

Art-Based Perceptual Ecology: An alternative monitoring method in the assessment of rainfall and vegetation in a ciénaga community

By Lee Ann Woolery

Abstract

As an artist, educator, researcher, and scholar, with a focus on divergent ways of knowing, I use art-making as a way to connect with the natural world. In the following article, I explore the making of an image with my hands when practicing Art-Based Perceptual Ecology (ABPE) as a way of extending my understanding and ecological knowing of the natural world, or what will also be referred to as the landscape. ABPE methodologies may offer the means by which humans reconnect to a pre-discursive (mimetic) language, a sentient language our ancestors used to communicate with the animate world. In addition to art educators, this article may be of interest to ecologists and others studying environmental global change. Developing an art-based longitudinal study alongside traditional Western science methods, to record historical changes in vegetation in a riparian community, could provide outstanding results and contribute to the further understanding of biospheric changes at similar stream communities around the world.

As an art-based researcher, scholar and educator, my desire is to engage people in methodologies that lead them to an understanding of global environmental change that does not rely solely on the Western scientific paradigm. In our current environmental crisis, I recognize the need to address our problems in as many ways as they are experienced and understood.

Why do we need connections to nature?

I write from the premise of E.O. Wilson's biophilia hypothesis, whereby he suggests humans possess a genetically programmed affinity with other life forms – or a need for

periodic contact with them.¹ Humans have an innate appreciation of nature as they have evolved outdoors and amidst nature for most of the last two million years. However, many still deny their relationship with the ocean and fish, savannah and mammal, tree and primate. The lack of interest humans have to engage in nature and/or the limited accessibility to nature is placing a heavy toll on the health and well-being of a global population.

The problem of human disconnect with the natural world

Today Americans are moving indoors in mass numbers rather than forming close bonds with nature. Negative health consequences are shown to come from a life indoors exclusive of contact with nature: anxiety, depression and heart disease. Richard Louv encourages parents to save their children from what he calls nature-deficit disorder. Louv's call provides a magnificent case for unplugging our youth from the Internet and getting them outside. Yet this remains challenging. With continued technological advancement, we rapidly move toward a global society united by mediated images, built environments and lifestyles with a focus on things over experiences.

For example, the only connection many children possess with nature exists through the Nature channel on television, movies, or in video games. These two-dimensional relationships cannot offer the depth one might find in a phenomenological experience with plants and animals found in the living landscape. Yet, mediated images are not the only cause for callous connections with nature. Relationships with other humans formed through technology – communication via the web, email, text, and cell phones – are wireless relationships that move us nearer to the speed of light and away from the depth and the dimensionality experienced through engagement and active participation with the land.²

The problem of loss of natural habitat

Contributing to this disconnect with nature is the rapid decline of diverse natural ecosystems. Overt human impact on the earth's surface can be seen in the deterioration of natural areas, bringing species to the brink of extinction, the loss of indigenous knowledge and ancient stories of plants and animals.³ How we think about the human condition remains of paramount significance. Some individuals believe that global

¹ See Wilson (1993, 1994).

² Depth and dimensionality experienced through engagement and active participation with the land is a phenomenological engagement. Phenomenology is the study of direct experience through the senses; it is our body in relationship to the world around us. Edmund Husserl in early 1900's articulated phenomenology as *the world as it is experienced in its felt immediacy*.

³ Botkin (1990); Nabhan (1997).

environmental change stems from systemic problems in our societies.⁴ Yet, people need interactions with nature because these interactions promote well-being on physical, cognitive, and emotional levels.⁵ Human disconnect with nature and loss of natural habitat also leads to the loss of place-based knowledge.⁶

Place-based knowledge comes from our perception of local natural history through observation and experience, by being embedded in one's ecological and cultural community.⁷ Gary Paul Nabhan and Sara St. Antoine surveyed the natural history knowledge of a young generation of Tohono O'odham and Yaqui Indians in Mexico and Arizona and contrasted this with the knowledge of elders in the same community. They found four key things that led to the loss of place-based knowledge in those communities: (1) acculturation, accelerated by the advent of television, (2) linguistic assimilation, (3) the disappearance of storytelling, and (4) the decline in direct outdoor experience.⁸ And, as our elders pass away, so does the knowledge of the land they carry, which warrants an immediate urgency in garnering place-based knowledge through alternative methods. A place-based approach that includes a deep physical and emotional connection with the land to inform our need for species richness – including both biodiversity as well as cultural diversity – presents an additional means to prevent species extinction and to restore natural history knowledge.⁹

Why do we need place-based knowledge?

What is the cost of not being aware of and not preserving this place-based language? As a human species, loss of place-based stories keeps us from understanding something more significant than the self; it keeps us from understanding our connections to nature – to the larger world. Writer Gary Nabhan tells us that each species offers a unique way of living in the world just as different places contain distinctive stories that may vanish if we continue degrading the environment at our current rate:

⁴ Thomashow (2002). Global environmental change is recognized as the entire matrix of planetary-scale ecological and evolutionary patterns. Typically, global environmental change refers to the challenges that confront the human species – climate change, habitat destruction, species extinction, ozone depletion, pollution, and natural resource extraction.

⁵ Kahn & Kellert (Eds.) (2002); Wilson (1998).

⁶ Nabhan (1997); Shepard (1982); Thomashow (2002); Basso (1996).

