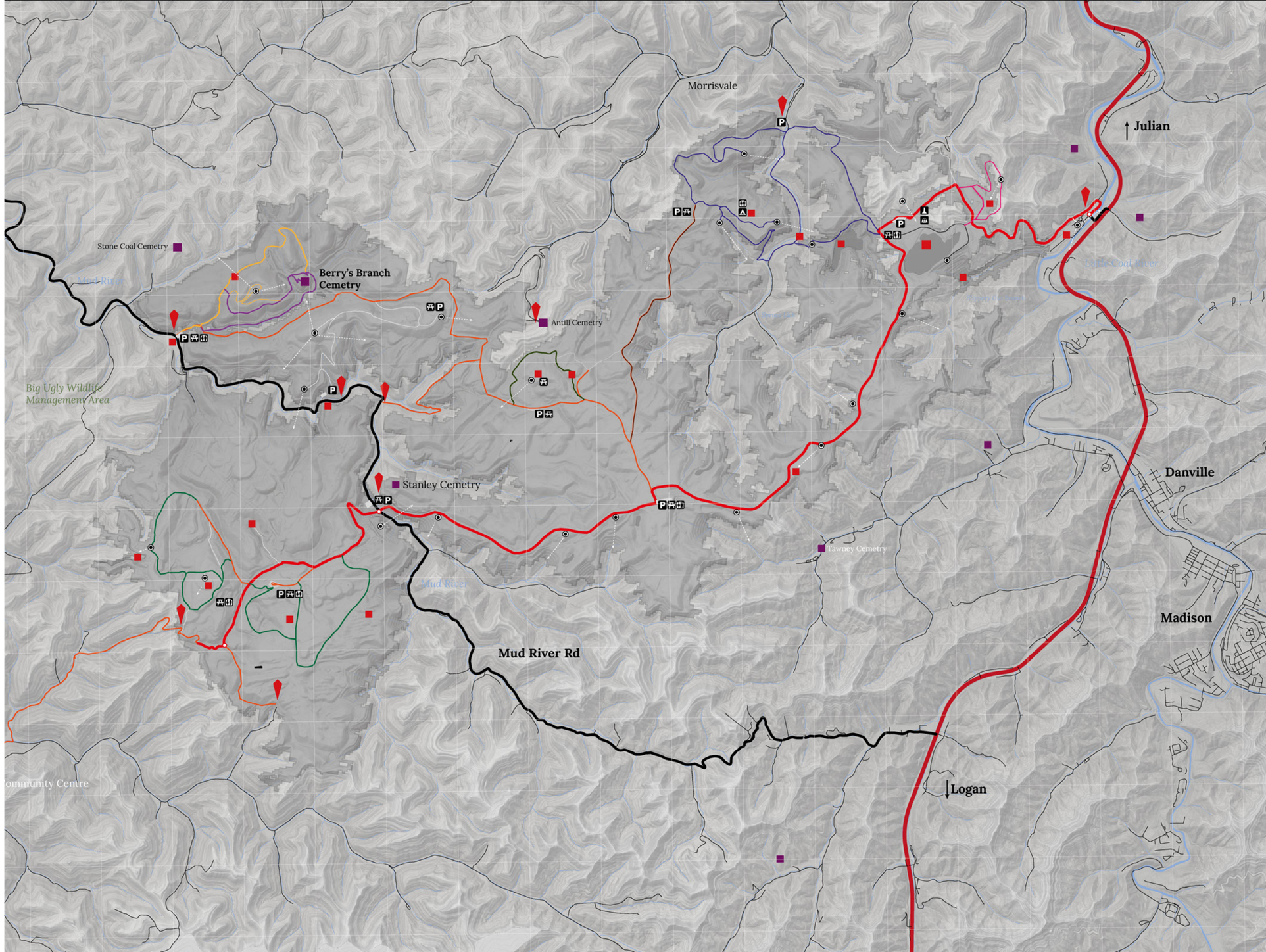
Accessibility

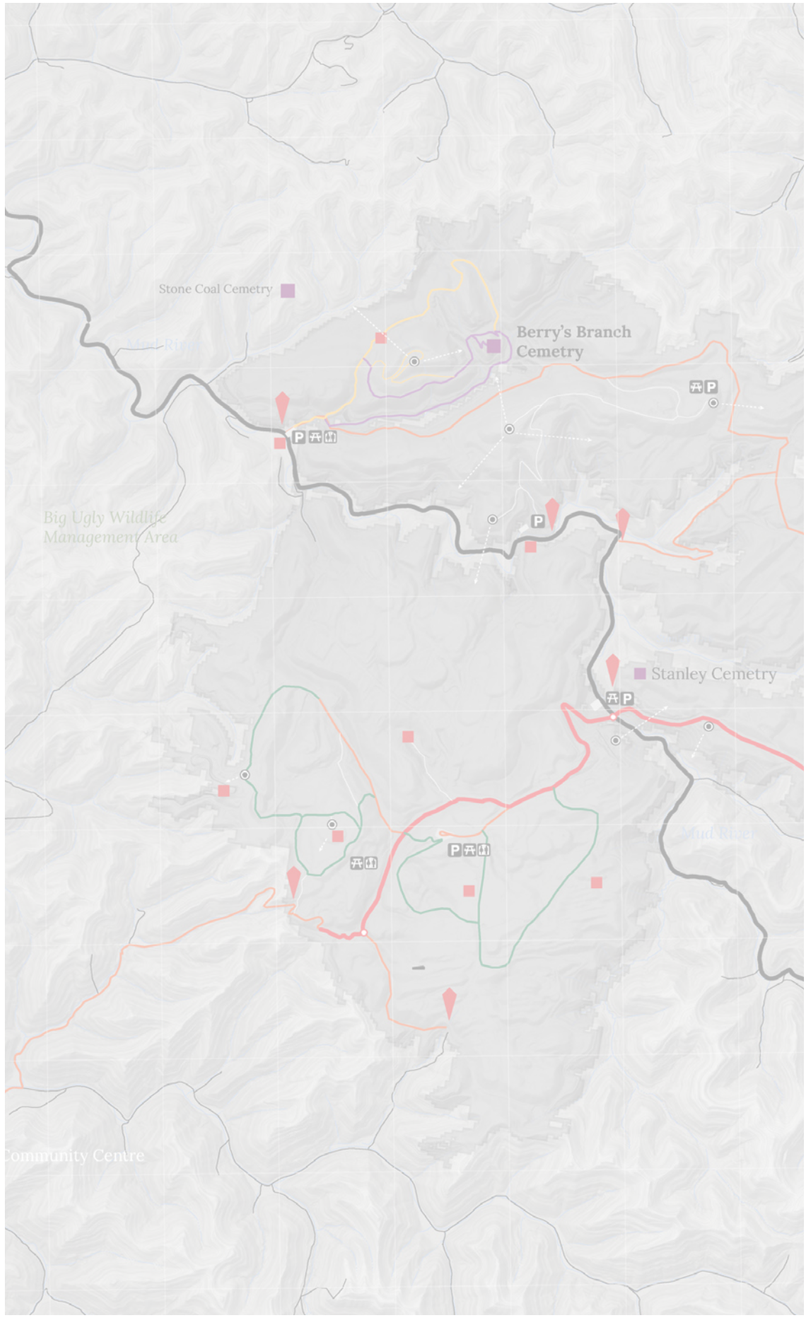
- Memorial
- Community Centre
- Parking / Trailhead
- Rest Area
- Comfort Area
- Campsite

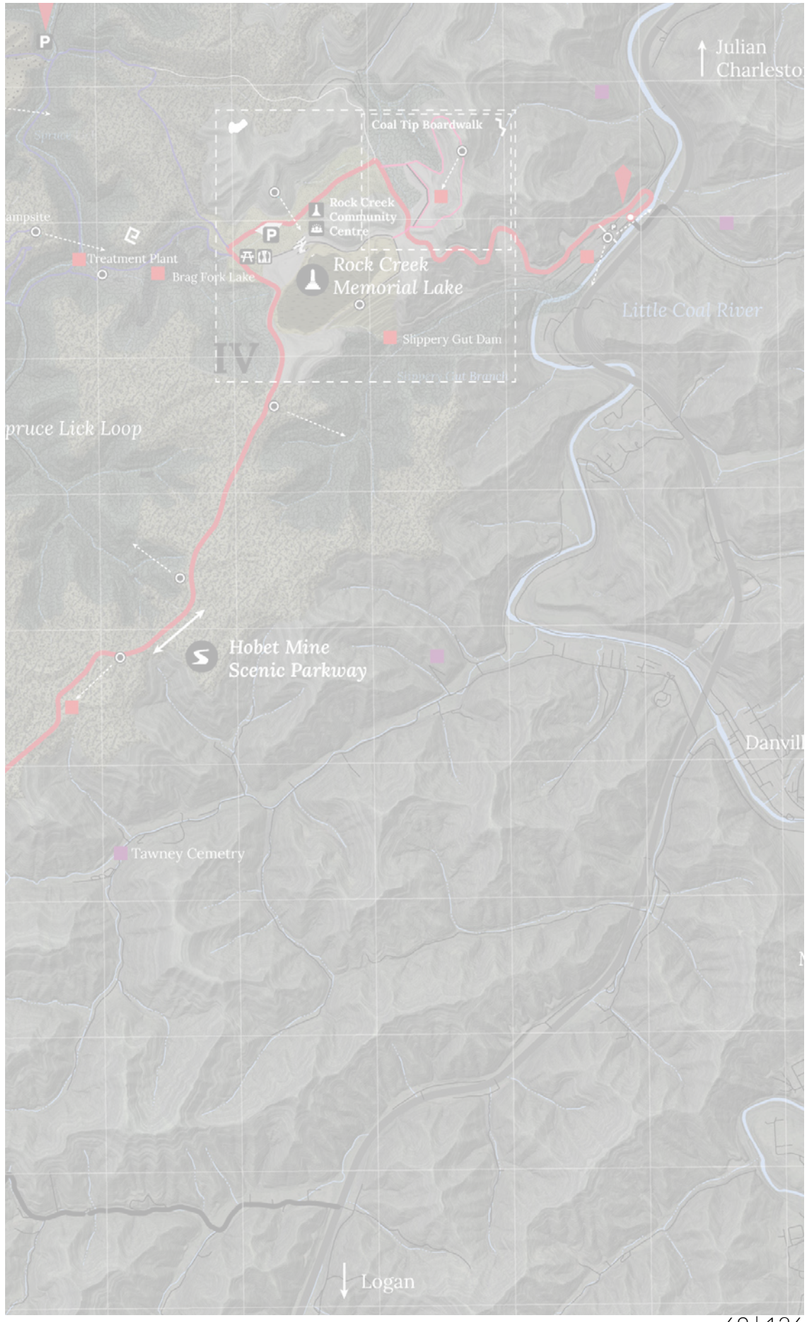
- Parkway
- Main Access Roads
- Serviced Haulroad
- Decommissioned Haulroad
- Trail
- Road
- River / Stream

- Invasive Species
- Water
- Erosion
- Cemetery
- Reforestation
- Polution
- Coal

- Point of Interest
- Cemetery
- Entrance Point
- Viewpoint
- Vista




Stone Coal Cemetry
Berry's Branch Cemetry
Big Ugly Wildlife Management Area
Stanley Cemetry
Community Centre


Julian
Charlesto
Coal Tip Boardwalk
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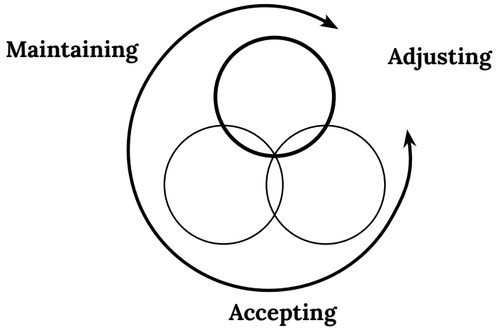
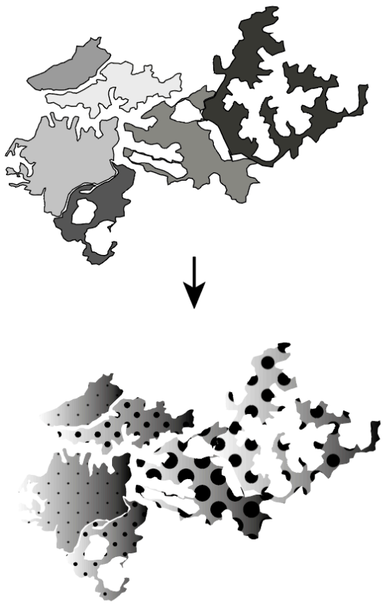
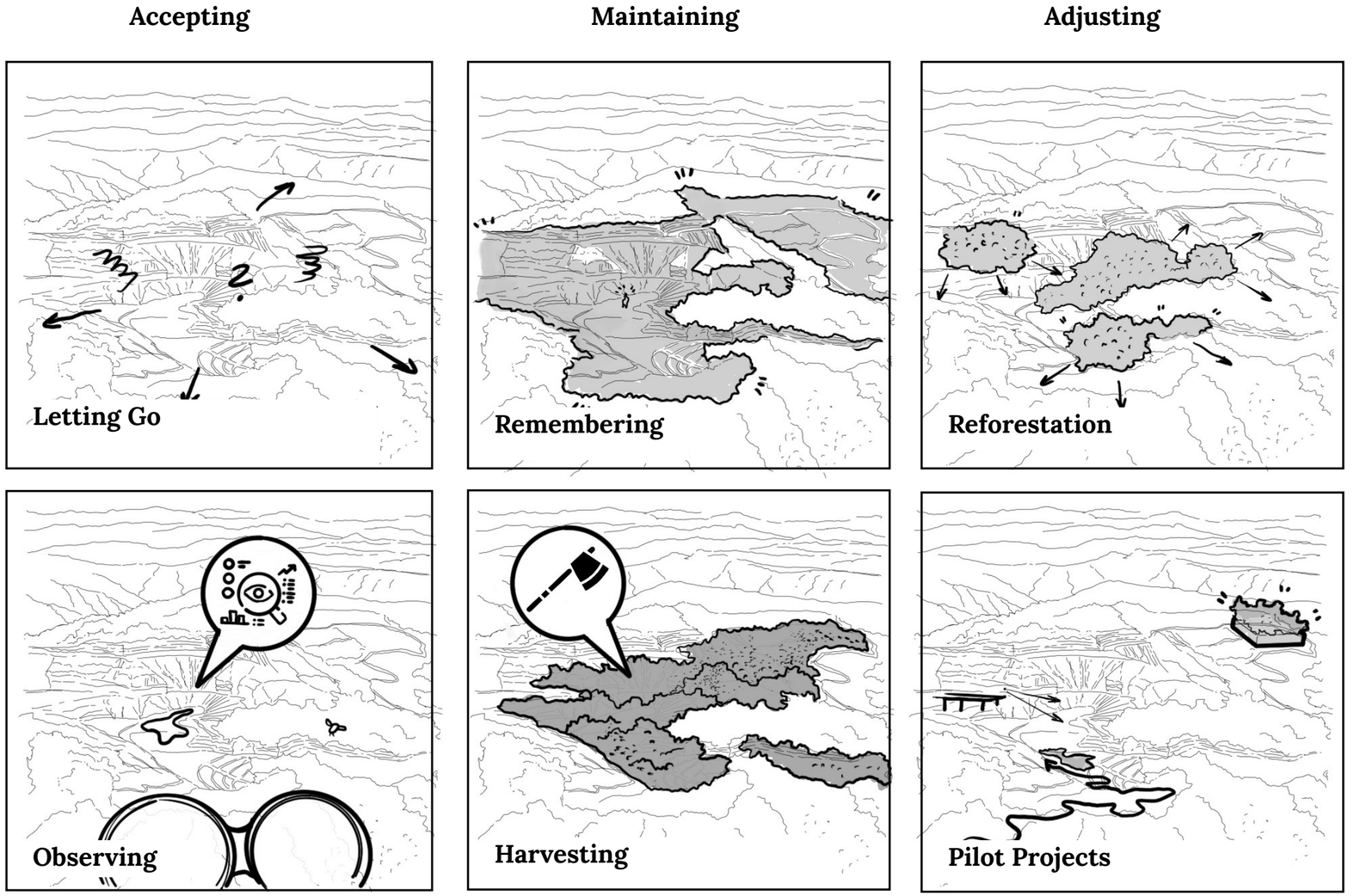
Brag Fork Lake
Rock Creek Memorial Lake
Little Coal River
Slippery Gut Dam
pruce Lick Loop
Hobet Mine Scenic Parkway
Tawney Cemetry
Logan

