Gaian Methodologies – An Emergent Confluence of Sustainability Research Innovation

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Abstract

How does the Earth conduct research? How can we model our own methods on the way the Earth researches? **Four key directives** unify Gaian Methods: **embed and embody, connect and collaborate, extend and extol, and thrum and thrive**. These four qualities provide clarion guidance for designing sustainability curricula and research.

Six images demonstrate how these four characteristics of Gaian Methods are coming to life and producing research innovation globally: **the planet, the web, the heart, the dance, the organic, and the ranch**. **The planet**: scientists and philsosophers converging on the planet as a living system generate the Gaia Hypothesis/Gaia Theory, pivotally informing Gaian methods. The **web**: the complexity web of methodological emergence demonstrates the transdisciplinary power of Gaian inquiry in bridging silos and sparking powerful campus collaborations. The **heart**: ecospiritual insights from science and across spiritualities about human-Earth relationships are increasing holism and diversity in research. The **dance**: multisensory embodiment brings the researcher and her Earth-body into direct aliveness, incorporating leading edge mind/body research to bring sustainability education to life. The **organic**: organic inquiry demonstrates how Gaian methods can mirror natural processes where the deep inner and outer experiences of researchers parallel the processes and systems of the Earth. The **ranch**: rigorous ethnographies utilizing Gaian approaches are surfacing how women ranchers become ecojustice educators through their experience of ecocentric connection with the living systems of the land. Each of the six sections of the following paper expresses the verve of one of these six doorways into Gaian Methods.

Keywords

Gaia Hypothesis, Gaia Theory, Gaian Method, Gaian Methodology, Earth research, complexity, emergence, ecospirituality, embodiment, organic inquiry, synchronicity, ecojustice education, women ranchers, ecocentric insight, dance, emergent education, sustainability education sustainability research.

Overview- Framework and Highlights

Marna Hauk

Framework

In a time when we sense the world as a living globe of interconnecting life, our sense of the planetary can increasingly inform our research and educational approaches. Many scholars have been profoundly affected, for example, by the view of the Earth from space as a unitary, cloud-swirled blue sphere. Others have a sense of the connected fates of wild oceans and clean air, species and language biocultural diversity, and flexibly thinking, healthy humans. Other research traditions, ancient and modern, deeply dedicate their work to actively enhancing the life and living systems of the planet. Gaian methodology is a superset of research methods to ensure that our academic explorations are sourced from and promote the life of a living, interconnected planet.

Gaian Methods and Methodologies flourish as a green and growing global research convergence. Sustainability extends beyond campus infrastructure; nature's design and organizing insights and patterns can inform research methods and guide research. Earth research insights are converging from the areas of complexity theory, ecophilosophy and ecopsychology, Gaia Hypothesis/Gaia Theory, healing traditions, indigenous wisdom and ethno-ecology, organic inquiry, ethnography, and multisensory embodiment.

This paper explores the theory and practice of Gaian methodologies- the roots, stems, flowering, and growing seeds of this fertile research space. Cutting edge research institutions, hands-on educators, and mixed methods researchers will want to understand this emerging field and discuss and explore its transdisciplinary and social justice possibilities. Ongoing research

and a community of practice are forming around Gaian methods at http://www.earthregenerative.org/gaiamethods.

Gaian methods are relevant across the academy. The Sustainability Officer or Professor is not just the Lorax of the physical plant but rather the herald of methodological innovation. This paper's authors bring dozens of years of experience in land-based community ethnography, ecological action research, and creative arts qualitative approaches to provide both academic constructs and scintillating examples of Gaian Methods in action.

Gaian Methods catalyze a just and sustainable world by bringing the fruits of sustainability into the methods of the research lab and field course as well as campus design. The paper explores six directions regarding how Gaian Methods are infusing rigor, connection, and justice into higher education.

We visualize Gaian Methodologies as a green and growing global research convergence of several approaches (see Figure 1):

- Complexity theory (including Emergence)
- Ecophilosophy (Deep Ecology, Philosophy, Ecopsychology, Planetary Evolution)
- Ecospirituality (including Animism, Judaism, Buddhism, and Earth-based paths)
- Gaia Hypothesis and Gaia Theory as Applied to Methods
- Healing, Ethnoecology, and Shamanism
- Multisensory Embodiment (including Organic Inquiry, Arts Based Inquiry, Embodiment/Experiential, Feminism/Ecofeminism, Observation as Inquiry, Mindfulness and Contemplative Inquiry, and Poetic Inquiry).

In short, these converging approaches each bring unique insights to Gaian Methods. Complexity theory includes the study of autopoeisis, the genesis of new life, as well as whole systems theory and design, and the study of the emergence of ever greater complexity. In ecophilosophy, ecology offers constructs for human knowledge systems, including deep ecology and integral theory as examples. Ecospirituality offers the fertile space where spiritual traditions interface with sustainability and ecology. Gaia Theory involves the modern instance of the ancient insight

that the planet is alive, in this case scientifically understood as the interconnecting emergent systems of planetary geophysiology. Shamanism, ethnoecology, and healing bring the oldest Earth wisdom and methods to the research conversation. And embodiment awakens sensory activation and includes our vibrant senses as primary research data.