⁷ It also comes from the stories passed on by elders and the animate beings of the landscape. By giving direct attention to, then recognizing the patterns and the particulars of what is before you, the knowledge of the landscape or place-based knowledge comes into you and shapes you. David Abram (1996) tells us that this knowledge comes from a reciprocal relationship between human senses and the sensuous earth.

⁸ Nabhan & St. Antoine (1993).

⁹ Thomashow (2002).

I am worried that as wild sheep slip out of sight, then out of mind, then out of dreams, a vacuum is created not only among desert people but among all people. I am worried that if we do not have their nature before us as a standard, we ourselves will grow domesticated and lose the sense of deep-seated wildness that lives within us.¹⁰

Paul Shepard fears that the loss of the wild leaves us with nothing but our own image to answer essential questions about our existence, especially in regards to who we are and why we exist.¹¹ In modern times, we cannot consider the human condition as independent of the global environmental condition.¹²

This is my story

As an artist, researcher and scholar, I use art-making as a way to connect with the natural world or *landscape*.¹³ As an educator, I teach others how to engage in this intentional art-making practice to experience a connection with the natural world.

Over fifteen years ago, I developed an art-based methodology called *Art-Based Perceptual Ecology* (ABPE) to use in the field for ecological research. In *Art-Based Perceptual Ecology*, all words hold equal weight. The term *art-based* acknowledges that art-making provides frames of reference and context to one's sensory experience in the landscape.¹⁴ *Ecological perception* refers to the body as the location of the connection between self and the landscape.¹⁵ Furthermore, ABPE affirms that perception is the process of making meaning out of sensation.¹⁶ When practicing ABPE, the body becomes the instrument through which the creative process occurs and new knowledge is

¹⁰ Nabhan (1997) p. 183.

¹¹ Shepard (1978).

¹² Thomashow (2002).

¹³ Allen & Hoekstra (1992) define landscape as a locality, the spatial matrix in which organisms, populations, ecosystems, and the like are set. Landscapes or nature are the natural environment in which we live.

¹⁴ Woolery (1999). Art-making provides frames of reference and context to one's sensory experience in the landscape.

¹⁵ See Gibson (1983), in his ecological model of perception, James Gibson says the world and we are inseparable, we walk through this world; "with-the-eyes-in-the-head-on-the-body-resting-on-the-ground." It is in this realm that we recognize it is the body that is the location of the connection between self and the landscape

¹⁶ See Beres (1965) & Klinger (1981), perception is the larger process of making meaning out of sensation. Perception and sensation work in tandem – the raw information is meaningless if it is not referred to something inside the organism that gives it meaning and sensation only takes action when something is there to guide the activity. In a more poetic sense see Merleau-Ponty (1962), perception is a reciprocal participation, bodily engagement with the patterns and gestures of place – it is the active relationship between my own flesh and the encompassing flesh of the world, a silent conversation with the animate landscape that unfolds beneath my conscious realm.

acquired.¹⁷ And, *Ecology* – the science – gives one a way to think about what one’s senses apprehend in this place.¹⁸ This practice of intentional art-making offers one an embodied knowing of the subject through the exchange of earth, art, mind, and body. The art-making acts as an interface to a direct physical, cognitive, emotional, and sensory experience of one’s human-earth connection. In the following article, I explore the making of an image with my hands when practicing ABPE as a way of extending my understanding and knowing of the subject I am studying – the landscape.

Key concepts to ABPE

I acknowledge fundamental concepts integral to revealing and recognizing patterns in the land – important components of ABPE: inherent wisdom in the natural world, direct experience in landscapes, mysticism, intuition, imagination, art-making, and ways of knowing. I assume that nature holds inherent wisdom.¹⁹ In this article, I address these key concepts: direct experience in landscapes, art-making, ways of knowing, and intuition.

Patterns as the land’s language

When practicing ABPE in the field, the investigator enters a temporal and spatial dimension of a particular landscape, revealing a world that she could not see, know, or otherwise understand before making art about it. In this practice, the investigator experiences the land as layers with patterns being the smallest element of the layer. To understand patterns further we look to the definition of biology – the science of life and living organisms, which provides a simplification of the life process of organisms as it involves growth about a point in space. Patterns are the tangible record of interactions between and amongst organisms in the landscape. The land’s ecological memory, or patterns are indicators of the land in flux – energy systems moving at a spatiotemporal scale. Patterns in the landscape embody the expressions of the land’s communication system, they tell the investigator what was happening in that landscape at a certain time in space.

¹⁷ Direct experience in landscapes is important to ABPE, recognizing that the self and world shape one another through a reciprocal relationship, with the body as the connection. Edith Cobb suggests that observing young children at play may give us the most dramatic understanding of the participatory relationship needed to ‘know’ nature, as the child’s means of building knowledge is, “knowing by becoming” through “direct organic participation of the perceiving nervous system in systems of nature” (1977, p. 33).

¹⁸ Thomashow (2002).

¹⁹ Woolery (2006) Key concepts were explored in my research: Art-Based Perceptual Ecology as a way of knowing the language of place. Doctoral dissertation.