Strategy 2. Open-Ended





Design Principles for Adaptive Ecological Action



Educational oportunities

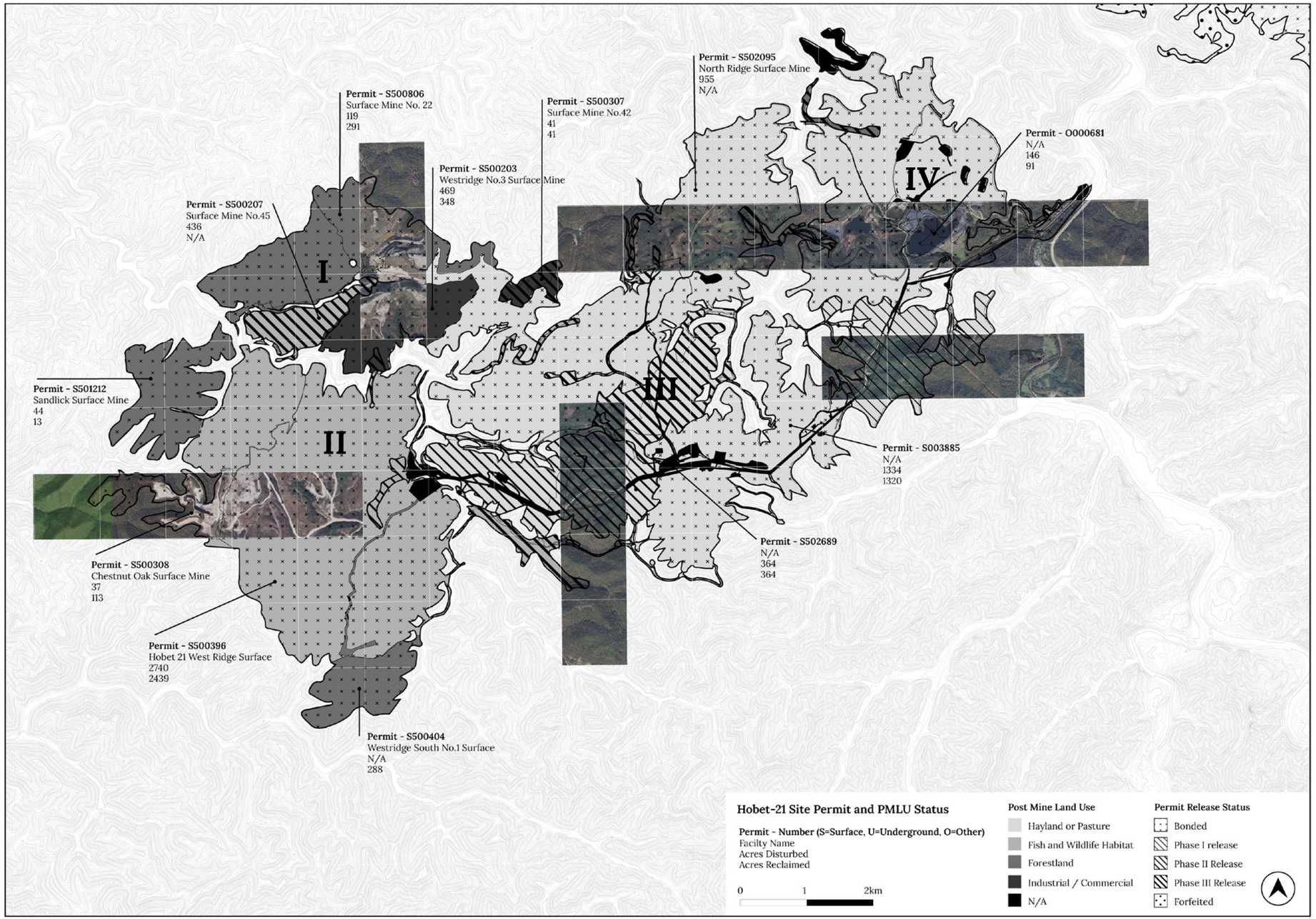
Decarceration

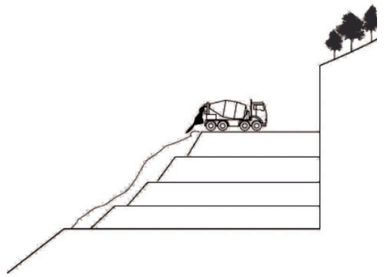
Community Involvement

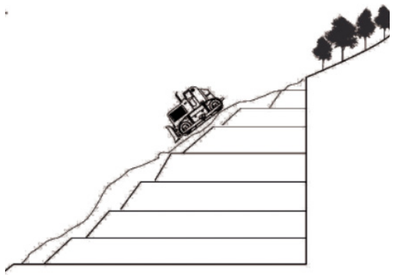
Drug Rehabilitation

Experimental Farming

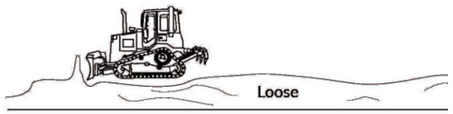
Target Groups







Compacted Spoils



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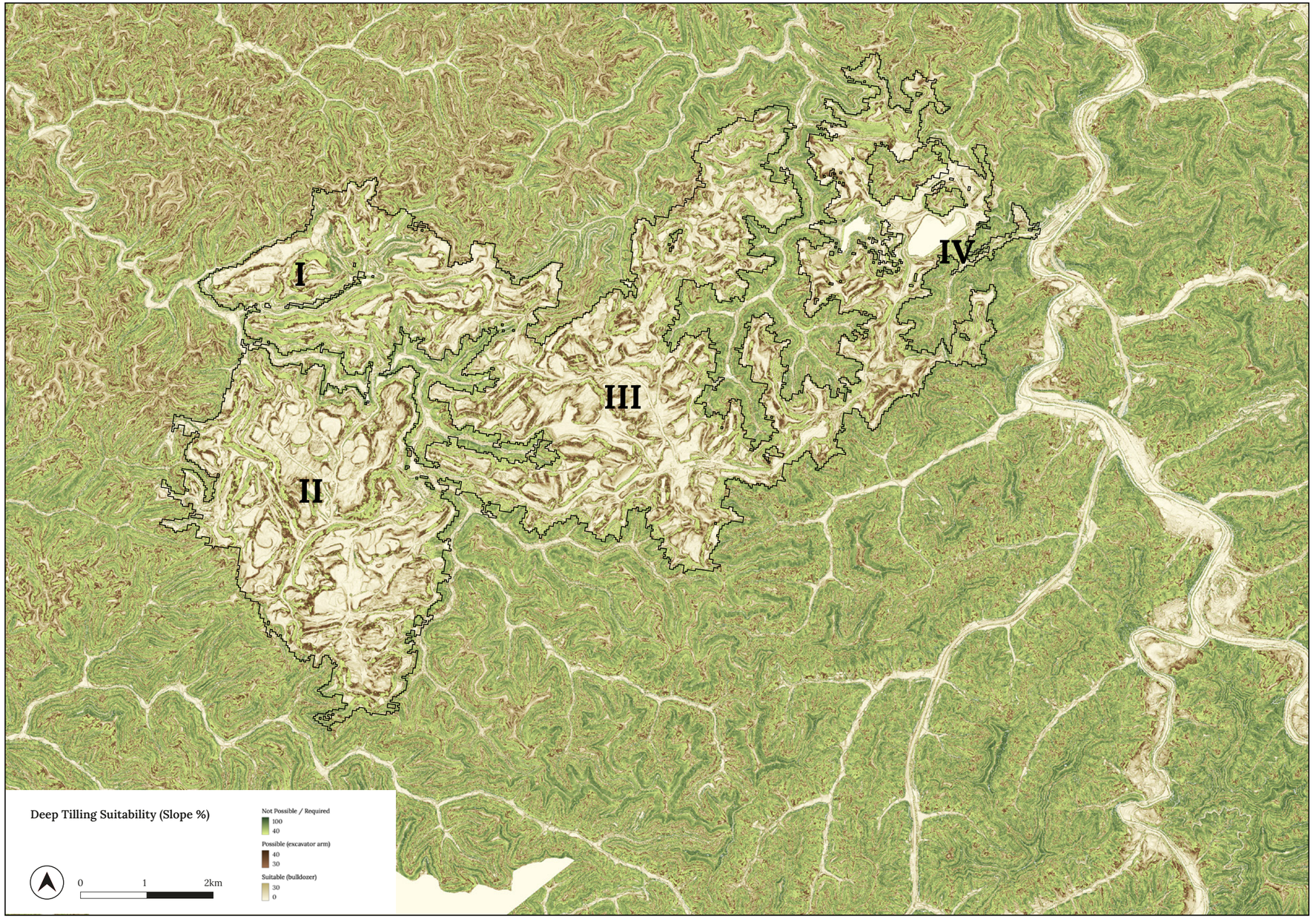
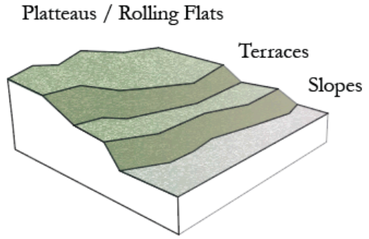
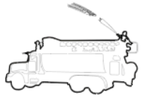


