

MEANDER Project
Land Art Generator Initiative
Modern Elder Academy
Saddleback Ranch



Ryan Henel www.ryanhenel.com
Craig Sponholtz www.watershedartisans.com

1 CONTEXT

The environment of Saddleback Ranch presents a unique view into the converging timelines of human and geological processes. The state of the site is not static; it is always evolving and shifting in relation to human and non-human inputs to its geological and ecological characteristics. It is a complex system that has evolved over eons.

However, more recent history has brought drastic changes. With the advent of destructive land use practices, severe drought, and climate change, the ecological balance of the watershed has been disrupted. We ask ourselves, what effect can our human presence have on this environment? How might we shift our patterns and practices to better synchronize with natural processes?

In the present moment in time, a symbiotically-integrated land artwork could be a vital contribution to the Modern Elder Academy's efforts to establish regenerative practices and improve habitat at the Saddleback Ranch.

As expressed by the Santa Fe Conservation Trust, "Galisteo Creek and its tributaries form a functional wildlife corridor network that establishes the linkage between the ecoregions. Additionally, the surface water drainage system also forms a regional and local hub of water resources and water-related ecosystems of riparian zones and wetlands in an otherwise arid landscape. The riparian and wetlands system of the watershed serves in particular as a small stepping stone (i.e., an "island") for waterfowl and other migratory birds that follow the alternative eastern fly routes parallel to the Rio Grande" (Santa Fe Conservation Trust, 2022).

A fundamental aspect of a sustainable future is the veneration of water, respecting the life that it provides to every living being. Throughout human history on every continent, there is evidence of human efforts to develop water infrastructure for various purposes. From acequias,

terracing, reservoirs, damming, to aqueducts, understanding and working with water has been crucial to the existence of all cultures.

We hope to continue in this universal tradition by developing a number of earthworks that will harness the energy of water to establish new meanders to mitigate the severe erosion in Galisteo Creek. This project will work in concert with other efforts on the ranch, such as Keyline design and sustainable grazing practices, to spread and hold water in the soil. All of these practices will support the renewal of a verdant habitat in the watershed for the benefit of all life that passes through, healing the land.

2 ARTWORK

Induced meandering is a stream restoration technique for arid lands developed by Bill Zeedyk. Incision is a process by which a river cuts down into its bed, deepening the channel and disconnecting the channel from its floodplain (Wikipedia, 2022). Flood plains are important because they reduce flood peaks, spread out sediment, and support riparian vegetation that provides essential habitat for wildlife (Zeedyk, 2009). Although a natural process, incision can rapidly accelerate when the upland area around a stream is disturbed. Given sufficient time, incised channels will tend to widen, flatten, and develop a meander pattern similar to the pre-disturbance conditions (Zeedyk, 2009). The function of a meander in a stream is to dissipate the energy of the water. *Induced meandering* uses in-stream structures to speed the development of flood plains in incised channels (Zeedyk, 2009).

Following the induced meandering techniques developed by Zeedyk, this project proposes to install a series of deflectors in the Galisteo Creek. Deflectors are triangular structures installed on one side of the stream that push streamflow toward the opposite bank (Zeedyk, 2009). As the deepest part of the stream (thalweg) shifts to the opposite bank, the opposite bank begins to erode and recede (Zeedyk, 2009). The channel widens and a pool forms along the opposite bank (Zeedyk, 2009). Conversely, the streamflow on the side with the deflector slows, and sediments drop out of the water to form a point bar adjacent to the structure (Zeedyk, 2009). When a series of deflectors are installed in a stream, materials that erode from one bank opposite a deflector, will be deposited adjacent to the next downstream deflector. These instream structures are minor interventions that change the flow pattern of the river, so that the river itself does the work of depositing sediment and seedstock to create a new flood plain (Figure 1).

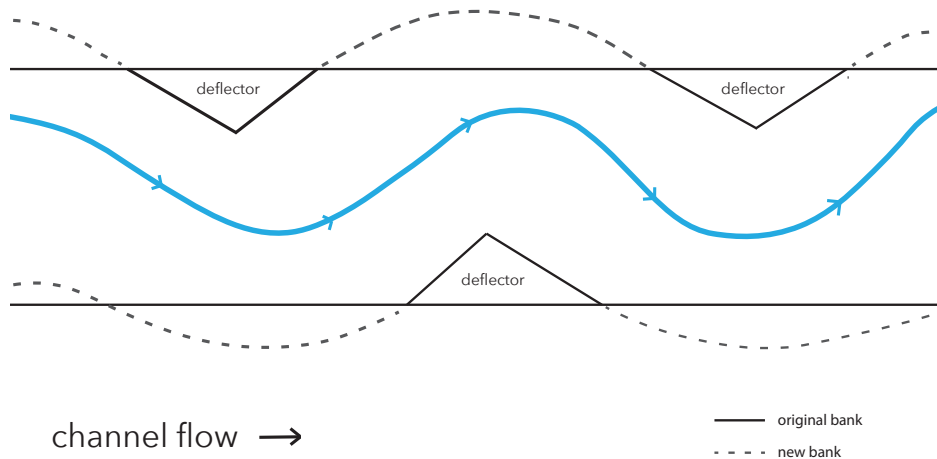


Figure 1: Conceptual diagram of deflectors changing the flow pattern in a stream (Adapted from Zeedyk, 2009).