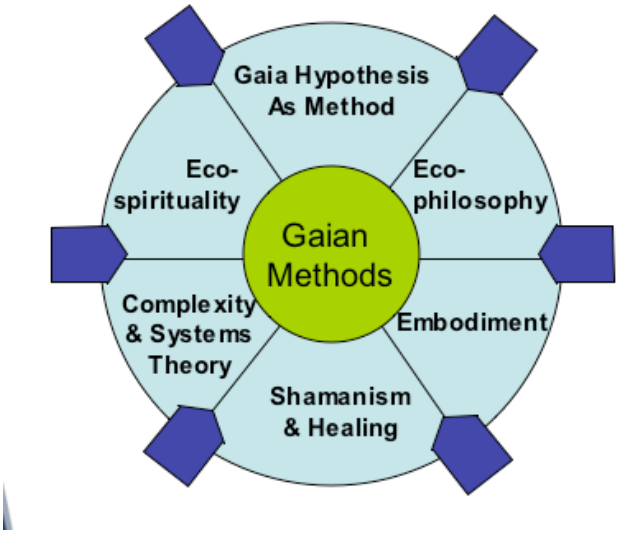

Figure 1 Converging Approaches Informing Gaian Methods

Prescott College Professor Pramod Parajuli (2008) coined the term "Gaian Methodologies" as a mode of scholarly inquiry. The research of Marna Hauk, Aimee deChambeau, and Judith Landsman (2010) synthesized the movements in the field. Gaian methodologies include multisensory, interdisciplinary inquiry at the intersection of multiple "scapes," including the bodyscape, landscape, lightscape, etc. (Parajuli, 2008). Collectively, Gaian methodologies provide a robust set of approaches, tools, and families of processes for understanding planetary systems and insights and for innovating research from planetary perspectives and connections.

Highlights

How does the Earth conduct research? How can we model our own methods on the way the Earth researches? **Four key directives unify Gaian Methods: embed and embody, connect and collaborate, extend and extol, and thrum and thrive**. These four qualities provide clarion guidance for designing sustainability curricula and research.

Six images demonstrate how these four characteristics of Gaian Methods are coming to life and producing research innovation globally: **the planet, the web, the heart, the dance, the organic, and the ranch**. **The planet**: scientists and philosophers converge on the planet as a living system to generate the Gaia Hypothesis/Gaia Theory, pivotally informing Gaian methods. The **web**: the complexity web of methodological emergence demonstrates the transdisciplinary power of Gaian inquiry in bridging silos and sparking powerful campus collaborations. The **heart**: ecospiritual insights from science and across spiritualities about human-Earth relationships are increasing holism and diversity in research. The **dance**: multisensory embodiment brings the researcher and her Earth-body into direct aliveness, incorporating leading mind/body research to bring sustainability education to life. The **organic**: organic inquiry demonstrates how Gaian methods can mirror natural processes where the deep inner and outer synchronistic experiences of researchers parallel the processes and systems of the Earth. The **ranch**: rigorous ethnographies utilizing Gaian approaches are surfacing how women ranchers become ecojustice educators through their experience of ecocentric connection with the living systems of the land. Each of the six sections of the following paper expresses the verve of one of these six doorways into Gaian Methods.

A Note on Methods

> "Rhizovocality, in its multiplicity and contingency, is difference within and between and among; it highlights the irruptive, disruptive, yet interconnected nature of positioned voices (including the researcher's) that are discursively

> formed and that are historically and socially determined – irrupting from discursive pressures within/against/outside the research process. Locating the coordinates of irruption and following a line of flight enables the Trickster to 'blow apart strata, cut roots, and make new connections'(Deleuze & Guattari, 1987, p. 15)." (Jackson, 2003, p. 706-707)

As noted by N. Cox Caniglia in this paper's last section, Jackson (2003) extends the application of the growth patterns of rhizomes (Deleuze & Guattari) and the musical notion of vocality to develop a poststructural feminist qualitative research approach termed rhizovocality. Jackson applies these concepts of nonlinear growth of rhizome roots to feminist voice in qualitative research, generating a model of emergence and connection: emancipative and interconnected irruption; positioned, aware situating of the researcher, especially when speaking for Other; deconstructing meaning and voice: arriving at a Trickster rhizovocality.

Four women authored the current paper, and we relied on the organic integrity of rhizovocality (Jackson, 2003), of overlapping, uprising, groundswelling, and intersecting insights and research, to inform our work. As we are sketching out the qualities and characteristics of a complex, emergent set of planetary systems research methods, we required an approach that was sufficiently large and complex.

In this paper, we use both the terms Gaian Methods and Gaian Methodologies. There is a difference, with overlap, between, methods and methodologies. Clingan (2008) distinguishes methods as steps or procedures used to conduct the research whereas methodologies are "'a body of practices or methods'… the theories or the critical lenses through which you interpret your data" (p. 4-6). She also notes that there can be considerable overlap, particularly in qualitative research, between methods and methodologies, "since many methods are founded on ideological or philosophical positions." Gaian Methodologies are the larger set of critical and creative lenses by which Gaian Methods or research are interpreted. In this paper, as the methods are often sourced from the viewpoint of the planet as a living system, both terms apply and are loosely

interoperable.

Section 1. Four Characteristics of Gaian Methods

Marna Hauk

Section 1 through 3 of the Gaian Methods paper offers an integrated framework, foundational sourcing, and design principle flourishing for research methods and methodologies inspired by the understanding that the planet is alive. First, distilling four definitional principles that are shared amongst Gaian Methods helps elucidate how these principles also have applications in higher education learning theory and design. Secondly, mapping aspects of Gaian methods onto levels and relationships of complex emergence yields an integrated framework for comprehending the massive opportunities and approaches within Gaian Methods. Thirdly, overviewing the modern roots of Gaian methods in the Gaia Theory and the theory of the Earth as a living emergence provides foundational insight.

There are four themes unifying Gaian methodology. The same principles that unify Gaian methods also serve as insight for how to teach in Gaian ways – these are some of the same tendencies Earth life itself expresses.