0-30%

30-40%

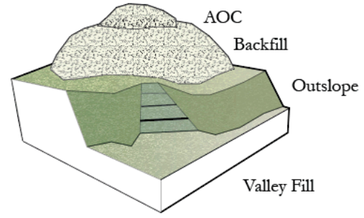


Platteaus

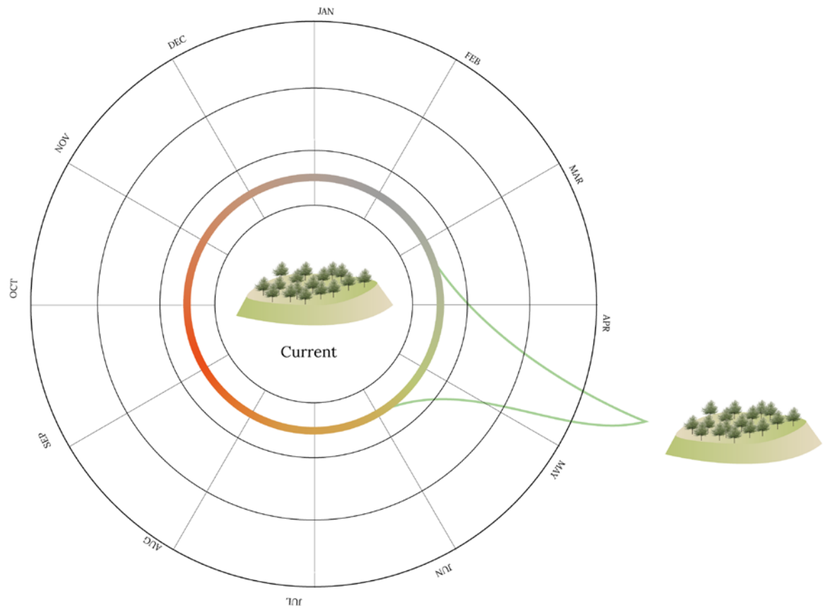


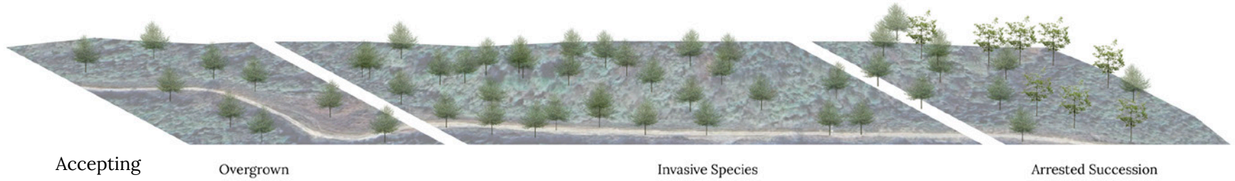
Hydroseeding

Manual



Steep Slopes





Accepting

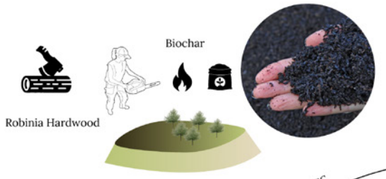
Overgrown

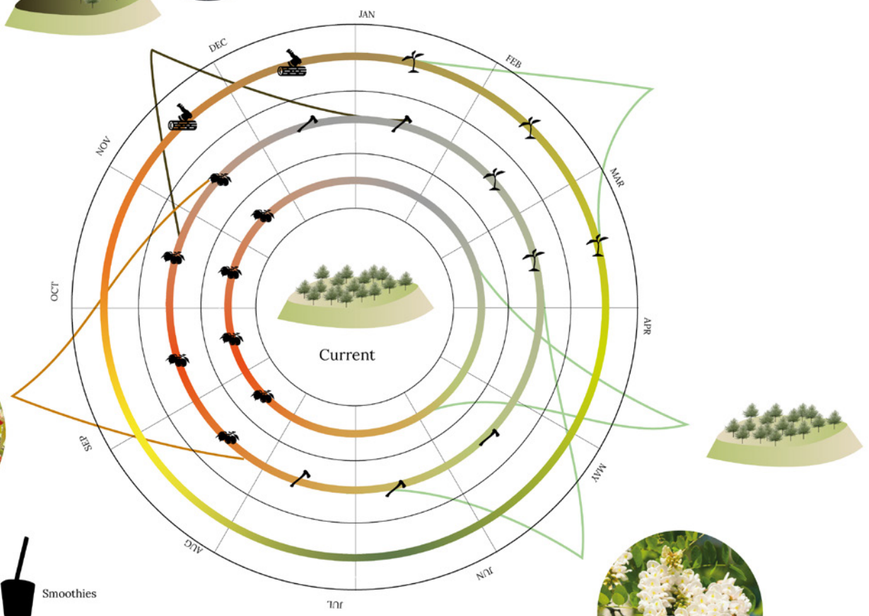
Invasive Species

Arrested Succession

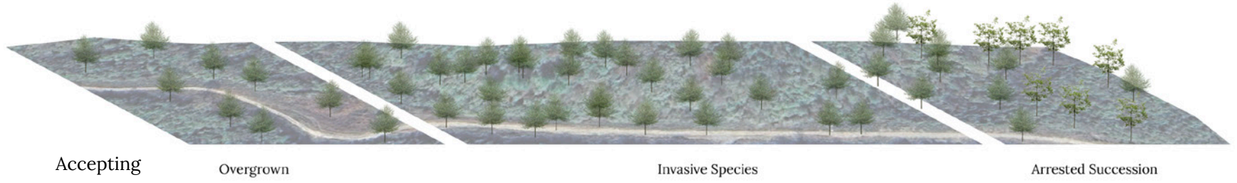
Proposed

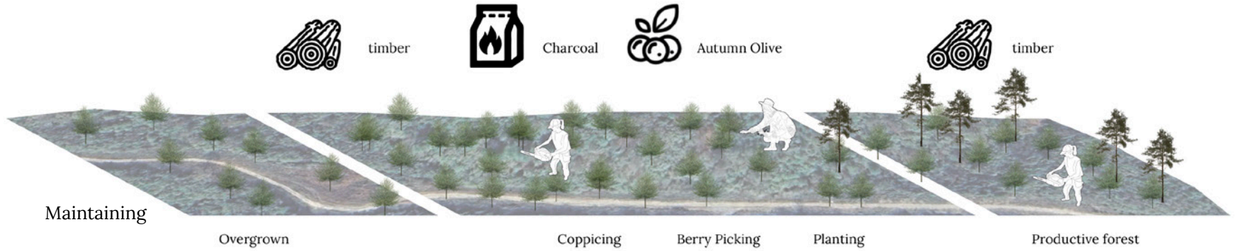
Accepting



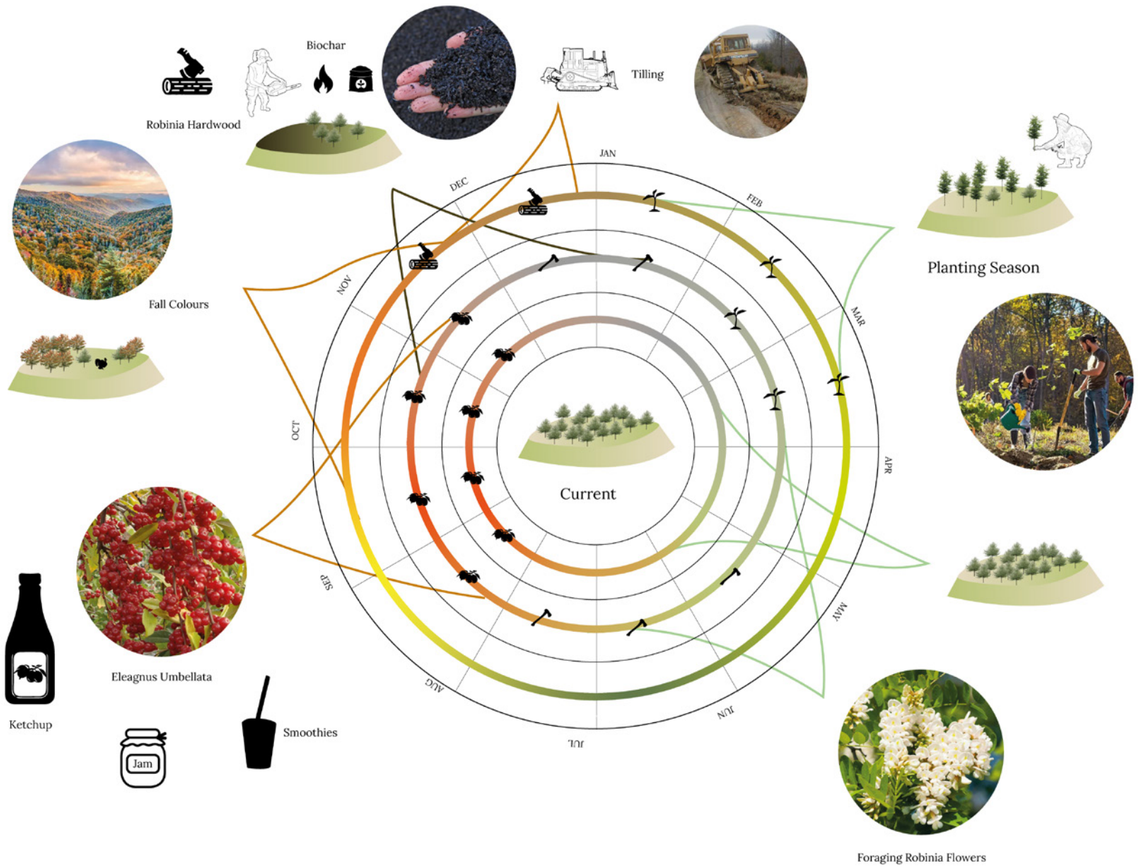


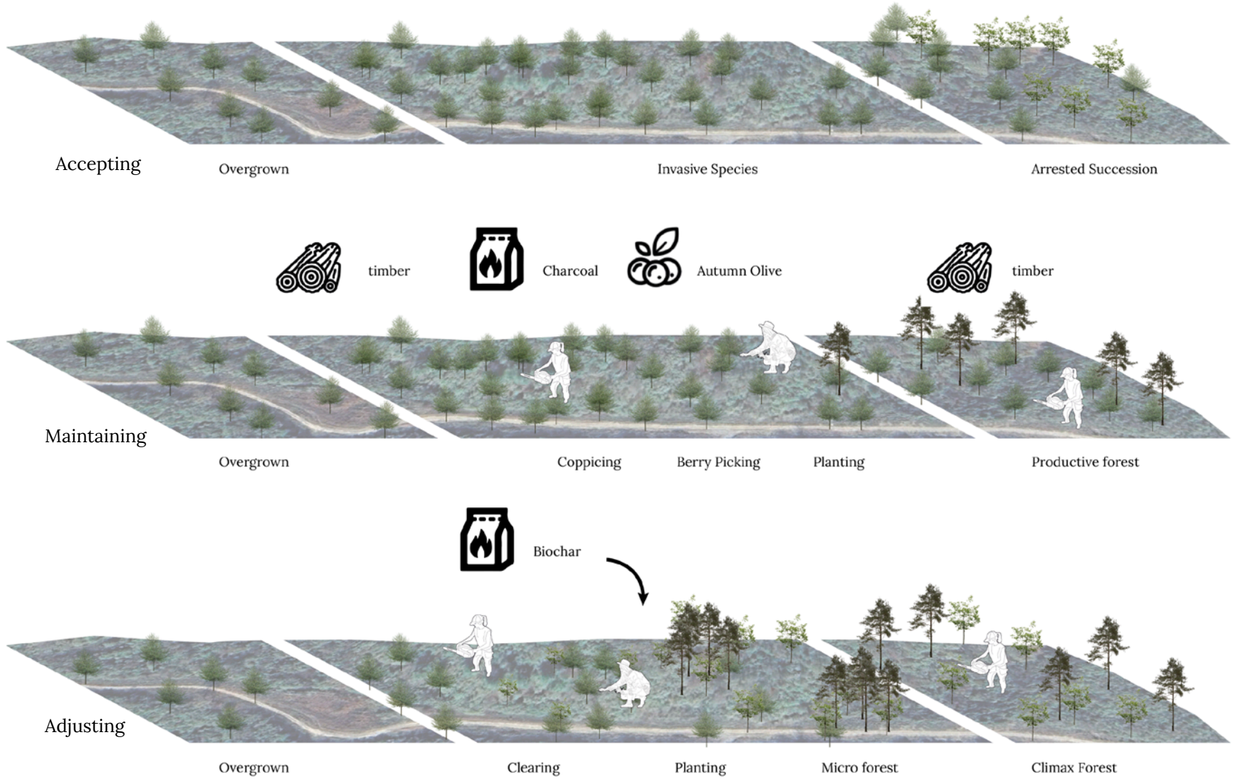

Foraging Robinia Flowers

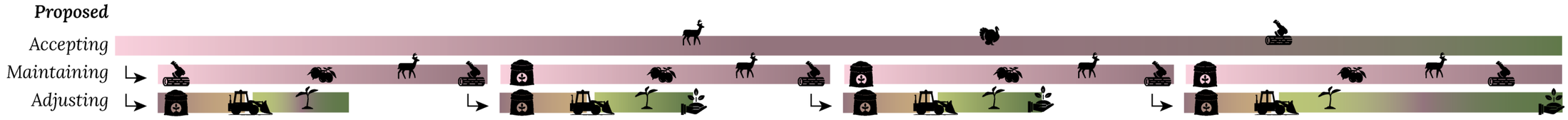


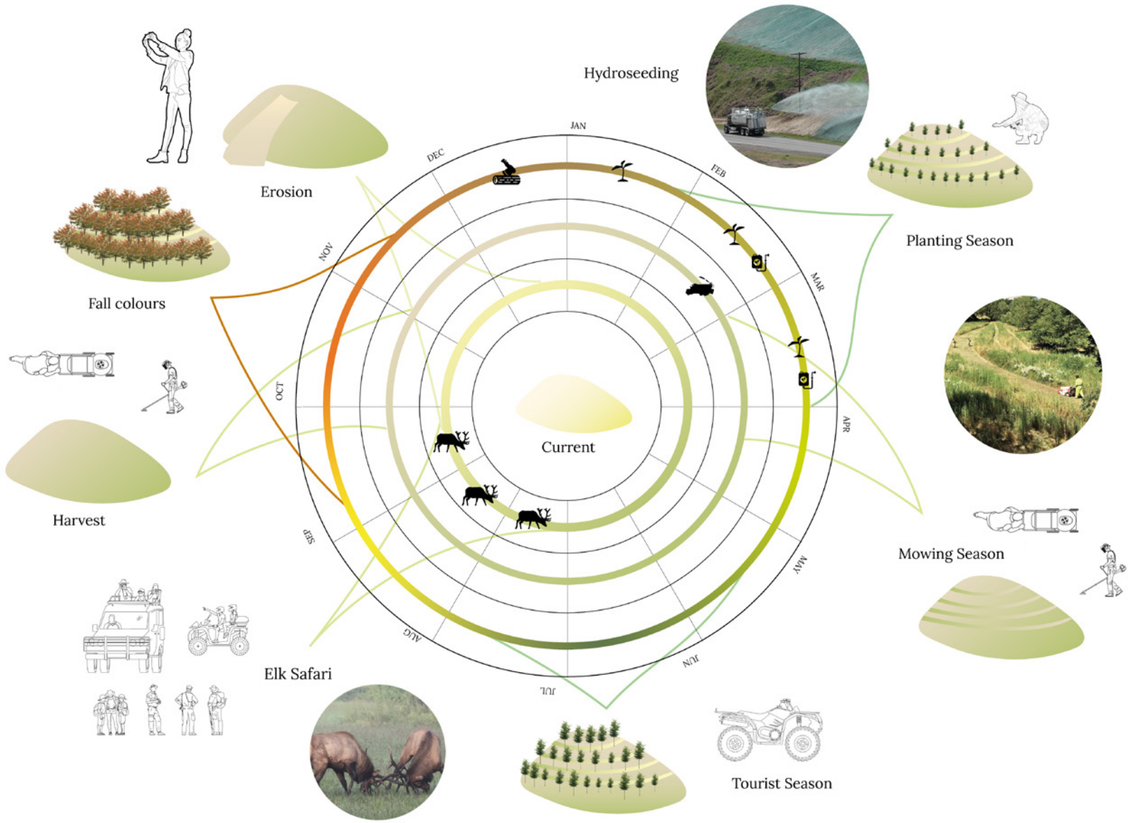


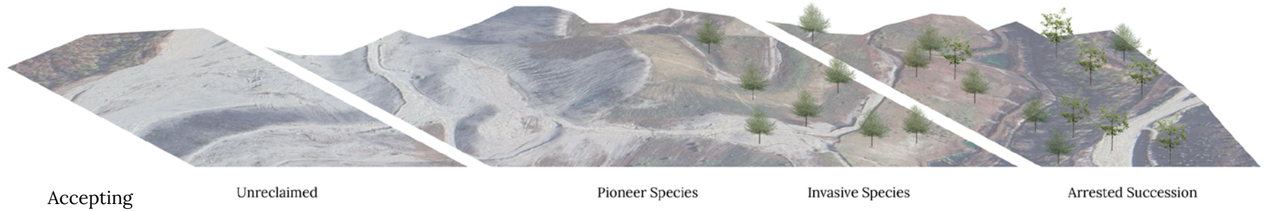
Proposed

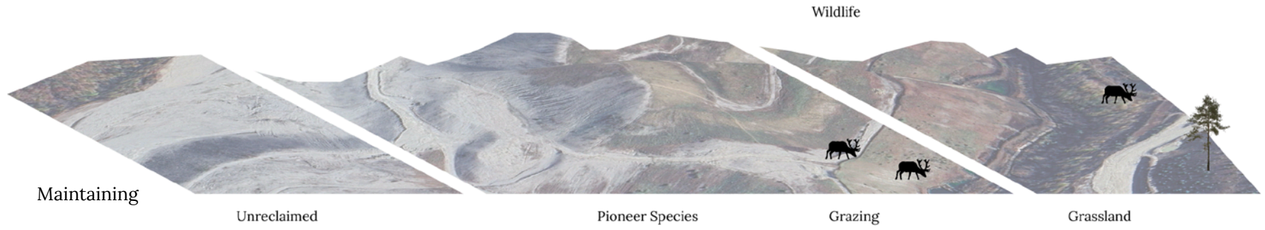

Biochar
Robinia Hardwood
Tilling
Fall Colours
Planting Season
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Current
Eleagnus Umbellata
Ketchup
Jam
Smoothies
Foraging Robinia Flowers

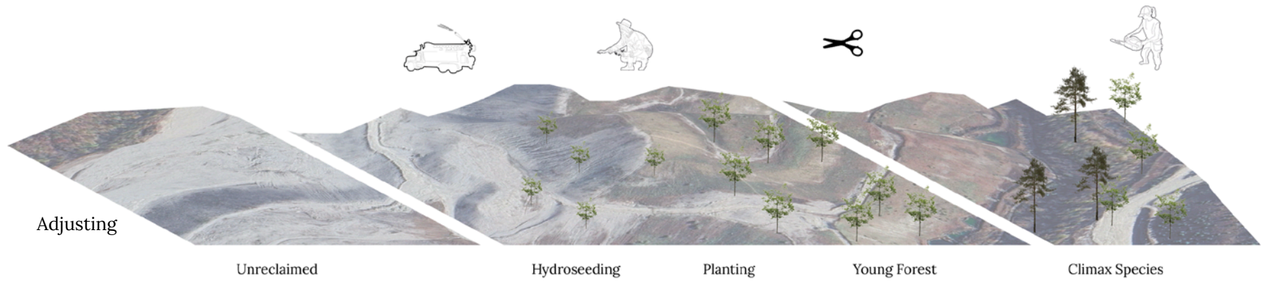

Accepting
Overgrown
Invasive Species
Arrested Succession
timber
Charcoal
Autumn Olive
timber
Maintaining
Overgrown
Coppicing
Berry Picking
Planting
Productive forest
Biochar
Adjusting
Overgrown
Clearing
Planting
Micro forest
Climax Forest

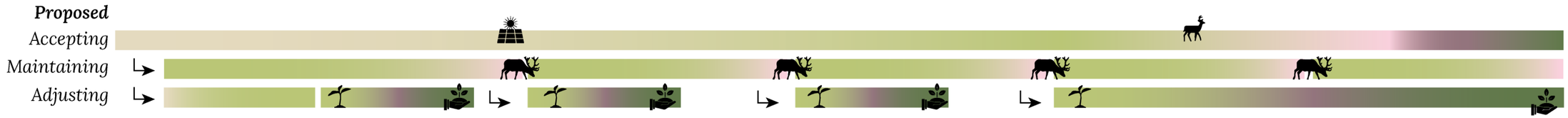

Proposed
Accepting
Maintaining
Adjusting

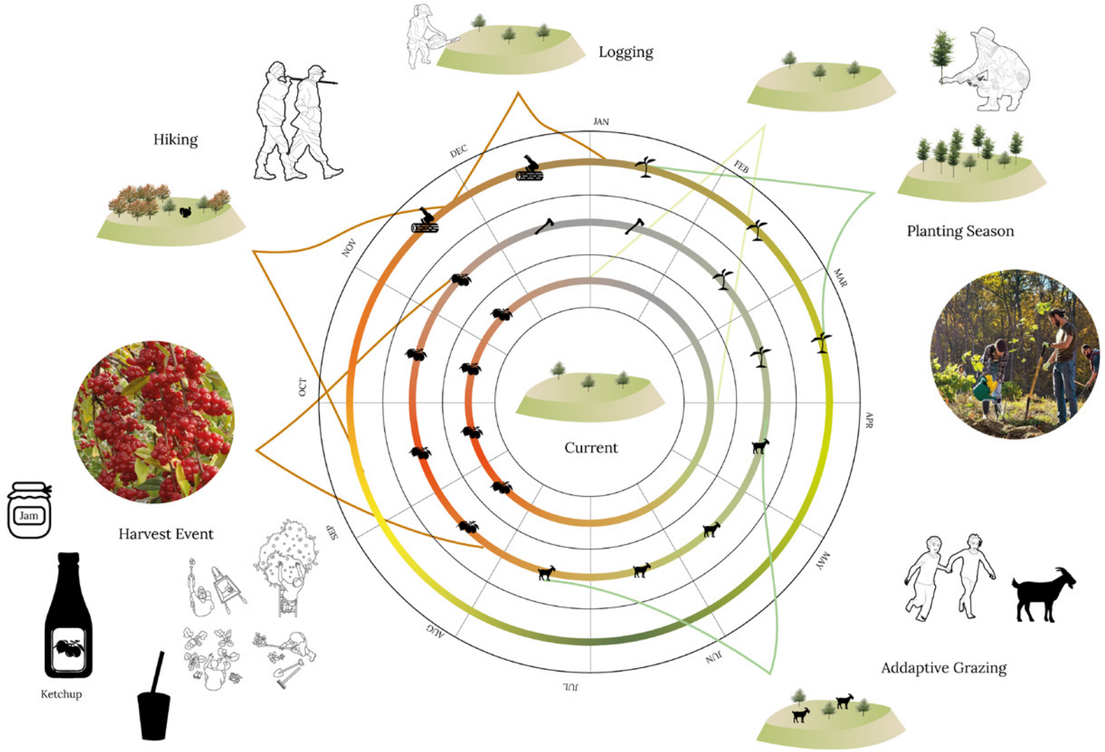

Hydroseeding
Erosion
Planting Season
Fall colours
Harvest
Mowing Season
Elk Safari
Tourist Season
Current
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC


