Reflecting on the Laws of the Conservation of Energy and Ecosystems’ Exploitation

Matter/energy can be transformed from one form to another. Matter/energy can neither be created nor destroyed. When matter/energy is transformed from one form to another, there is a net loss. This loss is called entropy. A system that has been transformed and lost energy moves towards high entropy. A system that has its energies intact is a low entropy system.

If a forest in a watershed is clear-cut
All the energies in the wood
Are transformed and dispersed.
The energy within topsoil
The energies embedded in the Earth dependent habitats
Supporting a multiplicity of lives
As a consequence of erosion is dispersed.
The entropy of the watershed has been increased
By the dispersal of these energies
The energy so dispersed cannot be retrieved.

What then, watershed, what then.

Sagehen in the High Sierra: A Proving Ground
# ArtSciConverge at Sagehen

sagehen-art.blogspot.com

**Sagehen: A Proving Ground**
Helen & Newton Harrison, 2011

**WHAT DO WE THINK?**

In 2011, the Nevada Museum of Art - Center for Art + Environment in Reno approached us, asking if we'd be willing to host a 50-year art project at Sagehen. This would be Sagehen's first artwork.

Helen and Newton Harrison were the preeminent environmental artists on the planet, having invented eco-art in the 1970's, and inspired ferociously talented new generations of artists to use their work to engage with culture and influence social policy (sadly, Helen passed away in 2018).

“The Harrisons’ visionary projects have, on occasion, led to changes in governmental policy and have expanded dialogue around previously unexplored issues leading to practical implementations variously in the United States and Europe.” — Center for the Study of the Force Majeure

We said, “Yes.”

This, our first experience with cutting-edge artists and art museum, opened our eyes to the potential of art to connect with new audiences, to get people thinking about their relationship to the environment, to detect hidden pattern, make fundamental discoveries, enhance scientific inquiry, and transform society.

“[The Harrisons’] work is a prime example of the potential of ecoart to create knowledge that promotes cultural change.” — Ruth Wallen, Leonardo XLV, no. 3, 2012

**WHAT DO THE ARTISTS SAY?**

“It becomes art when it begins to reverberate in your mind.” — Helen Mayer Harrison, 2011.

“Our motto is, Think Globally, Act Globally. We must adapt to the Force Majeure at the scale in which it occurs. We believe that Art and Science working together can provide key insights and solutions. This can be done – if we re-imagine what’s possible.” — Center for the Study of the Force Majeure
Dandelion
Faerthen Felix, 2011

WHAT DO WE THINK?

Art is not just illustration; it is deep cognitive activity that enables us to actually see new things, or see old things differently. In this way, art can leverage and enhance the process of scientific discovery, whether the scientist and artist are the same person, or different people.

WHAT DOES THE ARTIST SAY?

“See how messy this oh-so-familiar plant is? Dandelions are always drooping and slouching, never looking tidy and neat. In fact, if you look at old natural history prints, the illustrators would inevitably stand everything back up when drawing dandelions, to make them look prettier and more ‘perfect’.

Too bad, because in so doing, they concealed some fascinating (and—until now—undescribed) plant behavior. Look again. In fact, part of the plant *is* standing up straight and tall: the open blossom and the seed head. The rest of the old, closed flower heads are flopping over. Why would that be, do you think?

Seems to me that if you are a dandelion, it's good to stand up tall and straight when you want your flowers to be found by flying insects that can pollinate them. After that happens, it makes sense to close up shop, duck down in the grass to hide, and wait for your seeds to ripen. That way, your tasty flower heads don't get bitten off by passing animals. But you don't want to lay your seed heads on the wet ground, either: passing slugs and snails will eat them, or moisture will mildew them. So, you bend them back up a little, making an S-shaped stem. Once everything is ripe and ready to go, you stand each stem back up again as high as you can, and open wide so your seeds can catch the wind and spread farther afield.

Look again at the photo: you can see pollinated yellow flower heads closing up and heading down into the grass; they are passing a ripe seed head (with a white tuft poking out) on its way back up.

Pretty amazing behavior. And not sloppy and disorganized at all, once you see the pattern.” -- Faerthen Felix, 2011
Invisible Barn
stpmj, 2015

WHAT DO WE THINK?