Timothy Allen and Thomas Hoekstra define scale-independent patterns found in the landscape as “meanders, spirals, explosions, and branching systems.”²⁰ These patterns, Vladimir Vernadsky claims, result from the dynamic equilibrium of movement; they are the patterns of organization common to all living organisms and continually taking place all around us.²¹ Yet, he says, we barely notice them. “What we do notice most readily is the static result of the dynamic equilibrium of these movements resulting in the beauty of nature – its diversity of form, color, and rhythm.”²² Ability to read the patterns provides the investigator entrance to stories embedded in the land. These stories endure as the environmental history of the landscape. From a Western science perspective, ice cores, tree rings and fossils are recognized as the land’s stories, revealing something about the evolution of the subject being studied.

Pattern recognition

Our ancestors saw the significance of pattern recognition because it allowed them to understand what could kill them and what they could eat.²³ David Abram describes the language of the landscape as a sentient language – an awareness and understanding of the logos and signs of a place, whereby patterns exist as the language: “The invisible shapes of smells, rhythms of cricket song, and the movement of shadows . . . each terrain, each ecology seems to have its own particular intelligence, its unique vernacular of soil and leaf and sky.”²⁴

Ernst Haeckel, artist and scientist, painted and drew multiple images of the organisms he researched.²⁵ Contemporary scholars who study Haeckel’s work suggest he used the image-making process to access the knowledge embedded in the organism, and through this process, he understood the ontogeny and phylogeny or family tree of the organisms he studied. Cornelia Hesse-Honegger suggests pictures or images created within scientific illustration may be “precognitive.”²⁶ In her studies of scientists/artists, such as Haeckel and others, Hesse-Honegger recognizes that knowledge acquisition takes place during and through the art-making process. Therefore, the image-making extends nature’s original knowledge to the artist/investigator. In Haeckel’s relational theory of

²⁰ Allen & Hoekstra (1992) p. 87. Allen and Hoekstra define scale-independent patterns found in the landscape as “meanders, spirals, explosions, and branching systems.”

²¹ Vernadsky (1998).

²² *Ibid.*, p. 61.

²³ Liebenberg (1990).

²⁴ Abram (1996), p. 262.

²⁵ See Haeckel (1998).

²⁶ Hesse-Honegger (2001), p. 7. I recognize that when practicing ABPE the investigator connects with a preverbal or precognitive, subconscious level, revealing worlds unavailable to sight alone.

nature, he suggests it may not be so much an extension of nature's knowledge as it is a recapitulation of the original knowledge held within the organism.²⁷

The sacred qualities of landscapes, as well as the interactions between humans and their environment, are heightened and remembered through symbolic art forms.²⁸ The arts, an early human language, internalized the external world. In hunter-gatherer societies, the arts codified one's experience, acted as a language translator, and made possible the information exchange necessary for survival.²⁹ Art-making as an intermediary, moves one across boundaries, and specifically, as J. Davis and S. Lawrence-Lightfoot tell us in *The art and science of portraiture*, across "boundaries between experience and representation, the temporal boundaries between past and present, and the cultural boundaries between individual and humankind."³⁰

Art forms, such as dance and music, began as an activity derived from the rhythmic imitation of animals, of flowing waters and birdsong.³¹ Congruent with history, many contemporary artists see art as an expression of the experience of 'being' in the world. In the gestalt art experience, the image, or marks drawn on the page, represents the artist actively living through an event, the graphic record of the intelligence of the body in relationship to place or phenomenon.³²

In the world of science, before photography, scientists/artists such as Goethe (1749-1832), Darwin (1809-1882) and Haeckel (1834-1919) relied heavily on visual communication to explain their discoveries.³³ Intentional questions asked by the investigator of the subject being studied guided drawings and illustrations: What do you look like? What are you made of? These intentional questions suggest a willingness of the investigator to be a full participant in the process of knowing, recognition that self is inconceivable without the Other.³⁴

Images exist as a universal phenomenon that everyone experiences in different venues, through dreams, the mind's eye, reverie, and imagination.³⁵ Art-making is one process of giving images form.³⁶ The arts offer a means of expression and communication, a symbolic language. Ricoeur describes metaphor as a "figure of discourse."³⁷ Metaphor

²⁷ See Haeckel (1998).

²⁸ Shepard (1996)

²⁹ Biesele (1983); Dissanayake (1992); Liebenberg (1990).

³⁰ Davis & Lawrence-Lightfoot (1997), p. 21.

³¹ Feld & Basso (1996); Nabhan (1997); Shepard (1978).

³² Rhyne (1984).

³³ Hesse-Honegger (2001); Seamon & Zajonc (1998).

³⁴ Sloan (1993). In modern science, physics recognizes that all knowing is a participation of the subject in the object.

³⁵ Allen (1995); Bachelard (1983).

³⁶ See Allen (1995). Art is energy made visible.