Accepting
Unreclaimed
Pioneer Species
Invasive Species
Arrested Succession

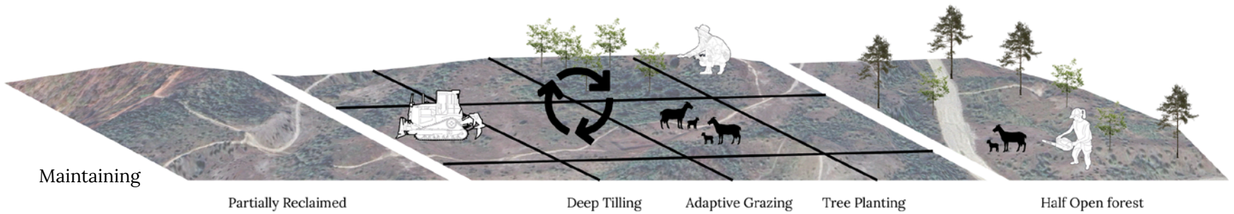

Wildlife
Maintaining
Unreclaimed
Pioneer Species
Grazing
Grassland

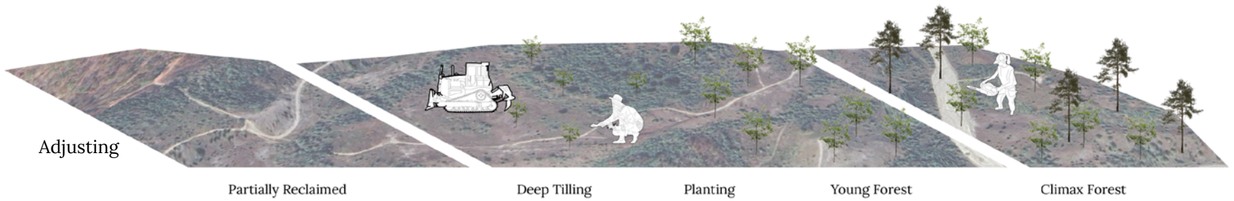

Adjusting
Unreclaimed
Hydroseeding
Planting
Young Forest
Climax Species

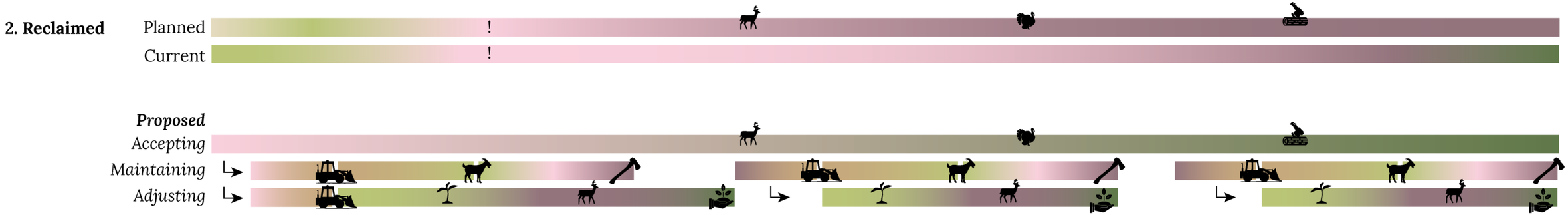

Proposed
Accepting
Maintaining
Adjusting

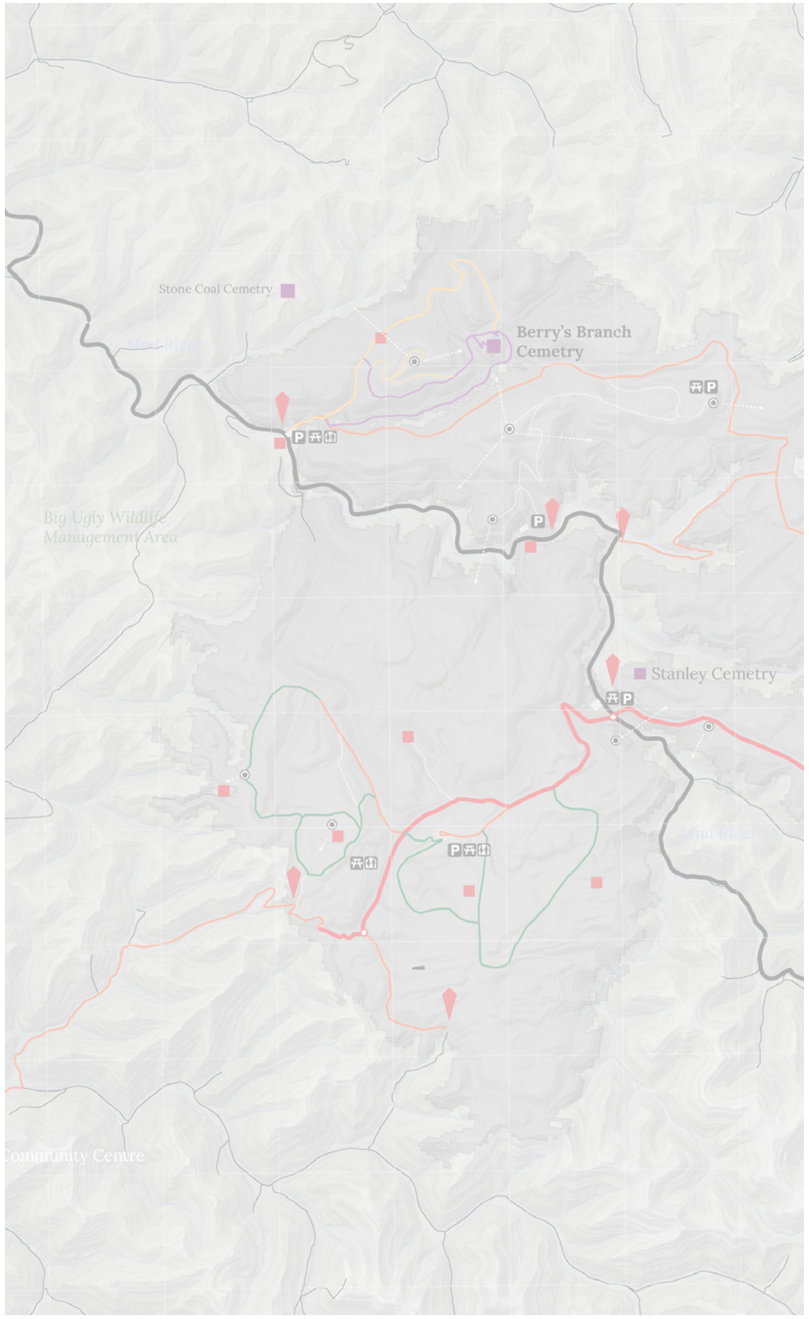

Logging
Hiking
Planting Season
Harvest Event
Current
Addaptive Grazing
Ketchup
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

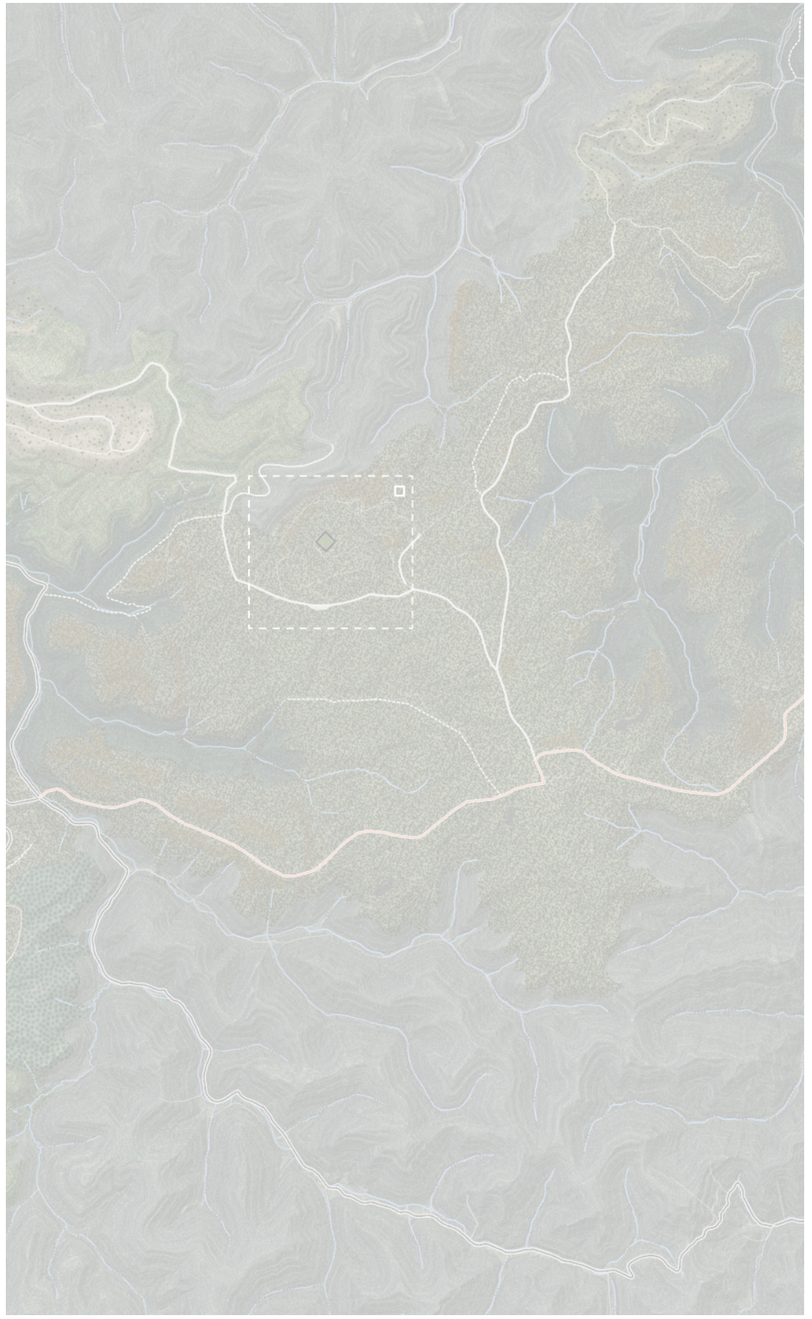

Accepting
Partially Reclaimed
Invasive Species
Arrested Succession

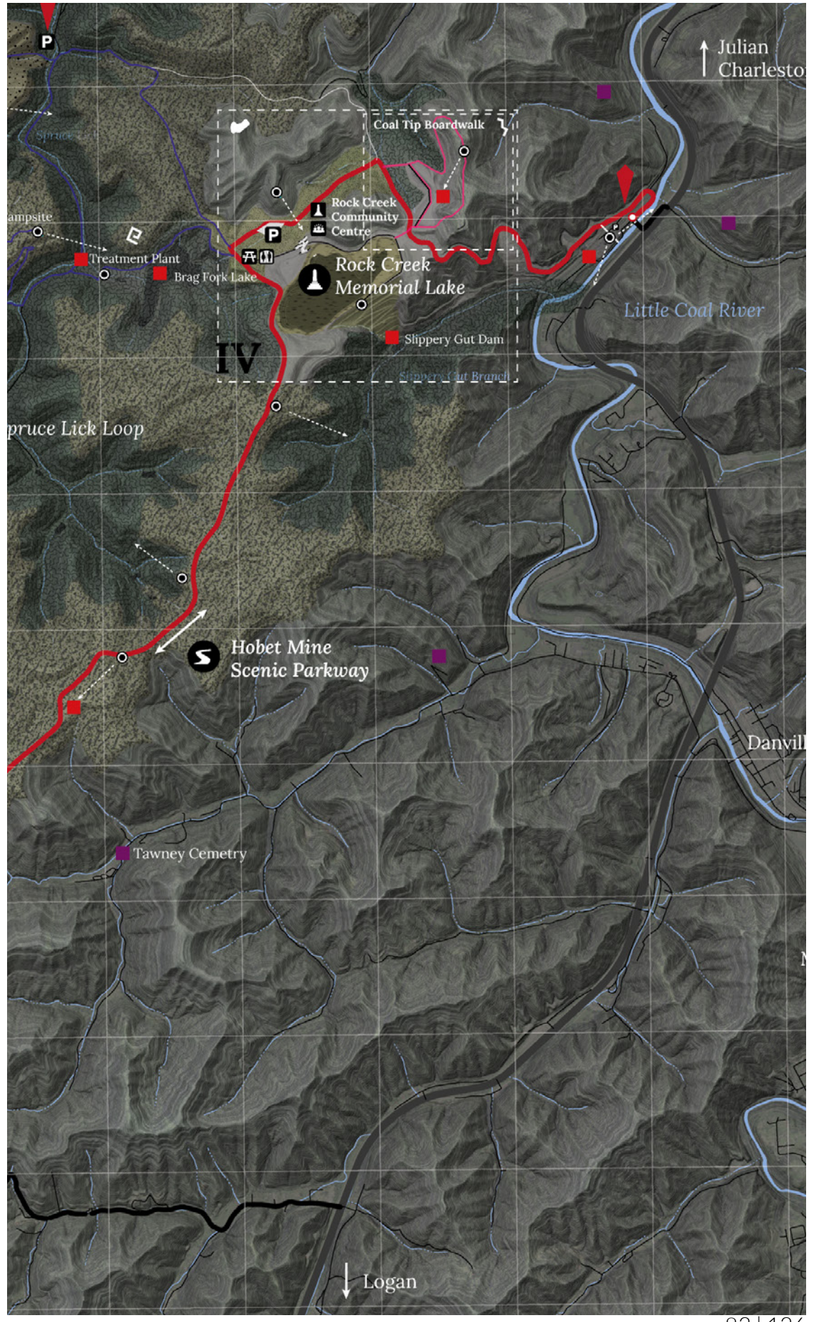

Maintaining
Partially Reclaimed
Deep Tilling
Adaptive Grazing
Tree Planting
Half Open forest


Adjusting
Partially Reclaimed
Deep Tilling
Planting
Young Forest
Climax Forest

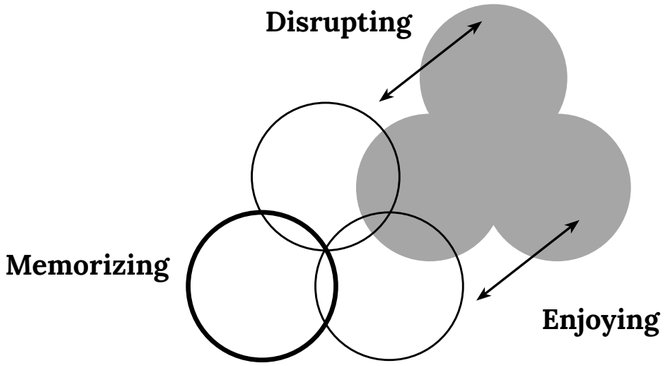

2. Reclaimed
Planned
Current
Proposed
Accepting
Maintaining
Adjusting

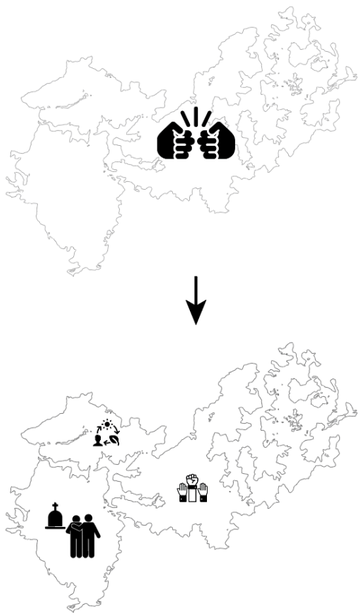

Stone Coal Cemetry
Berry's Branch Cemetry
Big Ugly Wildlife Management Area
Stanley Cemetry
Community Centre