At Sagehen, we were looking for a more approachable, more obviously "art" piece to lead people gently into questions about their relationship to the environment, and engagement with our art program. When we found Invisible Barn, it was exactly what we were looking for: seemingly designed to comment on our existing structures, triggering healthy debate, and blending into the natural forest environment in an intriguing way. But the community was worried about bird collisions, and said so.

One of the great powers of art is that it can act as a magnifying glass for thought. Bird-glass collisions are, indeed, a serious problem: the leading cause of migratory bird death behind habitat loss. Yet, we build structures with glass windows or even complete glass exteriors in bird habitat and flyways every single day without thought or comment.

Because Invisible Barn is art rather than a real building, it makes us think differently and ask the questions we should really be asking about everything we do: Why are we doing this? What are the effects? Is there a better way? In the face of changing climate and growing population, how should we be managing our wild places and built areas?

Take comfort: Invisible Barn is not invisible to birds. The structure is sheathed in mirrored aluminum, which—unlike glass—reflects UV light in the range that birds can see.

WHAT DOES THE ARTIST SAY?

“Invisible Barn is a site-specific design proposal that re-contextualizes the landscape of the site by projecting the landscape on the structural proposition.” -- Seung Teak Lee, 2015.
Here Come the Ecosexuals!
Beth Stephens & Annie Sprinkle, 2015

WHAT DO WE THINK?

We’ve worked hard to connect with artists who are interested in the same ecological issues that our science is. The Ecosexuals--Beth Stephens and Annie Sprinkle from UC Santa Cruz--shot scenes for their 2017 water documentary at Sagehen before it went on to premiere at documenta 14, considered to be one of the world’s most important art exhibitions. Jeff and Faerthen even marched at the 2015 San Francisco Pride parade with the Ecosexuals to officially add an “E” to the already over-long acronym LGBTQIA…E.

The artist’s concept is to reimagine the metaphor of Earth-as-Mother to a more ecologically sustainable one of Earth-as-Lover, since you can abuse your mother and she’ll still adore and take care of you, but try that with a romantic partner and you’ll be kicked to the curb.

Meanwhile, the concept engages huge swaths of society who have never before felt welcome at the environmentalist table. It’s a serious, yet light-hearted and fun approach that contrasts with the usual oppressive heavity of much environmentalist intellectual work. Controversial, engaging, and brilliant.

WHAT DO THE ARTISTS SAY?

“Ecosexuality is a new approach to current thinking about global ecological crises, eco-art and environmental activist strategies.” – Stephens & Sprinkle, 2015
Landscape Interventions
Nate Reifke, 2016

WHAT DO WE THINK?
Dispersed throughout the forest like hidden jewels, Nate Reifke’s landscape interventions await the attentive and observant wanderer to stumble upon them. As such, they are a lovely metaphor for the process of serendipitous scientific discovery that happens at field stations.

WHAT DOES THE ARTIST SAY?
"Beginning with pigments formed from only simple materials provided by the land nearby - clay, chalk, pollen, sedimentary rock, and ash - I create spontaneous and temporary works in the existing landscape. These pieces are a quiet dialogue with my surroundings. They are born of a desire to spend time under open skies and seek serenity. The photographs serve as documentation and preservation of an otherwise ephemeral work.

The manufacturing process is an active reminder that I am inseparable from this place I inhabit. A living being on and of the land, I see it as an affectionate nod of recognition and gratitude to something much greater than myself. The patterns themselves are an attempt to describe the potential energy inherent within the object and its constructive interference with my own, an expression of the awesome power of earthly evolution and human consciousness."
-- Nate Reifke, 2016.
WHAT DO WE THINK?

The Grand Environmental Challenges of the 21st century are unprecedented, inescapable, and require science-based solutions. But, it's grown very clear that simply knowing things is not sufficient to make the needed social and policy change. We somehow have to get more people to care about us, care about the science we are creating, and the results that are emerging from that effort.

Science is not very good at that. Humans are emotional animals, yet science has to be unemotional. Scientists can be--and usually are--passionate people, but when it comes time to present their results, emotion can play no part...or it isn't science.

The problem is that this detachment is alienating. In fact, there is currently immense hostility to science within our culture that is negatively affecting funding and basic research needed to address the massive change racing quickly down the tracks at us.

Fortunately, the raw material of art is emotion, and--when combined with our science--it can bring us to the attention of new communities, making them feel connected to our efforts. Art is also a tool of fundamental discovery that we want to join with our science in order to harness the problem-solving and pattern-detecting ability of more of our creative citizens: we're going to need everyone's help, not just that of professional scientists who are a very, very small percentage of our total population.