³⁷ Ricoeur (1984).

takes the seemingly unrelated and possibly ‘incompatible’ phenomena and produces a “new semantic relationship through their juxtaposition.”³⁸ Images, also known as transitional objects,³⁹ like metaphor, cross the boundaries of the normal and everyday use of language.⁴⁰ The arts support the construction of new knowledge, as art; in the same way metaphor provides a breakthrough into a dimension of intelligibility previously inaccessible.⁴¹

In this article, I propose a way of thinking about landscapes and a method of art-making in which people can experience the biosphere as it unfolds and refolds, on a perpetual basis. When practicing ABPE, the land is revealed – through the process of art-making – as levels of complexity, or layers. During the art-making process, these layers rise to the surface of one’s consciousness and present a tangible awareness, an unveiling of sorts, of the networks of relationships embedded in larger networks known as Earth’s systems. As an art product, the image created during the art-making process is important to the ABPE process. I recognize the image as a symbol, or transitional object, that represents the language of what one feels (intuition), with what can be touched (direct experience in landscapes), and things that cannot be seen (mysticism), producing a new semantic representation through their juxtaposition. And further, ABPE recognizes art as a language within itself, which as J. Dewey says, “speaks an idiom that conveys what cannot be said in another language and yet remains the same.”⁴²

Practicing ABPE in landscapes, allows the investigator/researcher to know multiple dimensions of the land otherwise unknowable and unattainable by sight alone. This experience builds on an ecological knowing of landscapes and provides the researcher with a greater understanding of the depth and dimensionality inherent in the organism and in the landscape.⁴³

³⁸ Gallas (1994) p. 100.

³⁹ Beres (1960, 1965) Beres describes three levels to the system involved in the coding of human experiences. At the first level is the sense-data collection of the primary modalities, the pre-perceptual phase. The next level is the organization of these primary sensations into percepts. Perception becomes the process of making meaning out of sensation; perception and sensation work in tandem as the body interfaces with the environment. The third level of perception becomes a mental representation of something not actually present to the senses at that time. “Symbolism is one type of mental representation among several, but a crucial one since it provides the building blocks for more complex mental representation: images, fantasies, thoughts, concepts, dreams, hallucinations, symptoms, and language” (Beres, 1960 p. 329). I suggest that the image as the symbol can also be considered a transitional object that connects me to my relationship with place.

⁴⁰ Gallas (1994).

⁴¹ Sloan (1993).

⁴² Dewey (1980) p.106.

⁴³ See Woolery (1999). The ten steps of ABPE lead the investigator to a deeper awareness of dimensionality in the landscape. This experience builds on an ecological knowing of landscapes and provides the researcher with a greater understanding of the depth and dimensionality inherent in the organism and in the landscape.

The image

The image, created when practicing ABPE, is a recapitulation of the subject being studied, communicating the patterns or vernacular of place, offering an opportunity to know the land's stories, first-hand. The image becomes a graphic record of the intelligence of the researcher's body in relationship to place – an embodiment of the knowledge held within a singular landscape, adding depth to one's understanding and ecological knowing of landscapes. The image makes the implicit explicit and the invisible visible. When I practice ABPE, as the investigator, I recognize, "The image lent me the ability to be aware of more than my eyes alone could see."

When practicing the ABPE method, the knowledge of an organism being studied – in its basic form, which is energy – transfers to the investigator, who then embodies the organism's knowledge through a phenomenological relationship. The image, which is energy made tangible⁴⁴ emerges as the investigator kinesthetically engages with the place. Through this kinesthetic act, the investigator transforms from viewer to active participant. I refer to this energy exchange as *patterns of participation*.⁴⁵ The body becomes the graphic interpreter. In the act of art-making – one actively lives through the event as energy is exchanged between the investigator and the organism.⁴⁶ The *energy exchange* remains vital to the ABPE process.

Development of place-based graphic facsimile method

During my first field research in Washington in the early 2000's, I developed a new ABPE method called a *place-based graphic facsimile*. This particular method stems from my professional training as an art therapist during my graduate studies, where I learned multiple methods of observation and dialogue framed in various therapeutic modalities.⁴⁷ At that time, my subjects included clients. As I continued to develop ABPE, I considered how the tools of observation and dialogue for studying humans might translate to my current subject of study: living organisms in the landscape.

As a student studying art therapy, one method that stuck with me due to my interest in embodied knowledge was the facsimile. This method was introduced to me by a

⁴⁴ See Allen (1995). Art is energy made visible.

⁴⁵ Woolery (1999).

⁴⁶ See Rhyne (1984). In the gestalt art experience, the image or marks drawn on the page represent the artist actively living through an event, the graphic record of the intelligence of the body in relationship to place or phenomenon.

⁴⁷ I was trained in various art therapy theories and methods in the Art Therapy department at The School of the Art Institute of Chicago during 1994-1996. The seminal authors I studied included: Edith Kramer, Margaret Naumburg, Florence Cane, Don Sieden, Robert Ault, Judith Rubin, Janie Rhyne, Shaun McNiff, Pat Allen and David Henley among others.

supervisor at one of my practicum sites. The facsimile method requires a re-creation of the client's artwork – an art-making process in real time – which provides a means to know and understand the individual. Ideally, during the act of drawing the facsimile, the art therapist lives the experience of the client (in real time and as closely as possible), by re-creating his or her art in exact detail – every point, line, and tint or shade of color. During the creation of a facsimile, it remains important to create an exact replication of the art; but equally significant is to mirror the client's body language as they engage in the art-making process. Body language offers a nonverbal form of communication, where thoughts or feelings are expressed by physical behaviors – such as facial expressions, body posture, gestures, and eye movement. Reading body language provides another way to know the client through nonverbal communication.