- Relationships (especially between and among complex emergents) are primary
- Participants and relationships are embedded and embodied. Most Gaian methods involve the researcher embedded in the research rather than separated from the research in a construct of Cartesian objectivity
- Earth as a living planetary system is important/present to the field of inquiry
- Research places importance on wholeness, life, and living systems (at whatever level of complexity).

These principles can be expressed in four Gaian Methods mottos to be explored in the following passages (see Figure 2 below):

- **Embed and Embody**
- **Connect and Collaborate**
- **Extend and Extol**
- **Thrum and Thrive**

To note, the characteristics of social justice and sustainability orthogonally thread through and permeate all four characteristics of Gaian Methods.

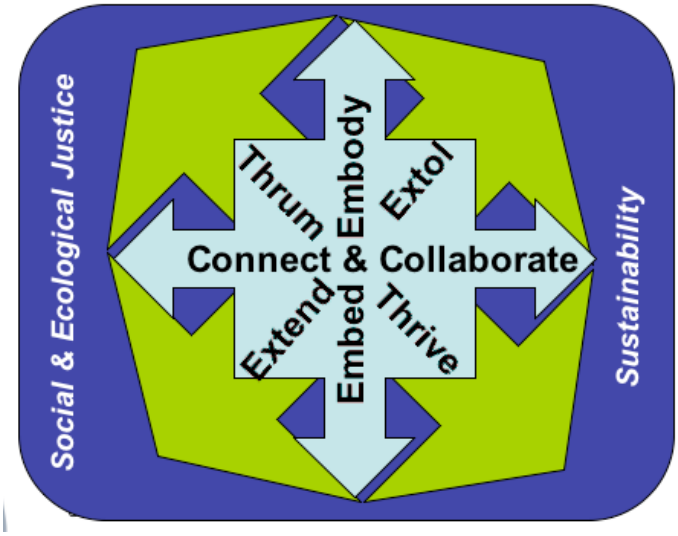

Figure 2 Four Unifying Characteristics of Gaian Methods

Embed and Embody

From our perspective as researchers in our human bodies, we cultivate and notice our multisensory experience, favoring movement and action, aware of how we are embedded in multivalent connection with the vitalizing presences and processes that generate our lively planet: home/body/Earth. We design and participate in research that notices, honors, and privileges sensory experience and the internal phenomenological interplay of oceans in our hands, cloudscapes in velvet, and the taste of peaches. Researchers are in bodies that relate to the Earth's body, using all senses as data: gaze, sniff, savor, listen, touch. We express honesty by noticing how our research is embedded in multivalent contexts. We strive neither to separate ourselves as distant observers nor to separate the focus of research phenomena from surrounding systems and interacting complex and emergent factors. Embedment in systems informs our

research, can itself be the subject of our attention, and elucidates larger, even planetary patterns. This is how the Earth researches!

Connect and Collaborate

As researchers, Gaian methodologies help us to connect and collaborate. Instead of reducing things down, our research expands and spans across. The point is collaboration: how to look for similarity; in effect, the convergent evolution of insights flourishes across disciplines, similar to symbiogenesis: evolutionary advancement through the interaction and collaboration of living forms to create novel, more complex life. How can our research build on and interrelate with other research? How can the active thriving and creativity of participants and co-researchers generate greater wisdom? How can we design research so that it can be highly useful and designed to work across disciplines? With who else on campus and in our communities could we foster greater connection in order to generate novel approaches? Are there other schools or movements, ecosystems, across the entire planet, with whom we could collaborate? Our focus, instead of reduction, is on connection.

"Connect and Collaborate" also relates to ecological approaches; ecology largely understood is the science of relationships. How can our research and its fruits connect learners with planetary process and the appreciation and restoration of the living systems of our selves, campus, neighborhood, bioregion, biome, and planet. How can the research increase connection and generate listening to the wisdom the Earth has to share with us? How can we connect with our co-researchers, include the living systems of the planet as co-researchers? What are forms of validation for our research we can glean from living systems?

Extend and Extol

The researcher must be able to go beyond our own limited perceptual capacities and look across, through, and beyond. As Gaian researchers, we notice how things function and interrelate, how they are mutually nourishing, taking a systems view, focusing on solutions-based research. How can we extend our research into the increasingly complex life of the planet? This relates to emergent properties.

If we think to focus on a campus, how could this research also harvest wisdom that could be extended to other campuses? How can we situate ourselves on the edges, the ecotones, and design our solutions to cultivate resilience and diversity? How can our research be a form of praise, extolling the vibrant life of the planet? How can we research and produce research that increases awe and wonder? How can our research notice and increase wholeness and coherence, holonic truths and holistic approaches? How can our research be satisfying and life-giving to the co-researchers and resilience-building for life systems?

Lovelock himself (in Margulis, 2004, p. 8) offered: "We have some distance still to travel because a proper understanding of the Earth requires the abolition of disciplinary boundaries." We extend beyond reductionism to connectionism. Margulis offers the model of natural history as a more holistic science model to support Gaian inquiry (2004, p. 8). "Transdisciplinary approaches are taken when problems are considered between, across, and beyond disciplines, in a unitary view of knowledge" (Minati & Pessa, 2006, p. 13). Section Two of this paper further explores the topic of transdisciplinary approaches.

Thrum and Thrive

Notice and follow models of the organic and living Earth processes. Aim for flourishing and delight. Increase vitality. Go for what feels life-giving, extend the senses to include the imaginal and larger realms of information as research data, as in Romanyshyn's *Wounded*

Researcher and by organic inquiry's breadth of permission. By wholeness, the Earth comes alive. Researchers follow their bliss, their passion, what excites them in research. And dancing radiates out from the performer. Researchers and Gaian sustainability educators inspire and spark further studies and adventures, projects of hope and planetary life-affirmation. Follow mystery and mysticism. Not being able to get our hands around it is understandable. We are dealing with systems which, if we limit our understanding of ourselves to the bounds of our small human skins, extends multifold complexities beyond us to emergents of emergents beyond our own embodiment and brain horsepower. How can we design research to nurture and increase Earth aliveness?