Snow is deeply meaningful to our local citizens. Sonja's snowshoe art engaged people emotionally, captured their imaginations, and created a receptive audience for our science, and how art can make it stronger.

WHAT DOES THE ARTIST SAY?

“I hope that my works help arouse appreciation and consciousness for the natural world. Modern society is becoming increasingly disconnected from nature. I believe, however, that for a successful future of humanity it is essential that we re-gain a greater awareness of our planet’s life and tune ourselves in with the natural world, understand it better and take better stewardship thereof.” – Sonja Hinrichsen, 2016.
Fish House / Human House
Mary Grace Tate, 2016

WHAT DO WE THINK?
Dispensing ridiculous (yet true) facts about humans to the fish peeking through the window of the observatory, Tate’s light-hearted piece makes us question whether the things we think we know about the natural world are really the things we need to know.

WHAT DOES THE ARTIST SAY?
“Fish House / Human House is a site specific work created at Sagehen Field Creek Station in Truckee, CA. The Fish House was originally constructed as an observation room [for] the visiting scientists to monitor the...trout population. Fish House/ Human House flips the gaze to give the human visitors the opportunity to feel watched, recorded, conscious and ultimately curious about their place in the world.

The installation includes five acrylic panels describing the behaviors of Homo sapiens alongside informative illustrations that enhance the trout’s understanding of our lifestyle. The rest of the basement is outfitted to resemble a traditional, human basement, replete with an outdated couch, faux-wood paneling, and a Big Mouth Billy Bass.” -- Mary Grace Tate, 2016.
# ArtSciConverge at Sagehen

sagehen-art.blogspot.com

## Wood Prints
Barbara Foster, 2016

### WHAT DO WE THINK?

Barbara Foster walks through the Sagehen Basin harnessed to weighted boards, or with wood planks strapped to her feet. Sagehen’s resident-carpenter Dan Sayler cut and planed the wood from trees removed during the Sagehen Forest Project, providing most of the raw material used.

Foster’s repetitive action collects accumulative impressions as the wood makes contact with the earth during her treks. She then relief-prints the results, often contrasting impressions of different distances, wood types, or divergent paths. It’s a fascinating way to represent presence over time in a landscape, that also yields beautiful and evocative art.

Her partner, Jack Stone, records a self-writing "poem" of Foster’s path using the geo-location app what3words (W3W has parsed the surface of the planet into 3m x 3m squares and has identified each square with three random words). Each path is unique, and these records make it possible for someone else to retrace Foster’s steps in the future.

In summer 2017, Barbara returned to Sagehen with the poet Farnaz Fatemi to deepen a forming collaboration across media. They brought with them inquiry and questions that drive this work.

The poetry becomes narrative, excavating possible meanings from Foster’s voyage and its artifacts.

### WHAT DO THE ARTISTS SAY?

“What does movement look like around collaborative mark-making? How do we walk through red fir forests, across high mountain fens, across time, and what happens when we do? What is to be found in the impressions in the ground and what happens when we encounter them?” – Barbara Foster & Farnaz Fatemi
On this eastern slope of the Sierra Nevada, it is so dry there is no decay. They are testing a tread-patterned thinning called "splats" for the fire.

The fire is like anything. Make it feel welcome. Content at ease. It will not feel the need to be so fierce to burn so hot to sterilize its own soil.

I know, you must go now. An appointment. A dinner. A drink.
Sagehen Comics
Christopher Baldwin, 2018

WHAT DO WE THINK?

Christopher’s drawings document Sagehen in a new and compelling way, offering a poetic interpretation that feels fresh and different.

His project with Cedra Wood to translate the essence of Sagehen’s graduate theses into one-page comics breathes life into these dusty tomes, parked on a shelf in the Sagehen library. The new format allows the viewer to see Sagehen science from 30,000 feet, and in relation to the other studies, rather than getting bogged down in the minutia of a single paper, with no larger context or narrative.

Along the way, the project exposes how the intent and execution of Sagehen science has changed over the decades in response to a very non-scientific principle: the preferences, values, and choices of the scientists.

WHAT DOES THE ARTIST SAY?