Julian
Charlesto
Coal Tip Boardwalk
Rock Creek Community Centre
Treatment Plant
Brag Fork Lake
Rock Creek Memorial Lake
Little Coal River
Slippery Gut Dam
IV
pruce Lick Loop
Hobet Mine Scenic Parkway
Danvil
Tawney Cemetry
Logan

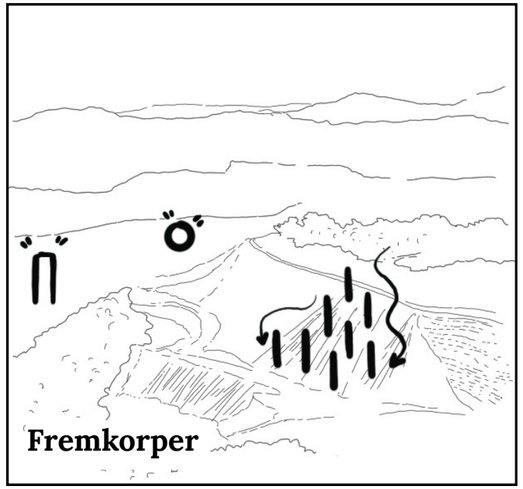
Strategy 3. Open-Minded

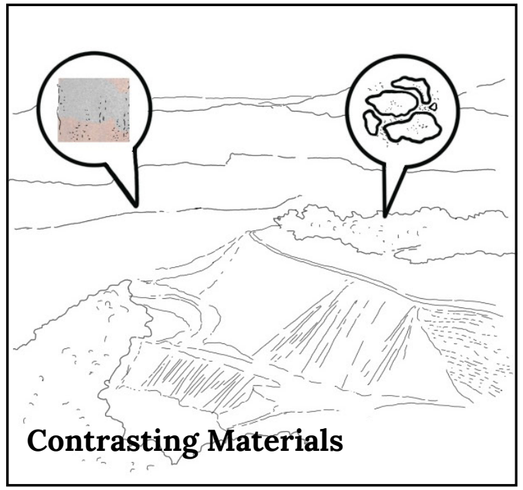




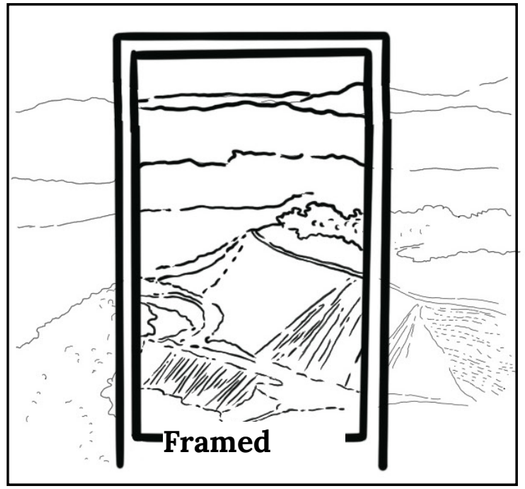
Design Principles for a New Appreciation of the Mined Landscape

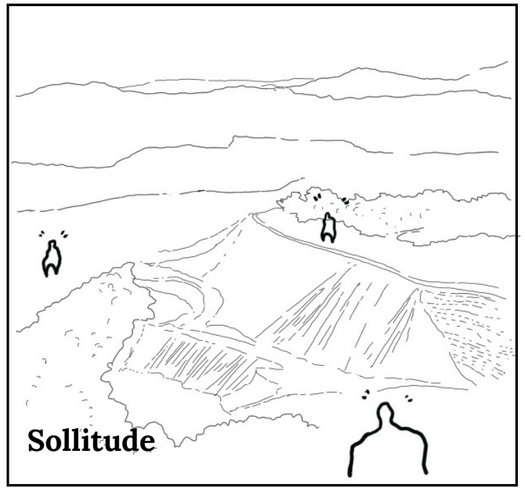
Disrupting



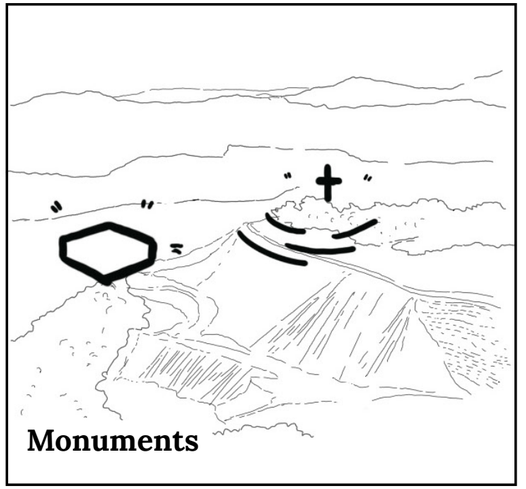


Enjoying





Memorizing



Collective Memory

Mourning

Community Outreach

Awareness

Soothing

Target Groups


Julian
Charleston
Coal Tip Boardwalk
Rock Creek
Community
Centre
Rock Creek
Memorial Lake
Slippery Gut Dam
Slippery Gut Branch
Little Coal River
Campsite
Treatment Plant
Brag Fork Lake
Spruce Lick Loop
IV
Stone Coal Cemetery
Snag Slope
Berry's Branch
Cemetery
Mud River
Berry's Branch
Hill
I
Treatment Plant
Spurlockville Hills
Big Ugly Wildlife
Management Area
Highwall
Antill Cemetery
Native Garden
III
Stanley Fork Forest
Hobet Mine
Scenic Parkway
Big Ugly Wildlands
Stanley Cemetery
Danville
Tawney Cemetry
II
Wildness Grove
Highwall
Clearcut
Reclaimed Forest
Mud River
Madison
Hobet Heights
Hobet Mine
Scenic Parkway
Mud River Road
Big Ugly Community Centre
Logan
500m
10^2
metres


Julian
Charleston
Coal Tip Boardwalk
Rock Creek
Community
Centre
Rock Creek
Memorial Lake
Slippery Gut Dam
Little Coal River
Campsite
Treatment Plant
Brag Fork Lake
Spruce Lick Loop
Snag Slope
Stone Coal Cemetery
Mud River
Berry's Branch
Hill
Berry's Branch
Cemetery
I
Treatment Plant
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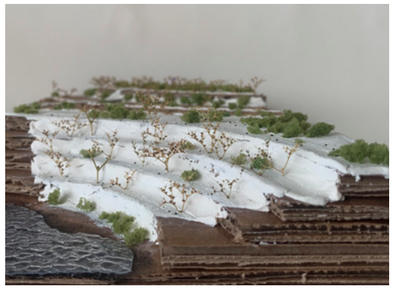
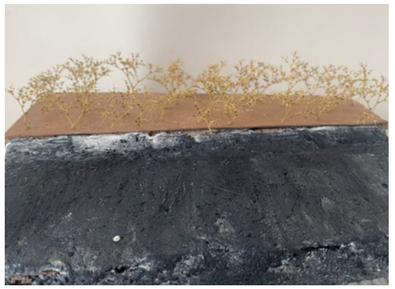
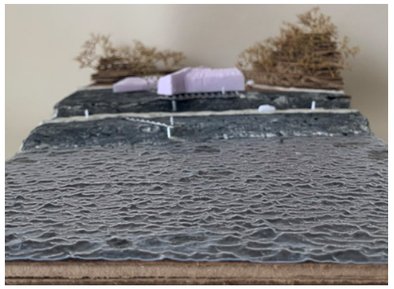
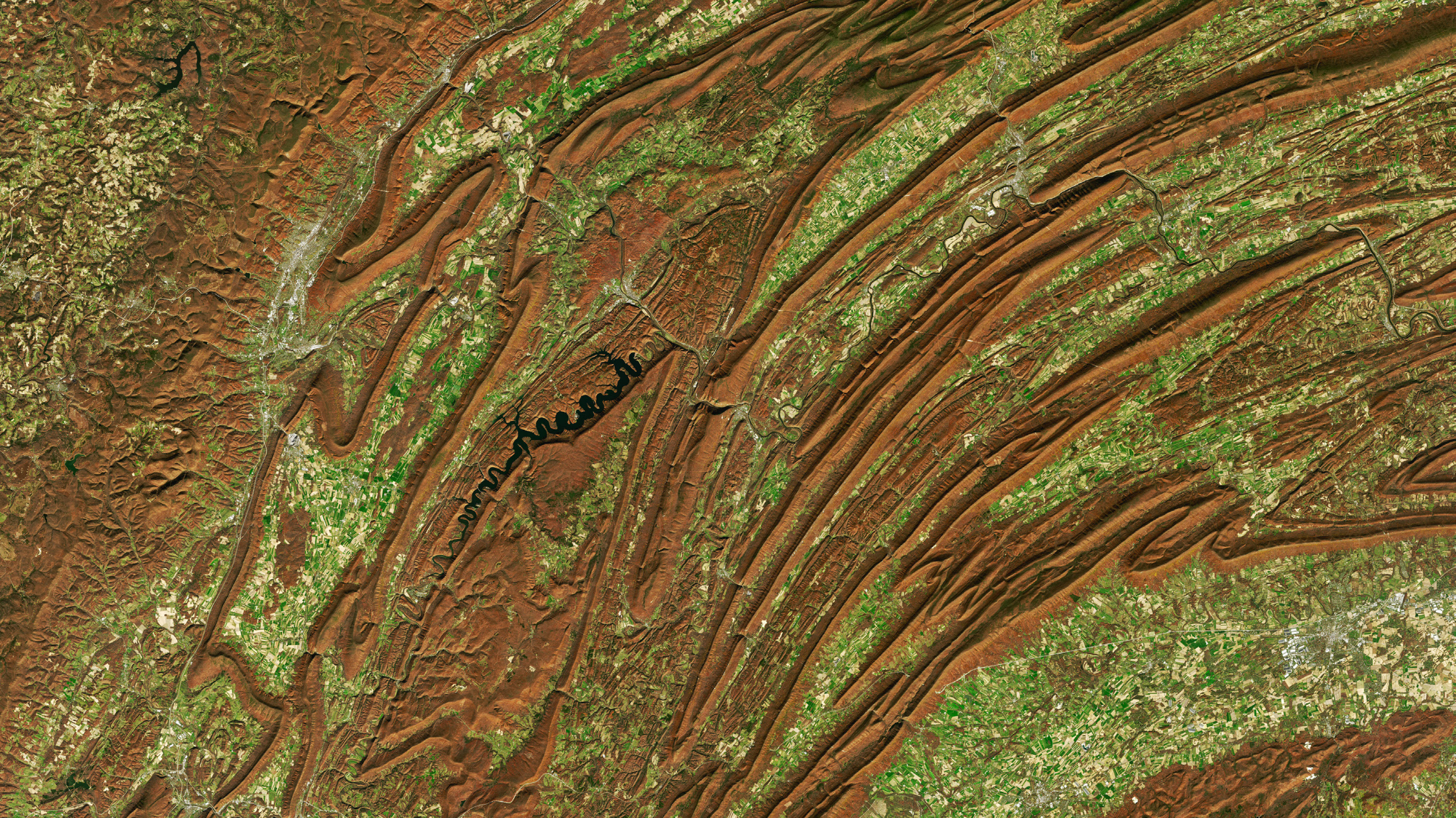
Stanley Cemetery
Danville
Wildness Grove
Highwall
II
Tawney Cemetry
Mud River
Madison
Clearcut
Reclaimed Forest
Hobet Heights
Hobet Mine
Scenic Parkway
Mud River Road
Big Ugly Community Centre
Logan
500m
10^2
metres