Imagine the therapist, as she sits across the table from the client. In an attempt to match the exact weight of a particular mark the client makes with her art tool, the therapist uses the same brand of pencil on the same weight of paper and presses with the same intensity. The therapist engages her body in a similar position used by the client, applying more or less pressure depending on what was used by the client. This time-consuming attention to detail leads to varying degrees of an *embodied knowing*.⁴⁸ The client's artwork – and his or her body, in the making of the art – communicates something about the self. Creating a facsimile of the original art product, in real time, allows the therapist to know another side of the client that may not be revealed if only engaged in talk therapy. And creating a facsimile allows the therapist to know what the client may be communicating through body language or expressing in the artwork. Therefore, my studies in art therapy support my belief that the image links to the unconscious. Later in the article I share how through practicing ABPE in landscapes, the image connects the researcher with the language of place.

ABPE: A way to monitor the assessment of rainfall and vegetation in a ciénaga community at Sonoita Creek, Patagonia, Arizona, USA

My interest in art as a way of knowing the language of place, brings me to southeastern Arizona. I am here to explore alternative or non-traditional monitoring methods of rainfall and vegetation in this floodplain by practicing the place-based graphic facsimile method. Here, I offer my story.

In the midmorning light of southeastern Arizona, I stand eye to eye with a spiny lizard, its belly ripe and full, and movements sluggish, unperturbed by my presence. Typically,

⁴⁸ Embodied knowing can be understood by looking at the definition for phenomenology: the study of direct experience through the senses; it is our body in relationship to the world around us. Edmund Husserl in the early 1900's articulated phenomenology as "the world as it is experienced in its felt immediacy".

this reptile offers a colorful display of pattern; however, this morning, the lizard's colors appear much darker as it continues to absorb heat – warming its body after a night in this cool, riparian ecosystem.⁴⁹

Sonoita Creek, a riparian corridor, its banks lined with cottonwood and sycamore trees, is an oasis, a green jewel glowing in the midst of an arid land. Only a few *ciénagas* remain.⁵⁰ As a registered natural landmark, Sonoita Creek maintains 300 acres of deciduous woodland, with one of the largest stands of Fremont Cottonwood trees in the country. In addition, the creek supports the Arizona black walnut, velvet mesquite, velvet ash, canyon hackberry, and various willows. This perennial stream feeds off surface and underground streams and sits at 4,900 feet in elevation. The creek provides one of the last remaining riparian habitats in the Arizona Upland region, a subdivision of the Sonoran Desert. The ecosystem's rich biodiversity is due to two wet seasons, which contribute an average of twelve inches of rain per year.⁵¹

Rainfall in this region proves undependable, and lacks a consistent pattern. A single storm may produce a full year's amount of rainfall – in one area; yet, the same storm may offer only a sprinkling of rain within an adjacent area. The monsoon or rainy season offers the first season of the cyclical calendar, as noted by the original people of the desert landscape – the Tohono O'odham. Monsoon season is followed by autumn (Oct. & Nov.), then winter – characterized by the gentler rains of the season – (Dec. & Jan.), spring (early to late Feb. to Apr.) and fore summer (May & June).⁵²

This morning, I traveled to the *ciénaga* on foot from the Rio Santa Cruz, a parent stream of Sonoita Creek. The Santa Cruz River, a predominately dry riverbed, begins in the San Rafael Valley and follows the southern end of the Patagonia Mountains in Sonora, Mexico before flowing back into the U.S., crossing the border at Nogales, Arizona. Sitting in the sandy bottom at the edge of Sonoita Creek looking up at the vast cloudless turquoise sky, I think about the power of rain in this dry desert. I am visiting in the middle of February, or the fourth season of the Arizona Upland Region. The temperature offers mild: 70's warmth in the daytime and low 30's at night. The area is ringed by a system of valleys and towering mountains. The Patagonia Mountains connect the Chiricahua, forming the lower half of the Sierra Madre. This system of valleys and

⁴⁹ A riparian ecosystem is the interface between land and a river or stream. Riparian is also the proper nomenclature for one of the fifteen terrestrial biomes of the earth. Plant habitats and communities along the river margins and banks are called riparian vegetation, characterized by hydrophilic plants. These zones are important natural biofilters.

⁵⁰ Dimmitt (2000). *Ciénega* or *Ciénaga* – is a spring that is usually a wet, marshy area at the foot of a mountain, in a canyon, or on the edge of a grassland where groundwater bubbles to the surface. Often, a *Ciénaga* does not drain into a stream, but evaporates, forming a small *playa*. Because evaporation usually causes the water to be alkaline, vegetation around a *Ciénaga* commonly includes halophytes, among which one would find many unusual, rare, and endangered species.

⁵¹ Dimmitt (2000).

⁵² *Ibid.*

mountains deter rain away from the region much of the year.

Directly in front of me resides a downed Fremont Cottonwood tree, sprawled across the curvature of the bank where it meets the clear, seasonal waters of this stream. The log, 12-feet in circumference, captured a large quantity of detritus from earlier floods. Detritus is dead organic material, such as leaves, bark, and needles, and fallen twigs, or (in this case) twigs washed downstream. This organic material enriches the top layer of surrounding soil, known as the litter layer, or O horizon. The litter layer, also known as litterfall, is characterized as fresh plant debris that is easily recognizable – by species and type. Ecologists remain interested in litterfall, as an instrumental factor in ecosystem dynamics. Litterfall provides indicators of ecological productivity and aids ecologists in predicting regional nutrient cycling and soil fertility.⁵³

The organic shapes and forms of the tangled humus grab my eye and I take visual measurements of the log's position in relationship to the edge of the washed bank. I notice the height, width, and depth of the duff, along the bank's edge, the remains of the flood. Since my last visit to this exact locale a year ago, I detect a reduction in accumulated floodwater debris along the bank reflecting a decrease in rainfall.