“I’ve spent the last 20 years working towards the advancement of graphic novels/sequential art. It is a medium that demands skills of the storyteller and that of the fine artists -- and the ability to marry the two.” – Christopher Baldwin, 2018
Pine Cone Cloak. Cedra Wood, 2018

Photograph of Cloak. Michael Llewellyn, 2018

WHAT DO WE THINK?

Cedra Wood sometimes creates clothing from natural materials to photograph on models for her photo-realistic paintings. These works have investigated, “imposing familiar processes on new environments where those traditions may or may not be practical”, and “explore the metaphor for the transplanting of ideas and ideals” to new environments. These concepts resonate with our work at Sagehen on recognizing and transcending the forest management mistakes of the past, imposed by a culture that displaced the one that had previously (and sustainably) managed the forest for thousands of years.

During her Sagehen residency, Cedra stitched together a stunning cloak of Jeffrey pine cone scales that looks like the pelt of some wild forest spirit from that past.

WHAT DOES THE ARTIST SAY?

“My paintings and drawings are the result of ongoing investigation into human/ecological relationships. Engaging with ideas of belonging and survival, my work interweaves human characters and natural environments, sometimes mimicking the tactics of other, better-adapted creatures...” -- Cedra Wood, 2018.
riverbeds for feet
Confluences
Todd Gilens, 2017

WHAT DO WE THINK?

Arts and sciences both create new ideas, knowledge and processes. Artists and scientists approach research in different ways and from different perspectives; when working together they can open up new ways of seeing, experiencing and interpreting the world around us. This sheds light on who we are and where we’re going.

Artist Todd Gilens is a meticulous researcher, scouring libraries around the world, regularly applying his results in collaborations with field scientists. His work in the Truckee River watershed that Sagehen is a part of uses fonts he based on the handwriting of Claude Dukes, Federal Water Master for the Truckee and Carson Rivers from 1958-1984. Gilens’ artworks trace long-vanished watercourses buried beneath Reno and obscured in the surrounding mountains and deserts, and places them in context with the larger system, as we are doing with our scientific and policy work at Sagehen.

Art/science interactions “allow us to explore radically new possibilities in which science and art are treated as equal partners in the understanding of the world...Most potently in terms of the future of human inquiry, intensive engagement with the arts can provide science with approaches that allow researchers to cultivate novel understandings of nature. The perspectives and practices of the arts, when adapted to the questions of science, elicited entirely new ways of engaging the natural world. Being fully human entails realizing the latent potential of both subjectivity and objectivity.” – Jeffrey Lockwood, 2014

WHAT DOES THE ARTIST SAY?

“In designing this project, I have been looking for the right proportions and contrasts that set associations in motion, that invite the sort of very human experience of engaging through curiosity and being rewarded with discoveries...I think it’s an important skill to be able to read things in multiple and often contradictory ways.

...There is an interesting regularization that happens as handwriting becomes a font – it goes from responsive to consistent. The handwriting-to-font process parallels the regularization of urban water flows and the simplification of phenomena for understanding.” – Todd Gilens, 2017.
What do we think?

The human element is often given short-shrift in forest management (which is traditionally largely about maximizing economic benefits).

Michael and Heather Llewellyn use photography, community collaborations, and art exhibits to dig deeply into the values and personalities of the people whose home is the forest. These people must live with the results of those management decisions, which are often made by business and agency people from somewhere far away, who will move on to the next forest when this one is depleted.

What do the artists say?

Forest + Fire will be a curated, multi-disciplinary installation, interpreting the forest management research originating from UC Berkeley’s Sagehen Creek Field station, designed for an indoor public space in Truckee, CA, and intended to engage Sierra Nevadans in a meaningful conversation about the effects of climate change in the region.

Eastern California is rural, economically challenged and, unlike coastal California, deeply conservative. Conversations about Climate Change are polarized. However, the die-off of millions of acres of trees in the Sierra Nevada is an unavoidable fact pertinent to all residents irrespective of political leaning. By telling science’s story through art, Forest + Fire intends to subvert polarization and inspire pragmatic conversation about best forest management practices.

"My career in photo-illustration is driven by a desire to reach the general public with immediately accessible comprehension of given Ideas. I do this with a combination of photography, design and construction. Designing and curating exhibits is an expansion of my interest in communication and offers the satisfaction and benefits of collaborating with people from a variety of fields on issues that are meaningful to me." – Michael Llewellyn, 2018