Section Two of this paper explores how these four qualities of Gaian Methodologies extend across emerging levels of disciplines and are best addressed in transdisciplinary approaches. Sections Three through Seven provide specific examples of Gaian Methodologies and these characteristics in action.

Section 2. Gaian Methods and Interdisciplinary Educational Emergence

Marna Hauk

> "In spite of what you majored in, or what the textbooks say, or what you think you're expert at, follow a system wherever it leads. It will be sure to lead across traditional disciplinary lines…. Seeing systems whole requires more than being 'interdisciplinary,' if that word means, as it usually does, putting together people from different disciplines and letting them talk past each other. Interdisciplinary communication works only if there is a real problem to be solved, and if the representatives from the various disciplines are more committed to solving the problem than to being academically correct. They will have to go into learning mode. They will have to admit ignorance and be willing to be taught, by each other and by the system."
>
> (Donella Meadows & Diana Wright, 2008, p. 183)

The Gaian Methods Framework for understanding how Gaian Methods relate to each other leverages complex emergence. Gaian Methods appropriately seem as large as the planet. Complexity theory includes the insight that as complexity increases, new properties emerge that are greater than the sum of the constituent parts. This phenomenon is called emergence or emergent levels. This is one of complexity theory's gifts to demonstrate how phenomena can have interrelated organization and structure without being designed. Simple renderings of this include representations of various levels of nested hierarchies and their related areas of study

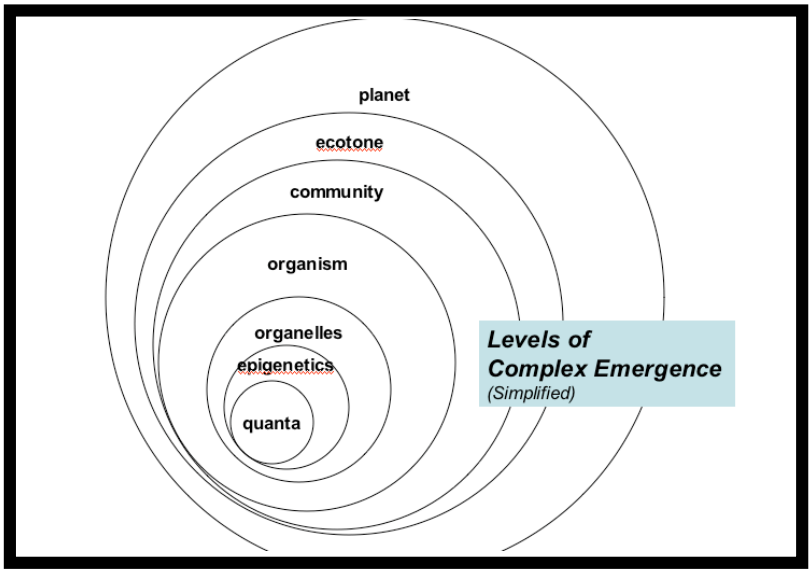

Figure 3 Levels of Emergence (Simplified)

(quanta, atomic particle, molecule, genes, organelle, organ, organism, society, rock, strata, biome, planet with physics, chemistry, biology, genetics, medicine, sociology; geology, ecology, gaiaology). [See Figures 3 and 4 for a simplified rendering.]

Modern complexity theory makes this theory of emergence more robust and interrelated by pointing out interactions amongst emergents at the same "level" of ("vertical") complexity as well as points to interactions between horizontal emergents (Conger and Goldstein, 2009, "The Doctrine of Levels," in *Emergence: Complexity and Organization*). This can reach the point of Hofstadter's tangled hierarchies, thickets, or Goldstein's paradox, where once complexity has

emerged, the constituent levels are sucked up into complex relationship with and potentially essential changed by the phenomena of emergence (Goldstein 2009). This property of thick interaction, however complex and diffuse, and its skeletal rendering as emergent levels, can provide a framework for current Gaian Methodologies (Hauk, 2010a, p. 8; Hauk, 2010b).

The levels, layers, knots, and paradoxes of complex relationships between and among emergents are also reflected in Margulis' work on symbiogenesis and her description of the folding over of the evolutionary tree (anastomosis) (Margulis, 2008) and parallels Merleau-Pointy's work on chiasmic enfleshed relationships of humans researching and being embedded