With the downed cottonwood tree directly in front of me, I am now ready to make art and practice the place-based graphic facsimile method. My plan includes recreating the relationships between the floodwaters and the plant litter collected by this cottonwood tree through this image-making process. I choose a black fine point marker and a medium-weight drawing paper. In my attempt to recreate the view in front of me, I match the weight of a particular line – the lacy thin edge of the frayed sycamore leaf – by lessening the pressure on the pen. Next, I use a heavier touch of the pen to denote the disintegration – the breaking down of the leaf litter – of the slender willow leaf. The facsimile I create includes a visual graphic of the relationship of each natural element to one another – the lines, shapes, color, forms, and patterns – communicating weight, tension and balance among other things (Figure 1).

⁵³ Litterfall is an instrumental factor in ecosystem dynamics; it is indicative of ecological productivity, and it aids ecologists in predicting regional nutrient cycling and soil fertility.



Figure 1: The place-based graphic facsimile created at this site is a record of the intelligence of my body in relationship to this place, the flooded debris. The image represents a translation of the language of place as I find myself a fluent speaker of the native language of this landscape



Figure 2: Detail of place-based graphic facsimile

Recreating the build-up of layer upon layer of flood detritus through the image-making process requires much time. I sit at this site for over three hours without standing, continuously working back and forth between observation and drawing. Working in black and white and eliminating color from my palette allows me to concentrate on the full *gestalt* of the landscape and not get distracted by individual elements in my view.⁵⁴ However, an investment of time proves critical to conveying the embodied knowing of this section of plant litter, which I directly experience in the ABPE process; as such, I begin to understand volume and velocity as they relate to the force of water that manipulated and shaped mesquite limbs and animal scat against the downed log.

One way to think of this exercise is through these terms: in a gestalt notion, the whole equals more than the sum of its parts. One can envision the total subject by seeing the whole and seeing the relationship of the parts. When concentrating on the gestalt, one perceives differences and similarities, light and dark, form and mass. By shifting one's focus of attention, details surface. The parts form patterns to which one can respond. By developing a detailed graphic facsimile of the parts of the flooded area this singular collection of detritus, and by observing the relationship of these parts, one sees the whole – the biogeochemical system or the nutrient cycling system of this *ciénaga* community. The data offer detail of the organic material as well as provide information on the volume of rainfall and velocity of the water during flooding. The totality of this multi-layered data further inform the quality of life and the biodiversity available in this one *ciénaga* community.

It should be noted that a place-based graphic facsimile differs from photographic realism and observational nature drawing. The goal is not to reproduce the view exactly as seen with the eyes. Rather, the graphic facsimile is an embodiment of place synthesized through one's body, through a full sensory exploration that results in the recapitulation of place as revealed in the image.⁵⁵ In the art-making process, the investigator internalizes and absorbs this organic entity through her senses, smelling its lush warm deterioration, touching the velvet smoothness of microorganisms forming on its skin, tasting the fine powdery dry air, organic material filtered over time. By sensing the detritus through the whole body, a transference of energy is taking place, the energy

⁵⁴ *Gestalt* is the German word for organic form. Around the turn of the century Christian von Ehrenfels was first to use the term *gestalt* in the sense of an irreducible perceptual pattern. Leading the way for systems thinking later, von Ehrenfels characterized *gestalt* as asserting that the whole is more than the sum of its parts. Following in their footsteps were Gestalt psychologists Wertheimer and Kohler “who saw the existence of irreducible wholes as a key aspect of perception. Living organisms, they asserted, perceive things not in terms of isolated elements, but as integrated perceptual patterns – meaningful organized wholes, which exhibit qualities that are absent in their parts” (Capra, 1996, p. 32).

⁵⁵ See Haeckel (1998) on recapitulation.

from the body of the earth is processed through one's own body. The third step takes place as the investigator creates the image: the earth's energy is transferred and reflected in the image through the kinesthetic act of drawing. In the act, the researcher actively lives through the experience and the drawing becomes a visible, graphic record of the sensorial exchange; a record of a sensation perceived.⁵⁶ In this practice, I know the earth's energy or wisdom is transferred through my body and reflected in the image. I trust my experiential data as being accurate.⁵⁷

Patterns are the language. The image is the vocabulary

Another way to think of this practice is to conceive of it as capturing the language of the land as it speaks to us through its body. The land's communication system expresses itself in cues and codes, logos and signs. Practicing the place-based graphic facsimile helps one to recognize, to become aware of, what the land is telling us through these gestures. In Figure 1, the land's stories are expressed through the image as line, shape, and form, communicating the codes, rhythms and patterns of the landscape – depicting the water's movement, the biodiversity of the landscape and the phenology, as it engages with the independent Others in this *ciénaga* community.⁵⁸

Practicing ABPE methods, the investigator takes one frame of the earth's process and fixes it in time – the image freezes time on the page. Making art in this intentional way is integral to and causes one to slow one's pace. This allows the investigator to be more present in the moment, enabling her to notice detail that she otherwise would not be aware of.⁵⁹

Creating the image through the place-based graphic facsimile method changes one's perspective of the subject being studied and potentially leads the researcher to form new questions in the mind. In the art-making process, one opens to the unknown. One moves between the abstract and metaphorical leading to the concrete – the image framing the concrete idea. Employing painting as a non-conventional personal narrative research methodology is a form of art-making that helps us to work out, reorganize and clarify

⁵⁶ Beres (1965).