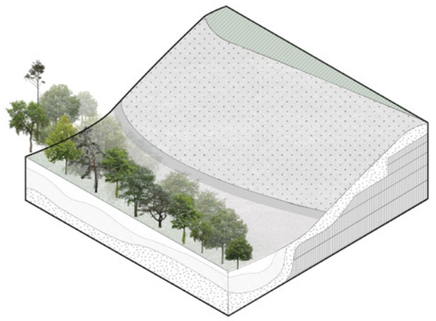


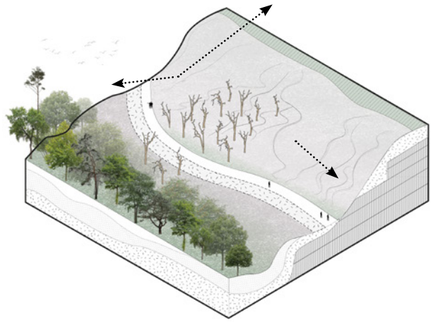


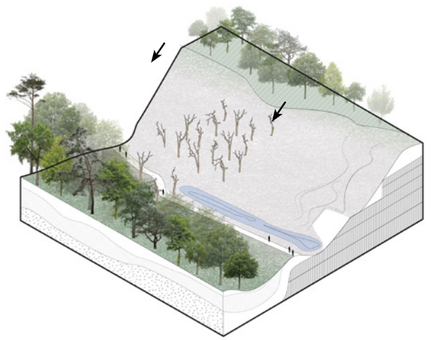





Pilot Project 1. Eroding Slope
Observing







III Unmined forest

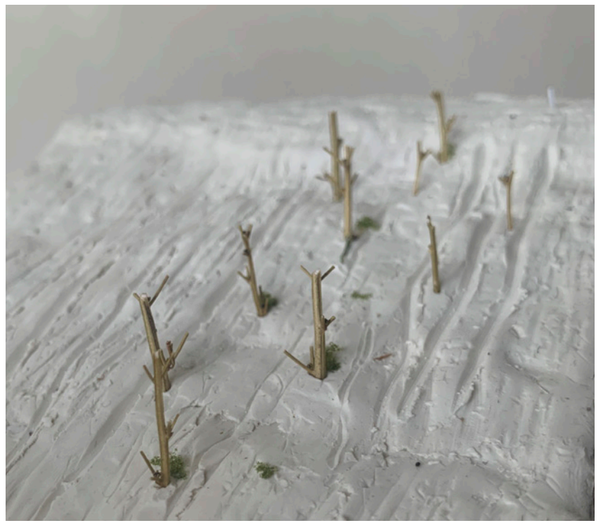
II Path

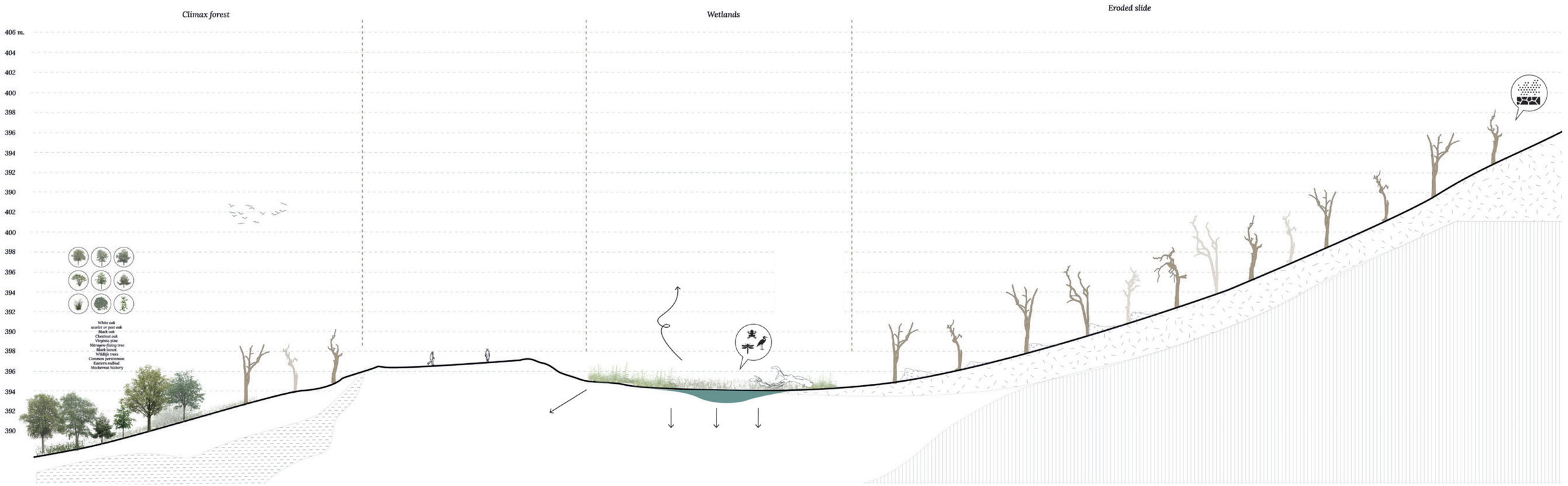
I Snag Hill

V Viewpoint

IV Hydroseeded Slope

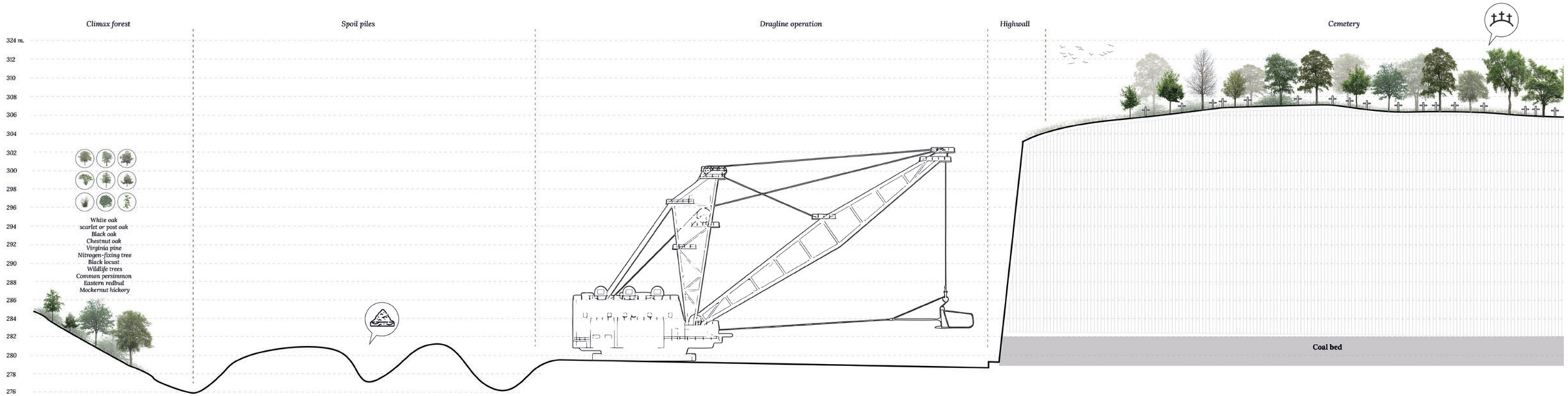
0 50 200m

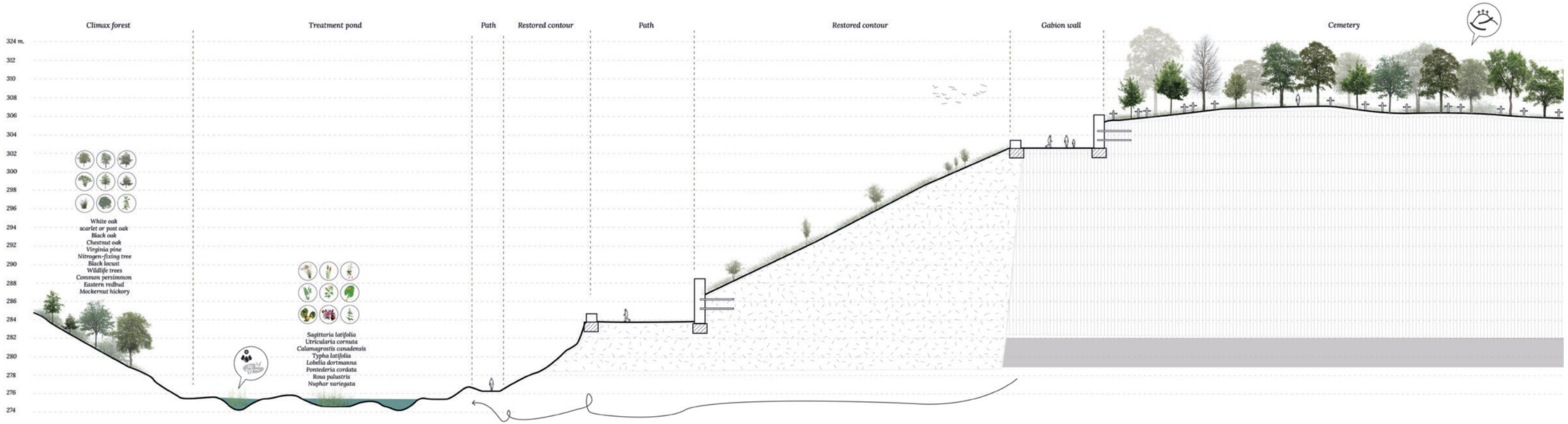



Climax forest
Wetlands
Eroded slide
406 m.
404
402
400
398
396
394
392
390
402
400
398
396
394
392
390
398
396
394
392
390
White oak
scarlet or post oak
Black oak
Chestnut oak
Virginia pine
Nitrogen-fixing tree
Black locust
Wildlife trees
Common persimmon
Eastern redbud
Mockernut hickory

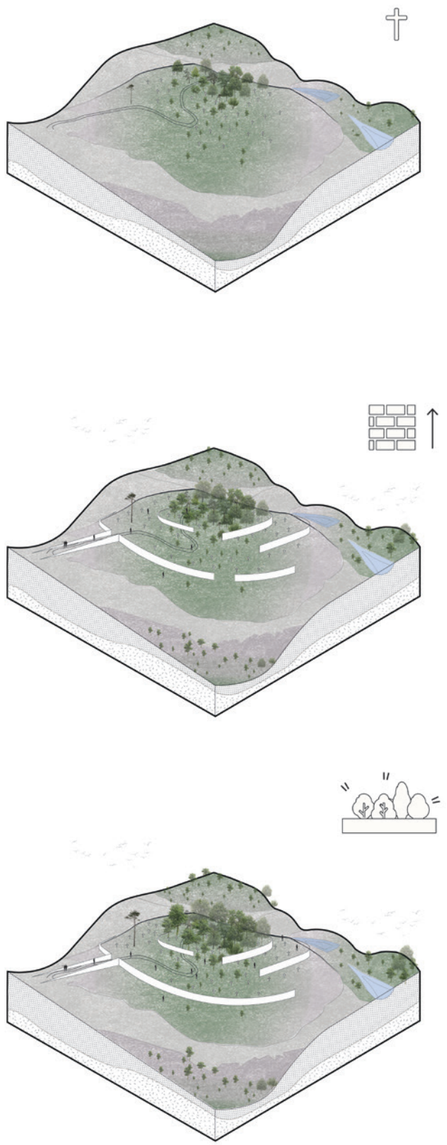

Julian
Charleston
Coal Tip Boardwalk
Rock Creek
Community
Centre
Rock Creek
Memorial Lake
Slippery Gut Dam
Campsite
Treatment Plant
Brag Fork Lake
Spruce Lick Loop
Little Coal River
Snag Slope
Stone Coal Cemetery
Mud River
Berry's Branch
Hill
Berry's Branch
Cemetery
I
Treatment Plant
Spurlockville Hills
Antill Cemetery
Native Garden
Big Ugly Wildlife
Management Area
Highwall
III
Stanley Fork Forest
Hobet Mine
Scenic Parkway
Big Ugly Wildlands
Stanley Cemetery
Danville
Wildness Grove
Highwall
II
Tawney Cemetry
Mud River
Clearcut
Reclaimed Forest
Madison
Hobet Heights
Hobet Mine
Scenic Parkway
Mud River Road
Big Ugly Community Centre
Logan
500m
10^2
metres


flickr: Biotour13


Climax forest
Spoil piles
Dragline operation
Highwall
Cemetery
324 m.
312
310
308
306
304
302
300
298
296
294
292
290
288
286
284
282
280
278
276
White oak
scarlet or post oak
Black oak
Chestnut oak
Virginia pine
Nitrogen-fixing tree
Black locust
Wildlife trees
Common persimmon
Eastern redbud
Mockernut hickory
Coal bed


Climax forest
Treatment pond
Path
Restored contour
Path
Restored contour
Gabion wall
Cemetery
324 m.
312
310
308
306
304
302
300
298
296
294
292
290
288
286
284
282
280
278
276
274
White oak
scarlet or post oak
Black oak
Chestnut oak
Virginia pine
Nitrogen-fixing tree
Black locust
Wildlife trees
Common persimmon
Eastern redbud
Mockernut hickory
Sagittaria latifolia
Utricularia cornuta
Calamagrostis canadensis
Typha latifolia
Lobelia dortmanna
Pontederia cordata
Rosa palustris
Nuphar variegata

Pilot Project 2. Berry's Branch Cemetery
Monument



II New Formal Entrance

III Gabion Walls

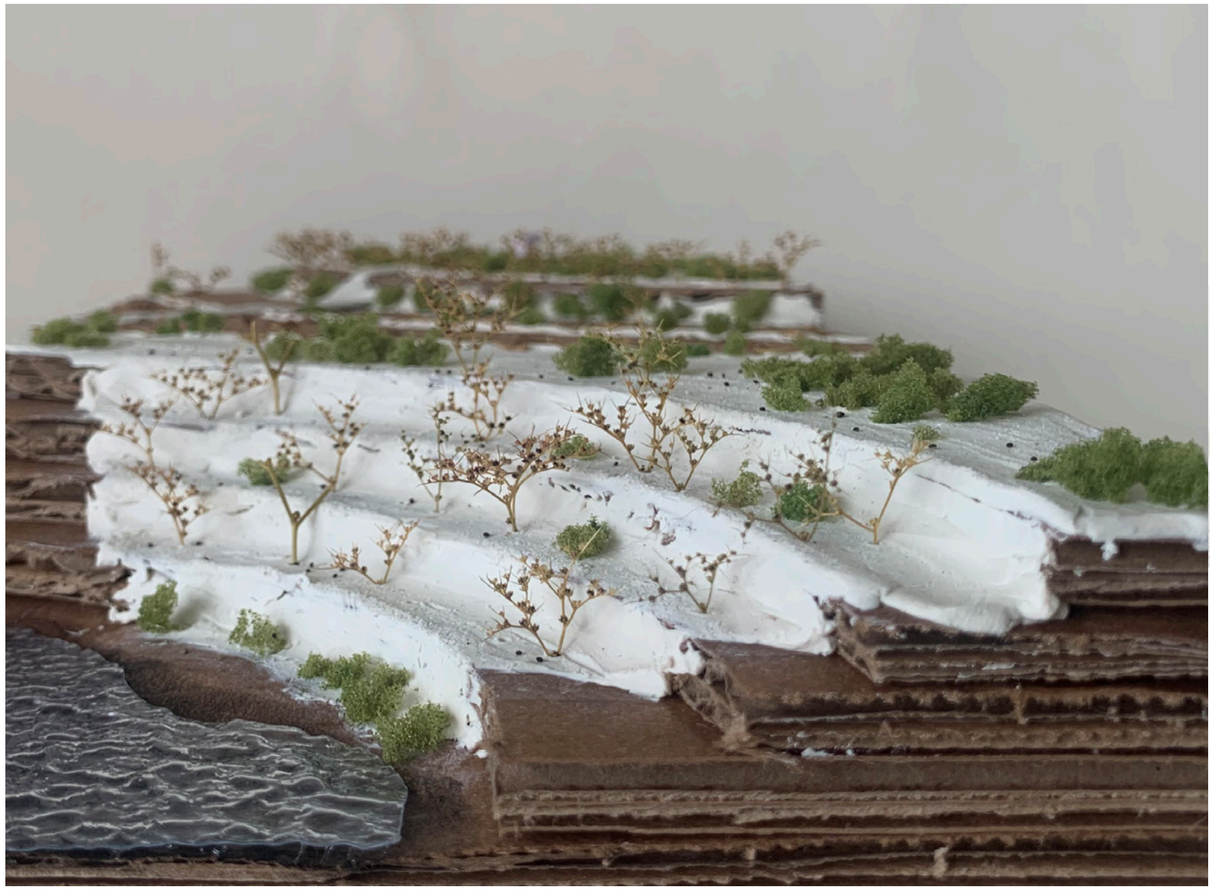
I Berry's Branch Cemetery

IV Approach and View

V Water Treatment System

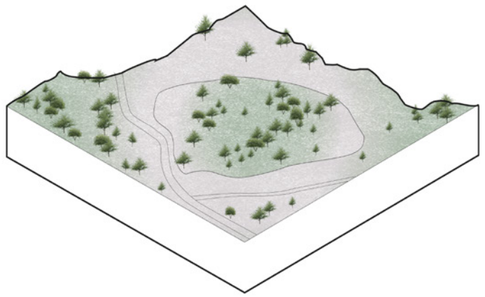
0 25 100m

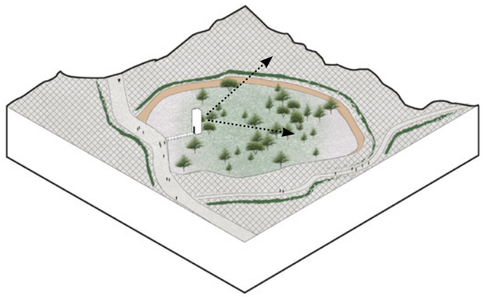

Julian
Charleston
Coal Tip Boardwalk
Rock Creek
Community
Centre
Rock Creek
Memorial Lake
Slippery Gut Dam
Campsite
Treatment Plant
Brag Fork Lake
Little Coal River
Snag Slope
Stone Coal Cemetery
Mud River
Berry's Branch
Hill
Berry's Branch
Cemetery
I
Treatment Plant
Spurlockville Hills
Antill Cemetery
Native Garden
Spruce Lick Loop
Big Ugly Wildlife
Management Area
Highwall
III
Stanley Fork Forest
Hobet Mine
Scenic Parkway
Big Ugly Wildlands
Stanley Cemetery
Danville
II
Wildness Grove
Highwall
Tawney Cemetry
Mud River
Madison
Clearcut
Reclaimed Forest
Hobet Heights
Hobet Mine
Scenic Parkway
Mud River Road
Big Ugly Community Centre
Logan
500m
metres