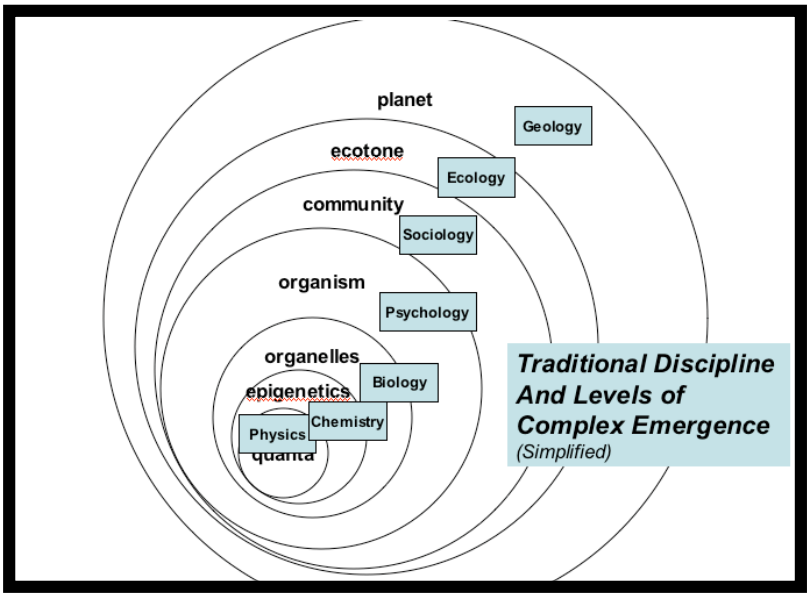

Figure 4 Traditional Disciplines Mirror Single Levels of Emergence

in nature (Hauk, 2010b). As Toadvine (2009) explains, for Merleau-Ponty, "since nature precedes and undergirds our reflection on it, our access to it involves a complex logic" (p. 108); it is "this moment of crossing, the becoming nature of humanity and the becoming-human of nature, to which Merleau-Ponty applies the term *chiasm*" (p. 109). This netting, knotting, overlapping, and interweaving between different levels of emergents demonstrates the need for Gaian Methods. Jackson's rhizovocality (2003) methodological framework is an example of a

Gaian model that supports the lush growth of complex, interweaving relationships between different levels of emergents, similar to Goldstein's emergent level paradox, Margulis' anastomosis, and Merleau-Ponty's chiasm.

Life is messy and labyrinthine. In leveraging levels of complex emergence to develop a framework for understanding Gaian Methods, the focus shifts from the lines between nested hierarchies (Figure 4) to understanding how some methods help us move across disciplinary lines and research relatedness (Figure 5). Further, which levels of complex emergence we are drawn to might inform which Gaian method is appropriate. Whereas traditional disciplinary lines in Western academia focus inside of a level of emergence (see Figure 4), Gaian methods build

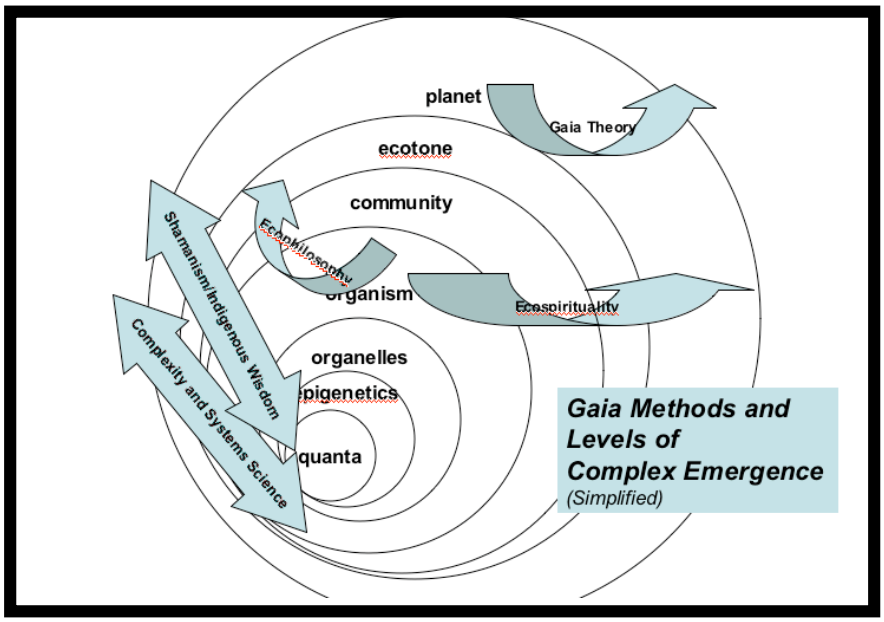

Figure 5 Gaian Methods Crossing Disciplinary and Emergent Levels

bridges between, among, and across levels of complex emergence (see Figure 5). Gaian methods invite an emergent, planetary approach to education that transcends and defies disciplinary bounds.

> "In this case the interdisciplinary approach is reversed; it is not a matter of an inter-crossing, cooperative use of disciplinary approaches looking for conceptual invariants using the same concepts in different disciplines, but of finding disciplinary usages of the

> same trans-disciplinary knowledge… It refers to the multiple levels and meanings of the world, the multiple levels of descriptions and representations adopted by the observer….Trans-disciplinary research concerns *the dynamics between different levels of representation* taking place at the same level of description." (Minati & Pessa, 2006, pp. 13-14, emphasis theirs)

Gaian methods hold promise creating connections and promoting collaborations across the campus and within communities. They integrate learners' experiences. Three of the four Gaian Methods mottos reinforce aspects of this discipline-leaping capacity: Embed and embody; connect and collaborate; extend and extol. In Gaian research, we position ourselves in relation to the Earth and the research, to **embed** ourselves in the research rather than displacing ourselves in faux Cartesian objectivity. We **collaborate** with others at different levels of emergence (e.g. person, community, biota, ecosystem, and planet) and **extend** our awareness and activity across to larger emergences. In this way, the personal connects with the planetary. Gaian methods call for a dramatically different orientation than the now-normal, focalizing, laser-like lens of reductionist inquiry. Gaian research creates education for transdisciplinary emergence. And life itself, living research, expressed as thrumming and thriving autopoeisis, emerges from the use of Gaian methods.