A minimum of three deflectors will be installed in the segment of channel located between the Chamisa and Drogheda buildings (Figure 2). This area was chosen due to the deep erosion on the eastern stream banks and its proximity to major buildings at the Modern Elder Academy.

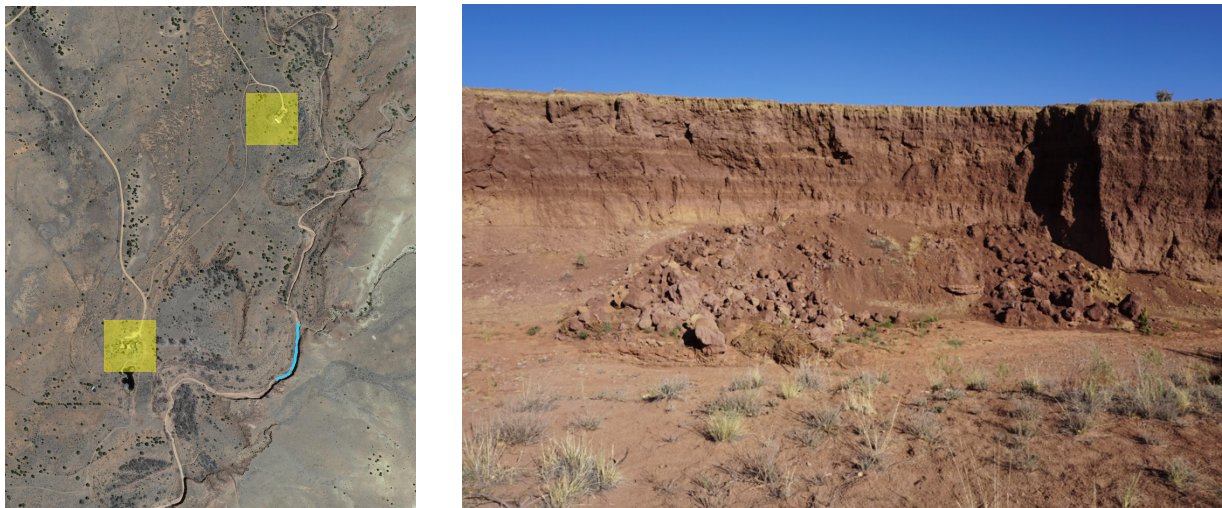


Figure 2: (Left image) Yellow Squares highlight Chamisa and Drogheda Retreat Buildings. Blue line indicates proposed project site in Galisteo Creek. (Right image) Incised arroyo bank within proposed project site.

The outer shell of the deflector structures will be constructed out of stabilized and semi-stabilized adobe brick and arranged in a step pattern. The inner core of the structure will be formed out of compacted rock and aggregate. Where soil conditions will permit, juniper or pine posts will be placed on the downstream end of the deflector. The post "baffles" allow sediments and other materials flowing down stream to collect and fortify the stream bank. These posts will be cut to follow the topographic contours of the deflector structure (Figure 4, Figure 5, Figure 5).



Figure 3: Conceptual rendering of first deflector (Image by Ryan Bromberg)



Figure 4: Induced Meander "Deflectors" (plan view)



Figure 5: Induced Meander "Deflectors" (side view)

The deflectors will be accompanied with a designated observation point demarcated with a "landmark" structure. Perched above the stream channel, this landmark will be visible from the broader viewshed of higher elevations, drawing visitors' attention towards the stream channel. The landmark structure will be a rammed-earth sculptural bench seat, abstractly referencing the pattern of a meander, suggesting the function of the deflectors downstream (Figure 6 and Figure 7). Visitors will be able to sit within the form, relating in a physical, human scale to the canyon walls and shape of the channel below. An interpretative sign, discretely integrated into the structure of the bench, will present information about the induced meander system.