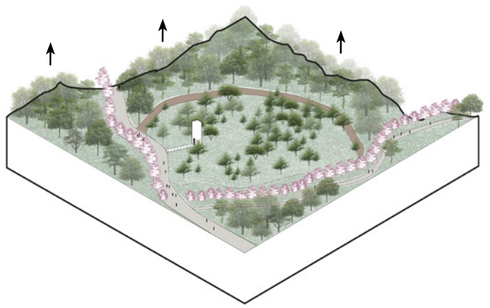


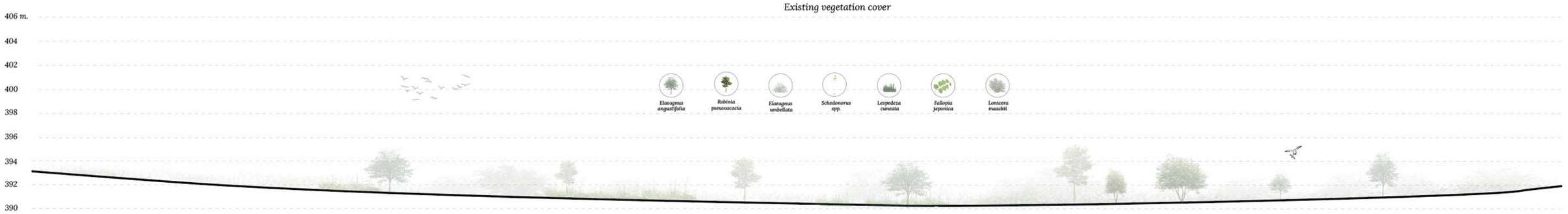

flickr: Biotour13

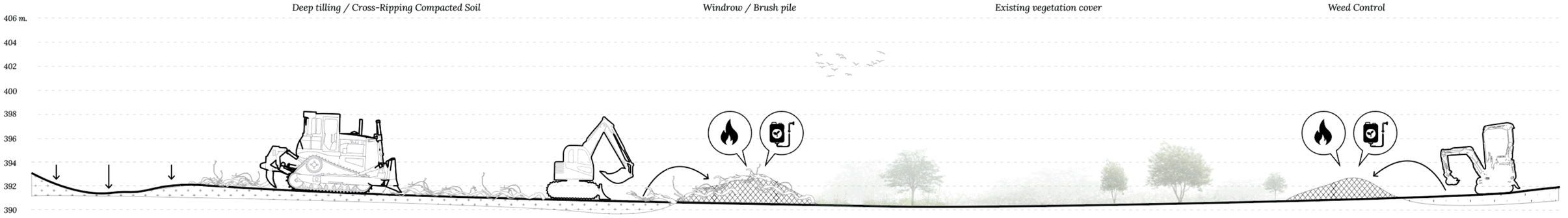
Pilot Project 3. Wildness Garden
Transforming

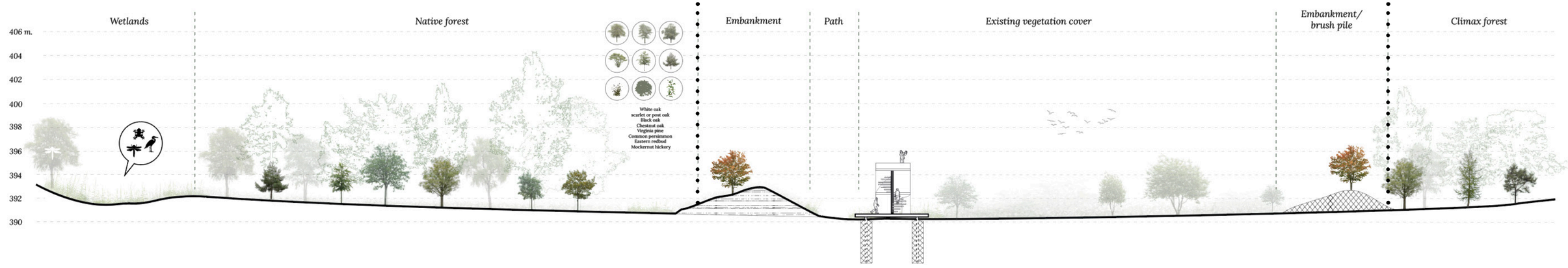







Existing vegetation cover
406 m.
404
402
400
398
396
394
392
390
Elaeagnus angustifolia
Robinia pseudoacacia
Elaeagnus umbellata
Schedonorus spp.
Lespedeza cuneata
Fallopia japonica
Lonicera maackii

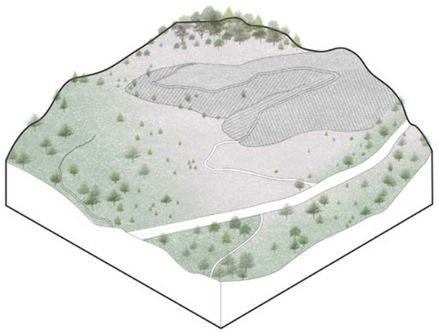

Deep tilling / Cross-Ripping Compacted Soil
Windrow / Brush pile
Existing vegetation cover
Weed Control
406 m.
404
402
400
398
396
394
392
390

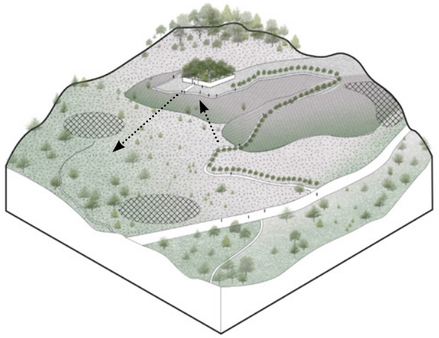

Wetlands
Native forest
Embankment
Path
Existing vegetation cover
Embankment/ brush pile
Climax forest
406 m.
404
402
400
398
396
394
392
390
White oak
scarlet or post oak
Black oak
Chestnut oak
Virginia pine
Common persimmon
Eastern redbud
Mockernut hickory

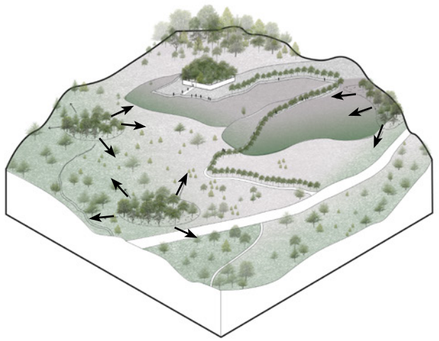

I Wildness Garden
II Resting Area
III Reforestation
IV Windrows
V Wetland


Julian
Charleston
Coal Tip Boardwalk
Rock Creek
Community
Centre
Rock Creek
Memorial Lake
Slippery Gut Dam
Little Coal River
Campsite
Treatment Plant
Brag Fork Lake
Spruce Lick Loop
Snag Slope
Stone Coal Cemetery
Mud River
Berry's Branch
Hill
Berry's Branch
Cemetery
I
Treatment Plant
Spurlockville Hills
Antill Cemetery
Native Garden
Big Ugly Wildlife
Management Area
Highwall
III
Stanley Fork Forest
Hobet Mine
Scenic Parkway
Big Ugly Wildlands
Stanley Cemetery
Danville
II
Wildness Grove
Highwall
Tawney Cemetry
Mud River
Madison
Clearcut
Reclaimed Forest
Hobet Heights
Hobet Mine
Scenic Parkway
Mud River Road
Big Ugly Community Centre
Logan
500m
10^2
metres

Pilot Project 6. Native Garden
Maintaining







III Unmined forest

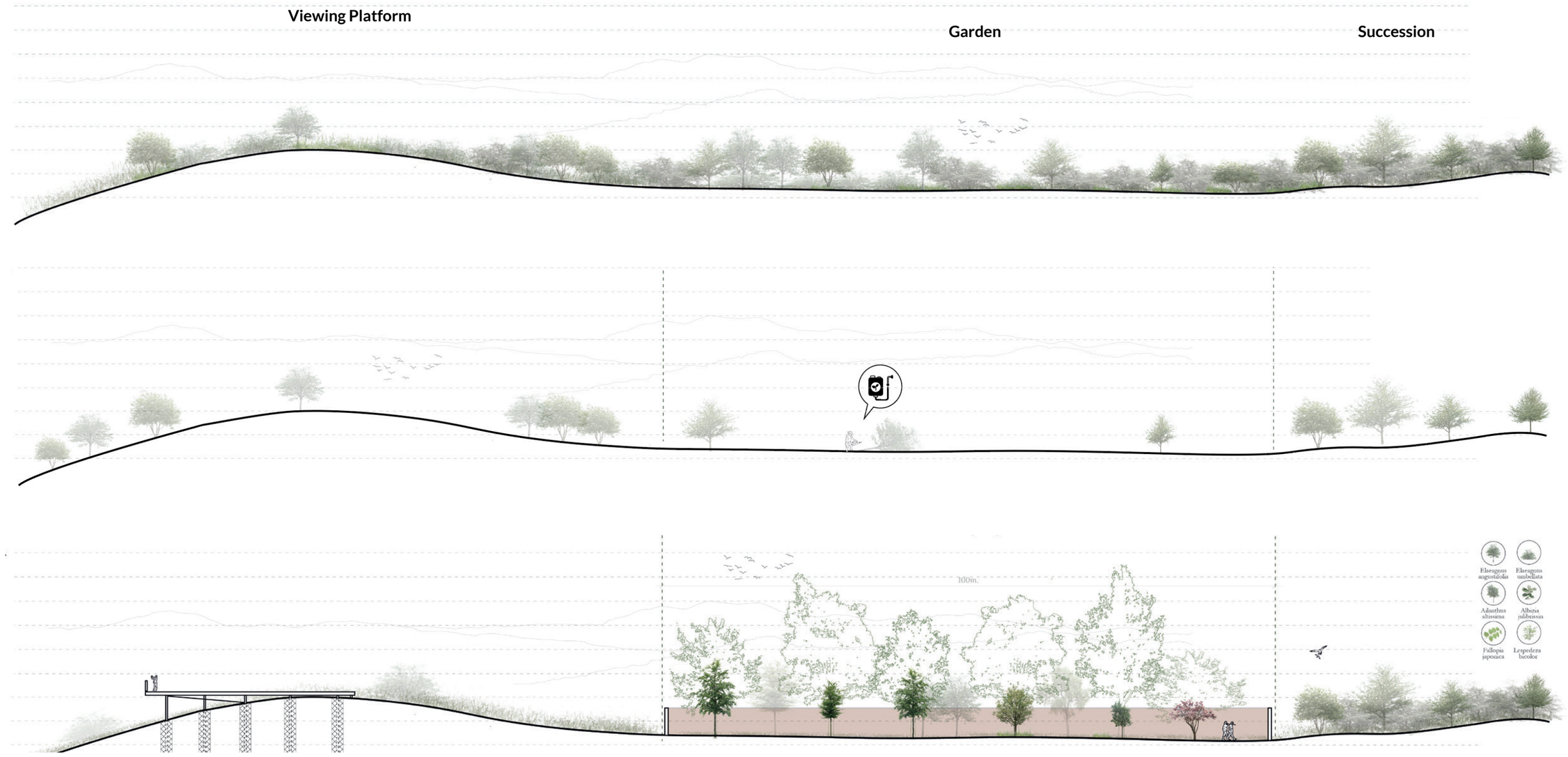
I Native Garden

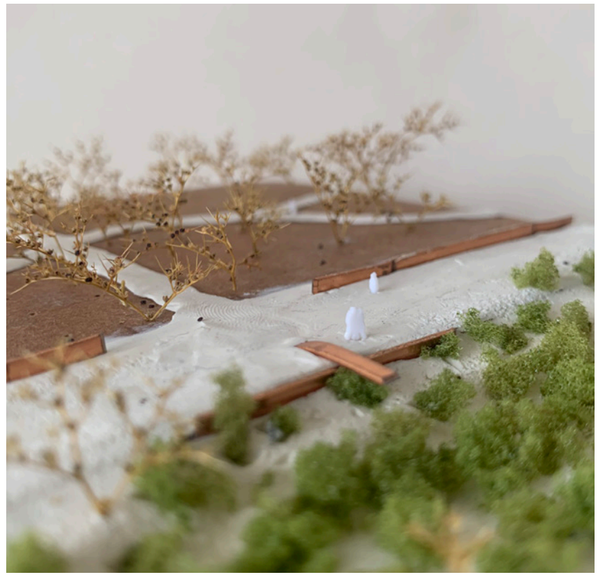
IV Microforest

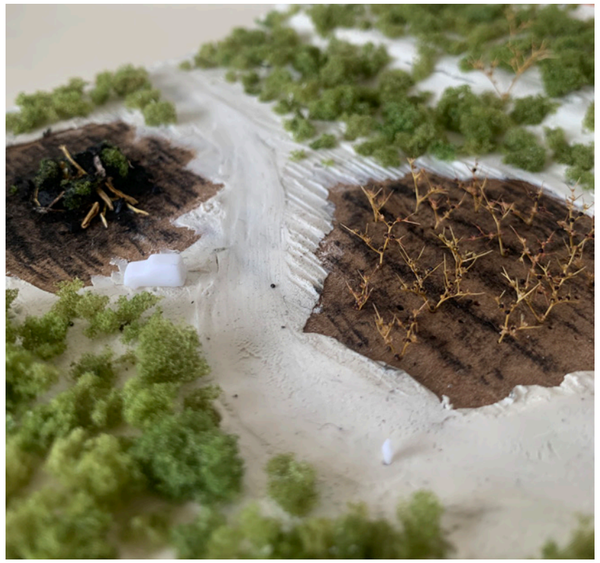
II Harvest

V Trailhead

0 50 200m


Viewing Platform
Garden
Succession
100m.
Elaeagnus augustifolia
Elaeagnus umbellata
Ailanthus altissima
Alnus nitidissima
Fallopia japonica
Lespedeza bicolor