⁵⁷ See Rhyne (1984) on experiential data.

⁵⁸ See Abram (1996) for description of independent Others. Independent Others are our ancestors, mammals and primates and are a part of the animate beings of the landscape. Animate does not only refer to that which we know to be alive, animals, but all phenomena. The quality of being animated calls us to participate through our senses, as it influences and engages us bodily. The word *animate* derives from a Latin word signifying soul or breath. Among its meanings in the dictionary are *to give spirit to* or *to energize*. Abram (1996) suggests that animate does not only refer to that which we know to be alive, such as animals, but to all phenomena as it calls us to participate through our senses. It influences and engages us bodily.

⁵⁹ Woolery (1999). See the ten steps of ABPE that lead to ability to notice detail in the landscape in my doctoral dissertation (2006).

questions that arise during the process, according to health care worker Karen Scott-Hoy.⁶⁰ Asking “what if” questions during this process can also lead to the generation of new ideas and possibly to unexplored research questions.

Additionally, the art-making clarifies these crucial points of inquiry through the process of picturing; rendering embodied knowing into conscious understanding of the subject.⁶¹ As an example of how the investigator would engage in ABPE, she meticulously draws the thickness of the compressed detritus against the log, layer for layer. Questions arise in the investigator’s mind: “If I count the number of swirls in the leaf litter and consider the structure, depth, placement and density of each swirl, then can I know the volume and velocity of water at the height of flooding? Or, if I investigate with fine detail the composition of the compressed litter, could I know the terrestrial plant species within this particular community?” This non-traditional means of monitoring and assessing rainfall and vegetation does not reveal all of the answers; however, when explored in unison with Western scientific-based investigations, this method could surface questions otherwise not considered by ecologists and thus provide uncharted direction for global environmental change research and conservation efforts.

Traditional methods used by ecologists, such as litterfall sampling, center around one piece of equipment known as a litterbag. Ecologists study decomposition of the litter layer by placing fresh litter collected in the litterbag directly on the ground, allowing time for decomposers to interact with the litter then collecting and analyzing the data using an exponential decay pattern equation to quantify litterfall production and chemical composition over time. Developing an art-based longitudinal study alongside traditional Western science methods, to record historical changes in vegetation in this riparian community, could provide outstanding results. Working collaboratively with researchers across the globe and sharing data could contribute to the further understanding of biospheric changes at similar ciénaga communities around the world.

Summary

The results of my doctoral research published in 2006 – *Art-Based Perceptual Ecology as a way of knowing the language of place* – demonstrated two outcomes: 1) that the image created in ABPE practices reveals the land’s stories and leads one to clues of the evolutionary history of the land; 2) that practicing ABPE leads to the emergence of sensory capabilities beyond sight, which provide a shift in awareness, and open the investigator to detail in the landscape, at scales previously unnoticed.

⁶⁰ See Scott-Hoy (2003).

⁶¹ Ibid.

In this present article, I propose ABPE methods – such as the place-based graphic facsimile – to detect undiscovered capabilities of the human sensory system. The place-based graphic facsimile offers an alternative way of experiencing our planet, experiencing phenomena which remain invisible unless we activate this inherent and sensory process. What we could experience through alternative methods are phenomena such as acoustic emissions, bioelectrical charges, biogeochemical changes, or the electromagnetic spectrum in the landscape. ABPE methodologies may offer the means by which humans reconnect to a pre-discursive (mimetic) language, a sentient⁶² language our ancestors used to communicate with the animate world.

Investigating problems and solutions from an educator's perspective

My investigations surfaced three substantive concerns that can lead to our inability as human beings to embody the knowledge and wisdom of nature: (a) the prevailing emphasis on singular modes of knowing in the current Western educational construct; (b) the human disconnect with the natural world; and (c) the loss of natural habitat and place-based knowledge. There is a direct relationship between these substantive issues. I presented (b) and (c) in the beginning of the article and will explain (a) here.

The problem of valuing singular modes of knowing and thinking

A positivistic view of knowledge holds that only formal propositions can, in principle, provide knowledge. Our Western educational systems strive for standardization in imparting knowledge and assessing intelligence, focusing on a linear means of investigation and narrowing the available constructs that ensure success. In most public educational systems framed in a Western European paradigm, as soon as children enter school they are persuaded to let go of their inherent ways of understanding the world. Instead, as Karen Gallas tells us, they are required to adopt a “linear language style in which logic prevails, a style that represents almost exclusively a hierarchical, convergent, ‘scientific’ way of ordering the world.”⁶³ Missing in this monistic methodology is recognition and support of students whose intelligence or learning style does not follow a

⁶² The term sentient refers to having sense perception, experiencing sensation or feeling. According to Margulis and Sagan, bacteria “...sense chemical differences in their surroundings and, accordingly, swim toward sugar and away from acid; they sense and avoid heat, move away from light or toward it, some bacteria can even detect magnetic fields” (1995, p. 179). According to Maturana and Varela’s (1980) Santiago theory, even the simplest organisms are capable of perception and thus of cognition. Sentient language is a means of communication by sentient beings. It is known in modern science that trees communicate with one another and that plants can recognize danger and warn other plants of that danger. It is believed by some that early humans had the capability of interspecies communication with other sentient beings.