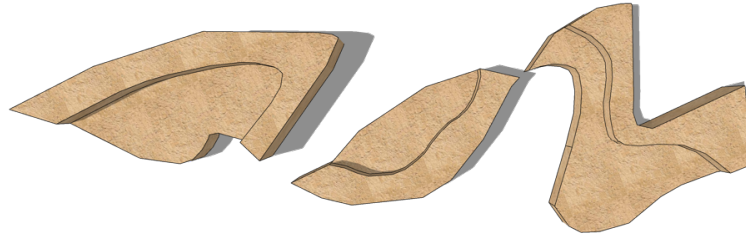


Figure 6: Meandering Bench (plan view)



Figure 7: Meandering bench (side view)

3 SITE SPECIFICITY

One of the intentions of this artwork is to develop sculptures that are integrated to the site. The design of the sculptures considers the materials, textures, and forms found at the site, from the contours of the Keylined landscape to the structures of sedimentary rock on the riverbanks. This approach obscures the normally-distinct boundaries between a human-built structure and the forms found in nature, allowing the mind to wonder what it is seeing: Is the earthwork a unique geological landform or perhaps a ruin? Does the shape of a deflector reference a fossil of a sea creature that once lived in this place when it was an ocean floor? The work is designed not to be disruptive to the viewshed, but rather to be a part of the environment. This aesthetic integration is philosophically acknowledging that we are part of nature, that our work, our constructs are ultimately part of natural processes (Figure 8).



Figure 8: Conceptual rendering of third deflector with post baffle (Image by Ryan Bromberg)

4 EVOLUTION OF ARTWORK OVER TIME

Although initially the sculptures convey strong geometric forms, the intention is that they will transform over time. The adobe bricks will erode, melding into the land and becoming part of a new and evolving landscape. Much like an aeolian dune moves through the landscape as the wind picks up each particle of sand and deposits it, here the water will carry forth the sediment, creating new patterns and forms downstream.

Because of the changes it will induce, we view the artwork as not as an object, but rather a process. As such, it is a performative work. The work's presence and duration will harmoniously flow in the service of the meander. The structures will slowly deteriorate in correlation to the growth of the new meandering channel and riparian habitat.

5 MEANDER TEAM

Ryan Henel is the Field Coordinator for the Land Arts of the American West studio art program and a Research Lecturer in the Art + Ecology department at the University of New Mexico. He is also a Lead Artist for the Harwood Arts Center's Apprenticeship for Art + Social Justice. Ryan's professional practice includes both individually and collaboratively generated, large-scale public artworks, fabrication and design, with a focus on functional elements that respond and

engage an environment. Ryan’s role in this project is to oversee the development of the overall design and contribute to the construction process.

Craig Sponholtz is the owner of Watershed Artisans Inc., which provides assessment, planning, design, and construction services in river and wetland restoration and broad acre land rehydration. Craig is an experienced practitioner of induced meandering methods and watershed restoration in this region and internationally. As a reference project, Craig Sponholtz and the Watershed Artisans team have been responsible for constructing over 500 restorative structures of all types, including instream, induced meandering structures, throughout the Comanche Creek watershed in the Valle Vidal Unit of the Carson National Forest. Craig’s role in this project is design, engineering, permitting, and construction of the induced meander system.

6 PRIMARY MATERIALS

- Stabilized and semi-stabilized adobe brick
- Adobe soil / rammed earth (some sourced from eroded soil on site)
- Pine, Juniper, Cedar posts
- Varying sizes of rocks and aggregates
- Native plants

7 DIMENSIONS

Deflectors: 30-40' L x 7-9' W x 4-6' H

Bench: 24' L x 4-5' W x 3' H

8 DESIGN, PROTOTYPING, FABRICATION, AND INSTALLATION

The site-specific nature of this work will require site investigation and prototyping. A detailed survey of the specific locations of the sculptures will be conducted. We propose prototyping a preliminary, small-scale deflector off the stream channel. This will help inform construction methods and materials for the larger structures, including the use of bonding for the adobe bricks. After prototyping, we will produce construction drawings for Modern Elder Academy approval and permitting purposes. After obtaining owner approval and permits, construction activities will begin including:

- Preliminary excavation and preparation of pads (tamping of the substrate) where the deflector structures will be placed using a backhoe.
- Construction of deflectors starting with 1-2 courses of adobe block forming the lowest “step” or layer. This is then backfilled with aggregate and tamped. Then the next layer is formed, and the process repeated until the structure is complete.
- Where feasible, posts will be driven into the stream bed at the downstream end of the deflectors. Plantings with native vegetation to reinforce stream bed will be installed.
- The Meander Bench will be cast in place with formwork from rammed earth.

10 SYSTEM INPUTS

This system is inherently passive, it does not have any technological components that require regular upkeep or maintenance. As described in Section 4, the artwork is designed to evolve with the development of meanders in the stream channel. Optional monitoring of the stream channel evolution would be beneficial to determine how the structures are performing over time. The project team is available to discuss optional monitoring methods with the Modern Elder Academy.

11 SYSTEM OUTPUTS

Due to the nature of this project, quantitative measurements of outputs are challenging. Outputs expected in the project area include floodplain development, erosion mitigation, improved water retention in the riparian zone of the stream, rehydration of soils, improved riparian habitat, and increased biodiversity.