Section 3. Gaia Hypothesis and Gaia Theory as Method

Marna Hauk

> "The Gaia hypothesis is science. The surface of the planet, Gaia theory posits, behaves as a physiological system in certain limited ways. The aspects that are physiologically controlled include surface temperature and atmospheric composition of reactive gases, including oxygen, and pH, and acidity-alkalinity.... Gaia, meaning a body with a controlled physiology in the celestial-planetary and biological sense, is the only name that can both unite a disparate group of scientists and make their whole work accessible to the international public. Just as the human body is sharply bounded by skin, temperature differences, blood chemistry, and a calcium-phosphate skeleton, so is Earth distinguished from its surroundings by its persistently anomalous atmosphere, its steady temperature, and its unusual limestone and granitic rocks....The planet's surface is not just

> physical, geological, and chemical, or even just geochemical. Rather, it is geophyisiological: it displays the attributes of a living body composed of the aggregate of Earth's incessantly interactive life." (Margulis, *Symbiotic Planet*, p. 123)

As Margulis articulates, the Gaia Hypothesis (now elevated to the status of a theory, as in Gaia Theory) is a scientific theory regarding the geophysiological self-regulation of planetary systems as evidenced by the planet Earth. Evidencing an emergent level of complexity greater than the sum of its constituent parts, which many theorists describe as having the emergent properties of life (related to complexity modeling), the Gaia Theory has kinship with many ancient cultural and scientific insights regarding planetary ecology. The modern Gaia Theory has spawned many directions of research and inquiry methods, including modeling self-organizing planetary feedback systems such as Daisyworlds (described below), understanding complex geochemical planetary cycles and their long-term qualities, and personal ethnographic and ecological research in applying and extending planetary emergence of life to inquiry.

Roots of Gaia Theory as Method

The Gaia Theory finds its roots in longstanding insights regarding a living planet. For example, Scofield in *Scientists Debate Gaia* explores over two dozen expressions of the concept of a living Earth in Western natural philosophy, including animism, hylozism, psyche, pneuma, pantheism, *sympatheia, anima mundi*, and world soul (2004, p. 157). Many affirm that indigenous and traditional cultures feature intact connections and patterns with a living earth focusing on wisdom and intuition (Golley, 1998, p. 35; Scofeld, 2004, p. 157) at a nexus point of knowledge, practice, and belief (Berkes, 1999, p. 163). These insights, scientific and cultural, parallel and harmonize with more ancient indigenous and earth-based insight regarding the living nature of the planet. Ecospirituality, deep ecology, shamanism and ethnoecology, and

ecophilosophy are forms of Gaian Methods sparked by these insights (see Sections 4 and 5 of this paper for examples).

Stem and Leaf of Gaia Theory as Method

The Gaia Theory is a collaborative brainchild of chemist James Lovelock and microbiologist Lynn Margulis and depicts the Earth system as a living, self-regulating, meta-organism continuing optimal life conditions through complex planetary controls. A novel point of the Gaia Theory is that if a scientist were to imagine what conditions on the Earth would be expected simply due to its planetary size, composition, and distance from the Sun (etc.), the scientist would expect to find a dead, lifeless planet without the temperature, moisture, and other conditions (including those optimum for complex life) found on Gaia Earth.

Lovelock's *Gaia: The Practical Science of Planetary Medicine* (2000) offers fabulous visual examples and visualizations for the "geophysiology" that Lovelock explores as part of the fleshing out of the Gaia Theory. His extended metaphor for the Earth as having a physiology includes later chapters on "The People Plague," fever as a metaphor for global warming, and exfoliation as a metaphor for deforestation.

The radical, visionary insight of Dr. Lynn Margulis, co-innovator of the Gaia Theory, that symbiosis is the central gyre for evolution has, over the past twenty years, brought endosymbiosis and symbiogenesis from an unaccepted fringe theory to evolutionary doctrine. For Margulis, symbiogenesis (not mutation) is the source of innovation in evolutionary change (2006). She has uncovered how mitochondria and chloroplasts demonstrate that **collaboration** rather than (neo-Darwinian) competition drive evolution. Her early work on eukaryotic evolution demonstrating global regulatory mechanisms was pivotal in the Gaia Theory (2002). Lynn Margulis overviews her lifework studying symbiosis as the central driver of evolution in

Symbiotic Planet. In "Gaia" (Chapter 8) in particular, Margulis describes the key characteristics of planetary self-regulation at the meta-ecosystemic level. Her systems thinking models of symbiogenesis and planetary geophysiology are foundational for several strains of Gaian methodologies.

Margulis advocates for collaborations with biology, chemistry and other fields in order to pursue the truth about the complex self-regulatory emergent property of the planet as alive (2006). Therefore Gaia Theory research methods are at their heart inter- and transdisciplinary.

Differences Between Gaia Theory and Biosphere, Ecosphere

Whether understood as an organism, a system, or a complex emergence, the Earth is alive. Understanding the Earth's autopoiesis is vital to leveraging the Gaia Theory as research methodology. Autopoiesis is a complexity concept that refers to the point at which a system becomes a living system. In other words, the behavior of component parts coupled with their context and activity start to continue to generate the system. In common parlance this is a way of understanding something becoming living (Mingers, 1995).

There is an important distinction between understanding the biosphere and cycling of materials versus the Gaia Theory, related to complexity and the concept of autopoiesis. Golley defines the Earth system as the ecosphere (ecological sphere, literally sphere of connections), emphasizing both its spherical visual unity and its environmental nature as a bounded system of layers (atmosphere, hydrosphere, lithosphere, and biota) of energy flows, chemicals, and organisms, with solar inputs and infrared outputs. Related to the Gaia Theory is the biosphere concept, Russian geochemist Vernadsky's early descriptions of flows of chemicals and particles through living organisms "from the atmosphere to the oceans to the Earth's crust in great cycles"

(Golley, 1998, p. 33) of active planetary self-regulation. Vernadsky's original biosphere concept has some similarities and some differences with Lovelock and Margulis's Gaia Theory.