⁶³ Gallas (1994) p. 16.

line of hierarchical, convergent way of ordering the world.⁶⁴ Additionally, we find little support in public schools for students who would possibly benefit from having access to other ways of knowing.

The scholars Galileo, Einstein and McClintock have historically been known as divergent thinkers – non-conforming critical thinkers. Trusting in her intuition is what allowed genetic scientist Barbara McClintock to reveal the deep mysteries of maize genetics. McClintock acknowledged she used an internal vision in her scientific inquiry. She admitted she took the time to look and hear what the maize had to say and the openness to let it come to her. Her intuition was an internal knowing of that which was not evident or deducible. She would say she had a feeling for the organism.⁶⁵ Another creative process for knowledge construction is imagination, the means of forming images in the mind.⁶⁶ Einstein acknowledged his use of imagination as he tested theories of science. Honoring multiple truths or realities requires redefining our understandings of the very nature of mind, knowledge, and intelligence.⁶⁷ This is not an easy task. Additionally, as Eisner reminds us in his article entitled “On the differences between scientific and artistic approaches to qualitative inquiry,” the language and system of discourse we choose mediates and defines the very experience we attempt to describe so we must find pluralistic methods of inquiry and ways of discourse.⁶⁸

Why do we need plurality in modes of knowing?

In the postmodern era, boundaries of traditional perspectives on inquiry and knowledge are shifting to modes of expression and representation which yield a more holistic understanding of the phenomenon being studied.⁶⁹ I encourage ecologists in the field when choosing their research methods to consider new modes of knowing, for it is important to recall what Hervey said: “the ultimate purpose of research, and art is to communicate a new vision or understanding of a phenomenon.”⁷⁰

Many intelligent individuals with sensibilities beyond the norm are overlooked in our society, because they do not represent the standards in our educational systems or cultural constructs. It may be that these very individuals who are overlooked – young children, artists, poets, painters, musicians, and writers – are the members of our society most likely to hold the sensibilities necessary to cultivate the dialogue with the animate

⁶⁴ Gardner (1999); Guild (1998).

⁶⁵ Fox Keller (1983).

⁶⁶ Singer (1980); Warnock (1976).

⁶⁷ Eisner (1985).

⁶⁸ Eisner (1981).

⁶⁹ Slattery (2001).

⁷⁰ Hervey (2000), p. 64.

landscape. A dialogue of grand proportions is needed to reverse the demise of our current estranged relationship with nature.

In our current monistic society, the human species continues to move away from an appreciation of divergent ways of knowing, such as intuitive, emotional and embodied as well as indigenous ways of knowing. In this article, I assert the significance of recognizing the self as whole: mind, body and spirit. Furthermore, I posit that the self is not a singular entity; rather, it is nested in a whole cast of participating Others. In an increasingly divided and unstable environment, we can no longer think of ourselves as being separate or delineated from the whole; alternatively, we must embrace the fact that we exist as a part of the whole, thus reflecting Gibson's ecological model of perception – the world and we are inseparable.⁷¹

There is an ethical foundation for the work as well. To learn pluralistic ways in which to perceive the landscape, we may come to know the place in which we live, finding connections with the local habitat. Achieving this multi-dimensional sense of place may contribute to a deep ethic of caring about the environment. Connected to landscapes, we are more likely to be good stewards of our ecological and cultural communities.⁷²

Conclusion

Using a non-traditional means of monitoring and assessing rainfall and vegetation, such as the ABPE place-based graphic facsimile method, cannot provide all of the answers. Instead, I recommend employing this method in unison with Western science-based methods. If we consider ecological systems through the lens of whole-systems theory, then the investigator would do well to utilize methods and questions that adhere to a holistic approach. Art as a way of knowing provides a good place to begin. In my ongoing dialogue on art-based research methods I consider the following quote of Bochner and Ellis as having great value: “Imagination is as important as rigor, meanings as important as facts, and the heart as important as the mind.”⁷³ In our current situation, art and science can complement one another by working together in the service of biospheric change and environmental sustainability. When practicing ABPE in the Sonoran Desert, I engaged in dialogue with the place, opened to the unknown and new questions arose. Sharing my work with ecologists has stimulated interest in non-traditional ways of knowing and led them to new perceptions and questions about their research in the landscape. This is the first step: awareness. As I have the opportunity to take more

⁷¹ Gibson (1983). In his ecological model of perception, we walk through this world “with-the-eyes-in-the-head-on-the-body-resting-on-the-ground.”

⁷² Thomashow (2002).

⁷³ Bochner & Ellis (2003), p. 506.

researchers out into the field to engage in ABPE methods, it may lead to new research and potentially new solutions to environmental issues. This is more than hope, it is a plan that I am currently engaged in. It is a slow process but I believe we are moving in the right direction toward a new vision and understanding of our world.

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