12 ACTIVITIES PROJECT WILL SUPPORT

Within the context of the vast high desert plain, the protective confines of the valley inherently draw in visitors to find refuge. Due to its reasonable proximity to the retreat buildings, visitors can easily hike to the Meander Bench and look out over the stream channel and deflector sculptures. This section of the creek would be conducive to both solitary and social activities, such as meditation, wildlife observation, reading, and workshop instruction. This site could be a demonstration area for discussing regenerative practices employed at Saddleback Ranch. The environment becomes the classroom, the context for connecting to place and self.

The project team recognizes that it is not possible to heal a watershed by dealing only with issues in the mainstem streams (Watershed Artisans, 2022). Most often the damage seen at the lower reaches of the watershed are symptoms of degradation over large temporal and spatial scales (ibid). The watershed must be treated as a whole to address degradation on a system level (ibid). Therefore, this project will support and integrate with other restoration activities at the Saddleback Ranch, including Keyline Design, sustainable grazing, and habitat restoration. Additional projects to install induced meandering structures in other reaches of the Galisteo Creek may be considered in the future.

13 ENVIRONMENTAL ASSESSMENT

Like all arid ecosystems, the project site in the Galisteo Creek is a sensitive ecological zone, and environmental impacts from the project must be carefully considered.

Historically, human impacts have negatively affected the hydrologic function and riparian ecosystem in the Galisteo Creek. The stream channel is deeply incised, with soil from the stream banks actively shearing into the stream bed. Riparian vegetation and habitat are limited. It is the intention of this project to mitigate these conditions within the project area by reintroducing meanders and reconnecting the channel to the flood plain.

Adverse environmental impacts of this project include short-term effects that will occur as the result of construction activities. Creating pad sites for the deflectors will require heavy equipment (backhoe), which will access the channel through an existing two-track road, and drive up the stream channel to the project sites. The pad sites will require excavation and tamping of soils in the stream bed. These activities may create some disturbance of soils in the stream bed and add sediment/turbidity to surface water in rain events following construction.

Project materials will be stored in a staging area above the stream channel designated by the Modern Elder Academy. Soils and vegetation will be disturbed in this staging area, and the artist team will restore the area in accordance with the recommendations of the owner/ecological design consultant after project completion.

Materials used for the project will include stabilized or semi-stabilized custom adobe brick. Stabilizing agents may include minimal amounts of lime or concrete, which may be introduced to surface water as the structures erode. These additives will be discussed and agreed-upon with the owner during prototyping.

Any imported soil and aggregate used in the project will be high-quality material without contaminants or weed seeds. Only native plants from a reputable grower will be used in revegetation.

As discussed in Section 2, the stream channel will move over time in response to the in-stream deflectors, lengthening and increasing in sinuosity. As the stream cuts a new channel, it will disturb soils and existing vegetation, but will ultimately stabilize in an improved condition.

Numerous environmental benefits over existing conditions will be realized over time as a result of project implementation. Long term benefits include improved stream channel and floodplain function, improved water quality, improved quality of riparian vegetation, improved wildlife habitat, improved soil conditions, and increased plant species and diversity within the riparian area.



14 IN CLOSING: HEALING AND GROWING

The artwork we propose is significant in scale, yet its intention is to be integrated with the land, working in confluence with systems and patterns that have been in motion for thousands of years. This project seeks not only to affect conditions within our own generational time frame, but within a more expansive time frame. We see these instream structures not as a single act, but an opportunity to develop regenerative systems and practices that could be replicated and evolved further, not just within the ranch, but within the region, or environments with similar conditions.

Our hope is that the methodologies employed in this project to rehydrate the soil, control erosion, and improve habitat continue to evolve on various scales at the ranch. Future activities by the participants in Modern Elder Academy might include smaller-scale riparian habitat restoration. The practice of experiential learning, such as the simple act of arranging rocks and soil to control the flow of surface water, can aid in understanding the complexities of our impacts on an environment, cultivating a sense of stewardship.

Our intention is that this work will also foster human connection to place. The work is designed to function as an opportunity to explore the watershed, to be present in the space, and to visualize the motion of water over time, recognizing that water shapes the landscape and provides the capacity for all life.

References

Santa Fe Conservation Trust, 2022. <https://sfct.org/protected-lands/galisteo-basin/>

Watershed Artisans, 2022. <https://www.watershedartisans.com/case-study-river-wetland/>

Wikipedia, 2002. https://en.wikipedia.org/wiki/River_incision

Zeedyk, Bill (2009). An Introduction to Induced Meandering: A Method for Restoring Stability to Incised Stream Channels. A Joint Publication from Earth Works Institute, The Quivira Coalition, and Zeedyk Ecological Consulting. Available at: <https://quiviracoalition.org/induced-meandering/>