Julian
Charleston
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Rock Creek
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Slippery Gut Branch
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Campsite
Treatment Plant
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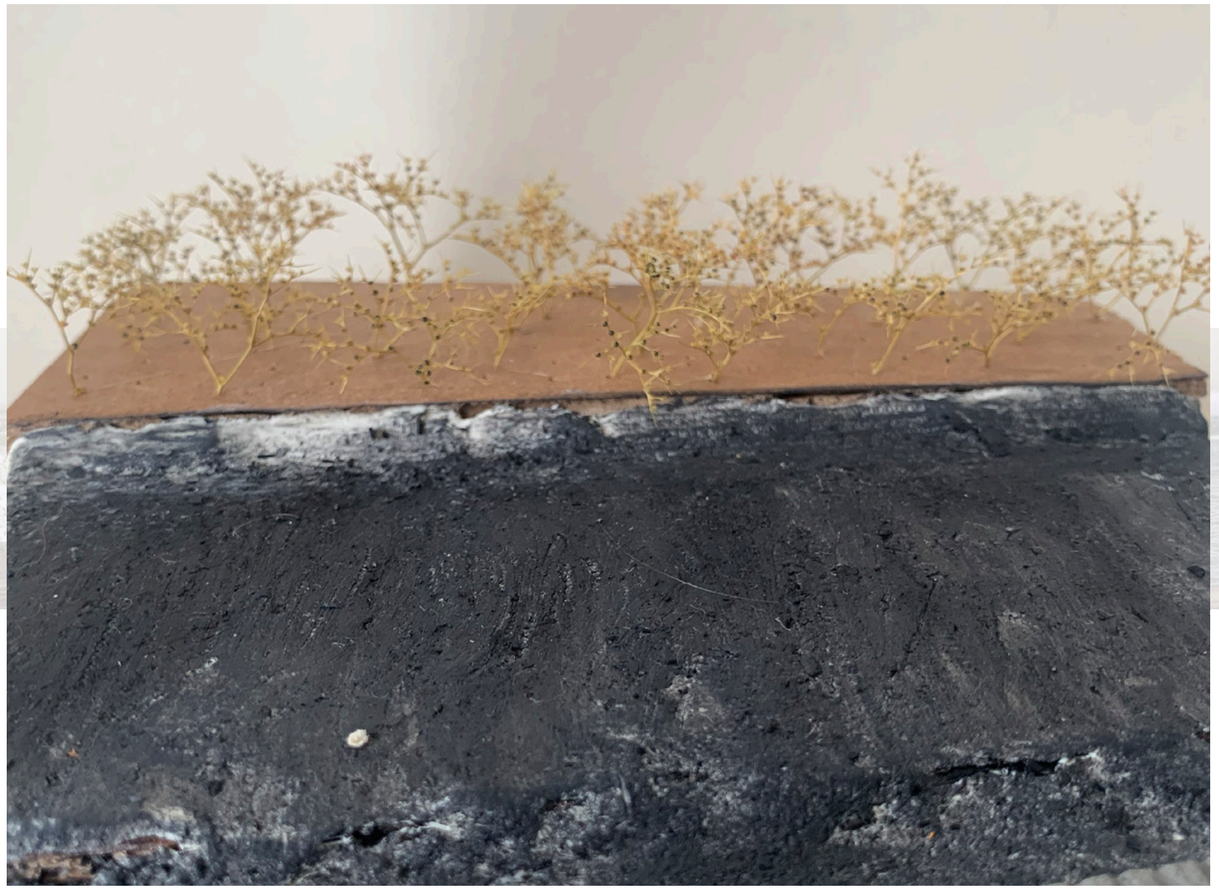
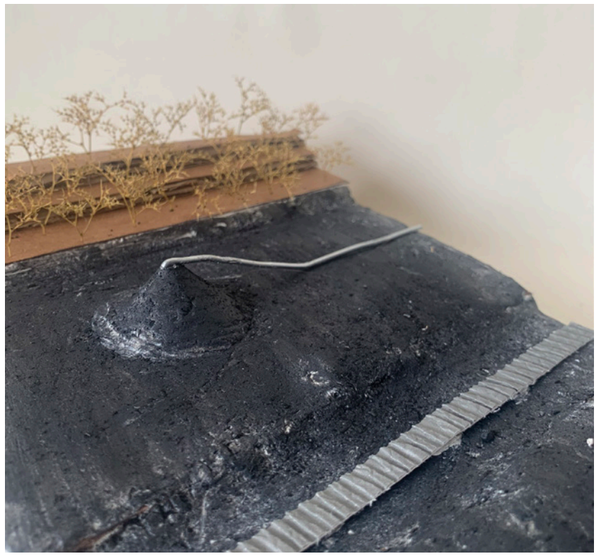
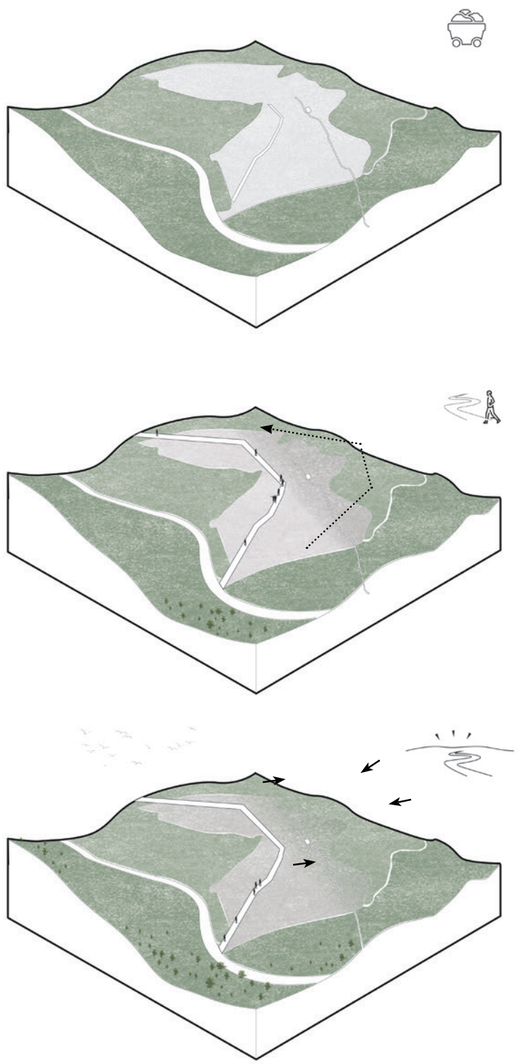
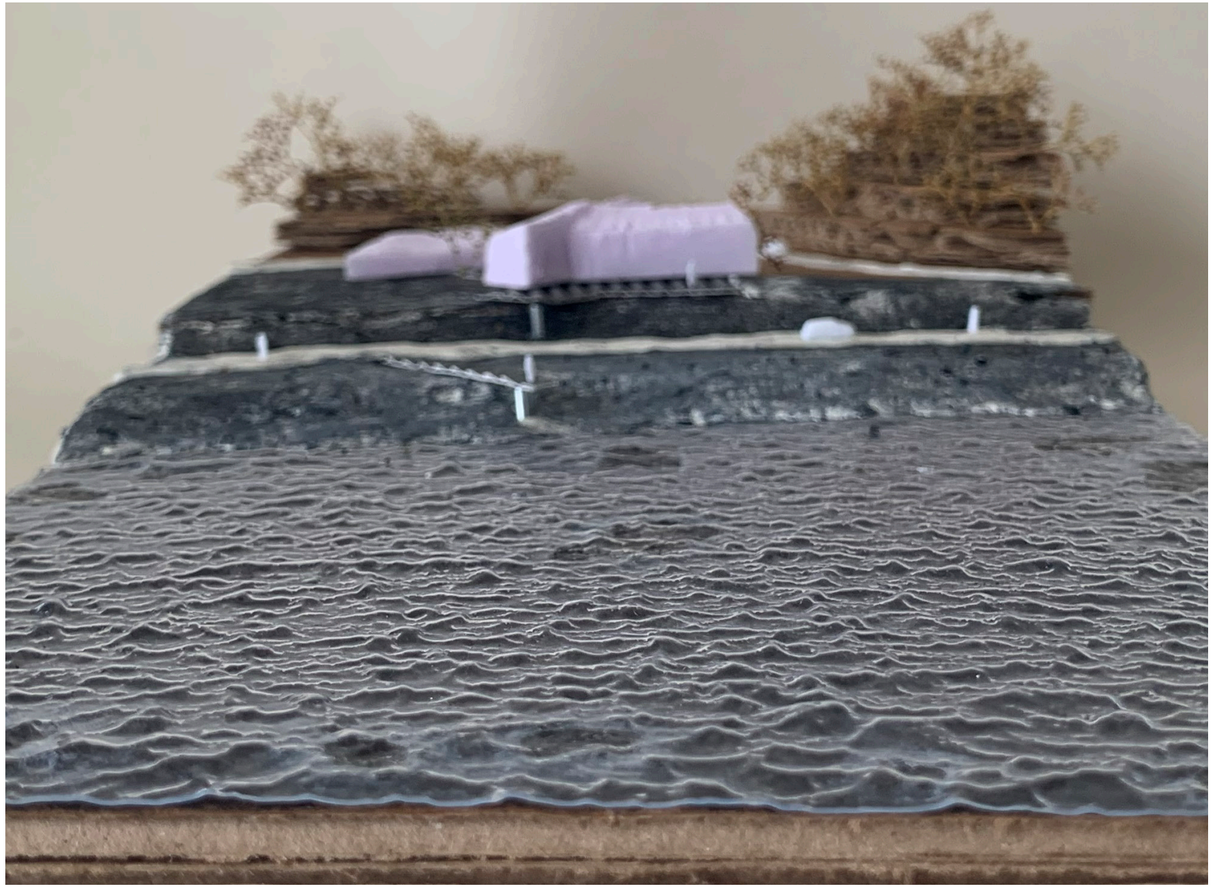
Reclaimed Forest
Madison
Hobet Heights
Hobet Mine
Scenic Parkway
Mud River Road
Big Ugly Community Centre
Logan
500m
10^2
metres



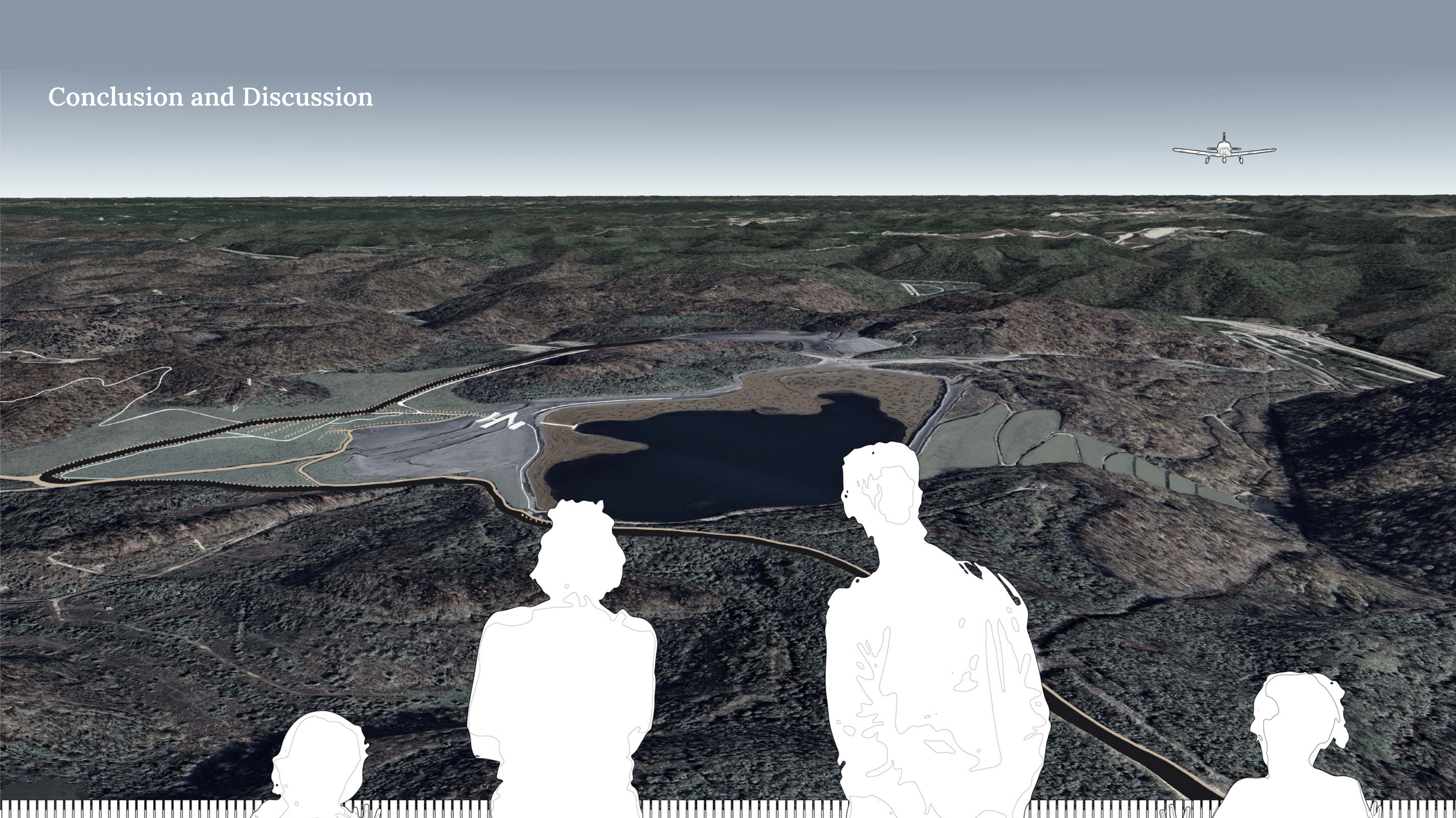
Pilot Project 5. Wildness Garden
Awareness

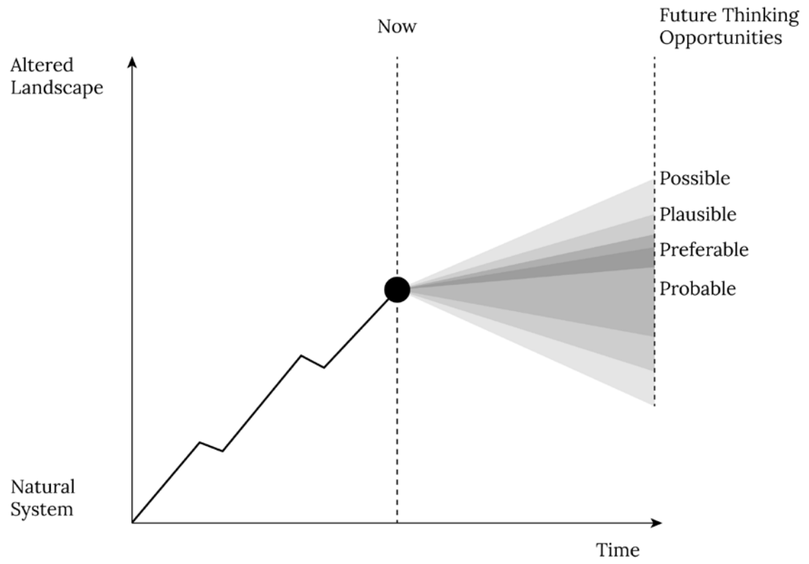




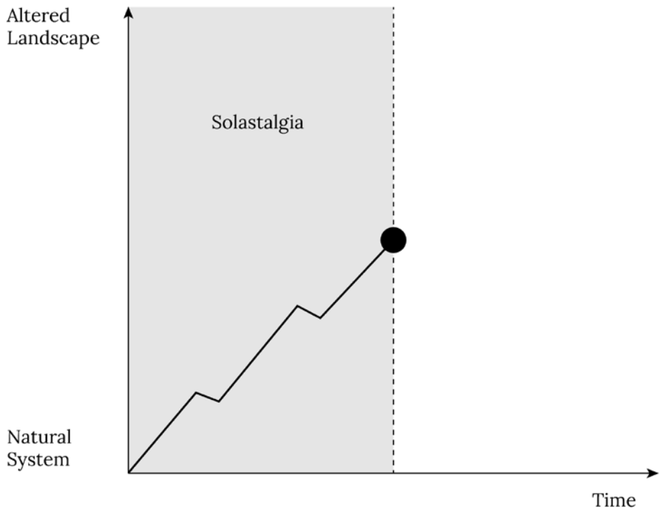

Pilot Project 6. Rock Creek Memorial Lake
III Viewpoint
II Parking
I Memorial Centre
VII Coal Tip Pathway
to 119 Highway
VI Rock Creek Lake
IV Sediment Pond
V Hobet Mine Parkway

Conclusion and Discussion

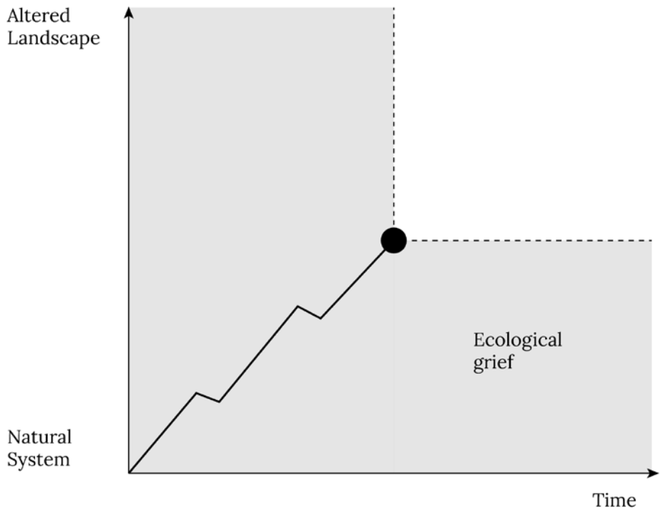




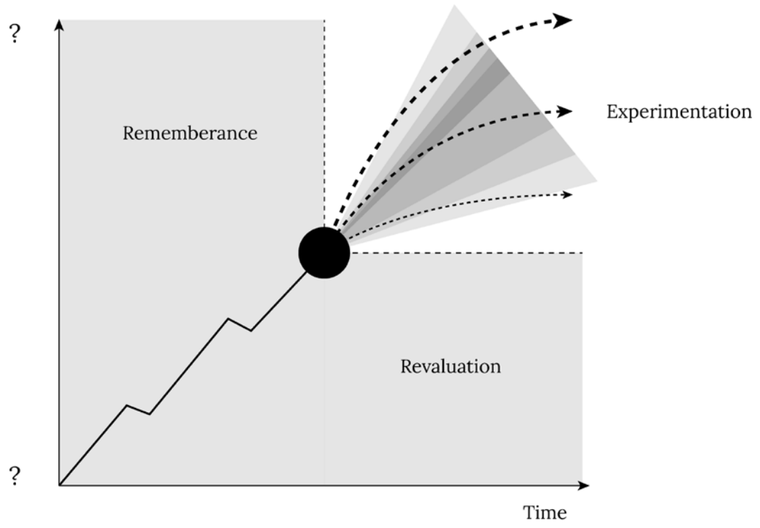
Future Narrative(s)



Solastalgia



Ecological Grief



Extreme Alteration

Valuing Extreme Alteration

Delft University of Technology

Master Thesis Landscape Architecture

Martijn Bisschops - 2024

Valuing Extreme Alteration, thank you