However, Berkes objects to this type of cog and wheel version of cycling (e.g. Odum, 2004, p. 51) that desacralizes the alive quality of the planet (Berkes, 1999, p. 183). Hornborg also critiques the definition of ecosystems as a mere system of matter and energy transactions (2001, p. 183). The *Noosphere and Biosphere Reader* (1999) also explores these intersections of frames between ecosphere, biosphere, noosphere, gaiasphere, living system, and living being. Clarifying the relevant frame on this spectrum for research helps clarify at which access point the Gaia Theory will yield fruitful research directions, from scientific and quantitative to complex and qualitative.

Flower and Seed of Gaia Theory as Method – Research Examples

> "For by explicitly showing that self-organization is a property of the surrounding biosphere, Gaia shifts the locus of creativity from the human intellect to the enveloping world itself. The creation of meaning, value, and purpose is no longer accomplished by a ghostly subject hovering inside the human physiology. For these things — value, purpose, meaning — already abound in the surrounding landscape. The organic world is now filled with its own meanings, its own syntheses and creative transformations. The cacophony of weeds growing in an "empty" lot is now recognized for its essential, almost intelligent role in the planetary homeostasis, and now even a mudflat has its own mysteries akin to those of the human organism." (Abram, 1990, p. 79)

Abram points out how understanding the planet as a complex living system upends many of our common research orientations. Golley's discussion of the implications of the ecosphere/Gaia/biosphere constructs includes a sensitive exploration of how humans can relate to such large systems as the Earth system. He mentions the work of several ecopsychologists and deep ecologists in making this eco-emotional leap, including Arne Naess (e.g. *Deep Ecology*) and Dolores LaChapelle (1988). Golley recommends deep ecology's tools and practices for connecting personal self-cultivation with a relationship with the planet. Golley notes that one

application of the Gaia Theory could be to further eco-design of built environments. Westerners, having lost connection with the larger intuitive sense of the living system of the planet, have traded our ability to adapt to the natural environment for entrapment in the built environment and subsequent self-fulfilling reliance on increasing technological solutions to escape the woeful consequences of this same human-built environment. He proposes a shift to technological and built environments synthesized with natural environments, with set-asides for ecospheric reserves outside of human management and the synthesis optimized for adaptation. Gaian food for thought on a global scale...

The Gaia Theory is one fertile source of the current understanding of "the formative role of life in the biosphere's biogeochemical cycles and climate [which] serve as an active feedback mechanism for biogeoclimatological control" (Schneider, 2004, p. xiii) – rather than through means of a global scale teleology, as an emergent property of the complex Earth system (p. xv). The MIT book *Scientists Debate Gaia: The Next Century* offers thirty-one applications and explorations of the Gaia Theory and its applications and methods. Researchers explore Gaian principles and processes in earth science, thermodynamics, regulation and natural selection; biosphere and ocean feedback, phanerozoic eon biogeochemical Earth models, life driving disequilibrium, and other Earth history and cycles; philosophy and human dimensions of Gaia—including complexity, gradient reduction, observer self-selection, and planetary models of human-Earth systems; quantitative inquiry of Daisyworld modeling (described below), artificial life, biogeography, and feedback modeling between water and vegetation in African climate systems; and lastly research on life forms and Gaia. Darwin's last book on earthworms and soil ecology also lays the groundwork for geophysiological understanding of earth and a living Earth

(Crist, pp. 161-170). The original, synthesizing research of Sahtouris (2000), Sheldrake (1991), Abram (1996), and Lovelock (2006) are all fruits of Gaia Theory applied as method.

Several researchers have explored the extensive intellectual children of the Gaia Theory (as in Joseph, 1990, *Gaia: The Growth of an Idea*). Elders (2004) in *Visions of Nature: Studies on the Theory of Gaia and Culture in Ancient and Modern Times* argues one of the main contributions of the Gaia Theory is the emphasis on participation with nature and how it offers a holistic approach to the Earth, an antidote to the mechanistic paradigm, offering "a new look at life on Earth…into a more integrated relation with nature and life" (p. 15). Westbroek (2004) finds Gaia Theory "a signpost, a guiding principle for future discoveries" (p. 24).

Stephen Harding's *Animate Earth* (2006) offers a fusion of Gaia Theory and Deep Ecology methods for personal ethnographic inquiry, for cultivating a personal relationship with the living Earth. Harding weaves together science and meditation, inquiry at the level of people and planet to extend the Gaia Theory into relational development.

Daisyworld modeling offers another aspect of extending the Gaia Theory into inquiry. To demonstrate how global super-effects of dynamics of shade and sun in a simple plant system could effect global self-regulation, Lovelock developed models and eventually computer simulations for what are termed Daisyworld scenarios. These simulations demonstrate visually and quantitatively how complex planetary self-regulation emerges from even a small number of interrelating variables.

Applying Gaia Theory as method invites us to explore with our students how feedback loops and whole systems models can increase our understanding of real world systems. We are urged to understand how interacting and increasingly complex flows of life and organisms create living systems. How is the Earth alive? How do our personal experiences in our bodies relate to

the life of the planet? How can we design our work and research to increase the resilience of the living systems of Gaia?

Section 4. Ecospirituality and Gaian Methods: Connecting Science and Spirituality

Judith Landsman

Gaian Methodology involves implementing the holistic understanding of sustainability into methods research. It is embedded in the sustainability paradigm; the methodology requires a working knowledge of the James Lovelock's Gaia Hypothesis (1979) and an understanding of sustainability (Landsman, 2010). Sustainability is a spiritual, or philosophical, construct as much as a scientific one, and Gaian methodology takes this into account. Part of the holistic understanding of Gaia Hypothesis and the ensuing methodology is an understanding of where we, as humans, fit into the paradigm. We are bags of mostly water (Roddenberry, 1988) with consciousness, in essence spiritual/philosophical beings with awareness and the ability to self—reflect, encased in skin—a permeable boundary. Each human body is an example of the earth's sustainability paradigm in form and function; we literally *embody* the earth's elements in a compact and mobile form. How humans define their relationship to earth, however, stems from, and is based upon, philosophical or spiritual belief systems. In terms of Gain methodology, ecospirituality is the place spirit occupies in the sustainability paradigm; and embodiment represents the capacity for action as a container of both earth and spirit.

Gaia is not only a scientific theory with a mythic name—the theory represents a spiritual/philosophical understanding of earth, the universe, human consciousness, and embodiment in living things. Gaian methodology is the meeting place of science, spirit, and art; it is the place where Ken Wilber's deep religion meets good science (2000, pp. 160).

Wilber's Integral Theory is consistent with Gaian Methodology, as "an all-inclusive framework that draws on the key insights of the world's greatest knowledge traditions…unlocking individual potential to finding new approaches to global-scale problems" (www.integralinstitute.org). Molecular biologist Ursula Goodenough concurs when she muses on the biological facts of our human existence and their macrocosmic parallels. In the chapter "How Evolution Works" in *The Sacred Depths of Nature* (1998), Goodenough writes: "Blessed be the tie that binds. It anchors us. We are embedded in the great evolutionary story of planet Earth, the spare, elegant process of mutation and selection and bricolage. And this means that we are anything but alone" (p. 75). In terms of Gaian methodology, both Wilber and Goodenough comprehend a connection between science and spirituality that is not confined to particular religious dogma, but is rooted in an understanding of paradoxical non-duality. Ecospirituality holds and chronicles the diverse manifestations of humanity's ongoing ethnospiritual conversation with Earth. Learning spiritual interpretations of our relationship with Gaia as well as scientific ones is essential in an integral approach to sustainability, methodologies, and solutions.

Gaian Methodology represents a holistic, integral approach to research, qualitative and quantitative. Ecospiritual traditions, both ancient and contemporary, are also revelations of Gaia, unearthing ecological truths not comprehensible elsewhere. Author and researcher Luisa Maffi works tirelessly to awaken a sleeping world to the loss of languages. One of her insights is that by losing languages we are losing ecological knowledge. Maffi calls language "the main repository of and transmission vehicle for knowledge" (2002, p. 386). She considers traditional ecological knowledge as "mediation" between language and the environment (p. 386). Losing knowledge of spiritual traditions reveals similar losses of ecological wisdom—how humanity

copes with living on Earth. In Gaian methodology, this question of our relationship as humans to an Earth we need but cannot ultimately control is thoroughly taken into consideration. Ecospirituality in Gaian methodology is recognized as containing diversity, consistent with sustainability. Spiritual traditions that foster a dualistic paradigm based on domination are not consistent. Gaian methodology is inherently non-dualistic, beyond binary—a methodology embracing diversity's role in the paradigm of sustainability.

Roots, Stems, Flower, and Seeds of Ecospirituality as Gaian Methodology

The **roots** of ecospirituality are in the bowels of Gaia and the soul and spirit of humans. The roots of ecospirituality started forming when earth and life first began coexisting. The fact that we are composed of soil and minerals and water, given some sort of indefinable breath and become alive and function and interact is astounding and mysterious, still. Ecospirituality has its roots in the need for humans to explain their interactions with the Mystery that is Gaia.

The **stems** of ecospirituality are various spiritual practices, the repeatable ways in which spiritual traditions teach, reinforce beliefs, allow for transformative space, maintain order, and create and celebrate community. Religion is an aspect of ecospirituality, but not the fullness of it. The breadth of mystical traditions that are experiential in practice is closer to the reality of ecospirituality within Gaian methodologies than either philosophy or narrow religion. While there are stems that develop from religion and philosophy, they may very well produce different flowers and seeds than stems growing from the roots of mystical traditions.

Mystical traditions that urge a unity of mind, body, and spirit have practices that provide opportunities for revelatory experiences of non-duality. The state of non-duality, the state of oneness, of complete integrity, free will and unity combined, is the perpetually dynamic state of Gaia. These experiences of non-duality are the **flowers** of ecospirituality, aesthetically pleasing,

gorgeous, creative, vibrant flowers. There are other flowers, blooming from other stems, their life force kinked perhaps by dogma or an inharmonious or fragmented relationship with Gaia, but blooming nevertheless. Gaia is resilient and finds creative uses for imperfection, ultimately transforming improbabilities and imperfections into viable parts of the sustainable cycle of life.

The **seeds** of ecospirituality are the scattered holonic truths (Wilber, 2000, p. 40) that are disseminated throughout the planet and begin to form roots in the soil in which they land. The seeds are the truths and methods and wisdom we use in our relationship with Gaia now and in the future. The seeds are the trees we plant, the international space stations, and the sustainable water, waste, and energy systems we develop out of an understanding of mutuality with Gaia and all her inhabitants. The seeds are born from the flowers of our experiences, the seeds contain within the fullness of action, the fullness of healing, the fullness of resilience, in a continual cycle.

Section 5. Embodiment and Gaian Methods: We are Dancing Earth

Judith Landsman

Embodiment in Gaian methodology is the recognition that the human researcher is a whole being, with a body, a mind, and a soul. In academia it is the mind aspect that is most often emphasized. It is important to have the intellect reveal itself. However, Gaian methodology takes into account that the researcher is also fully human, and that the way the researcher lives in their body, and thinks about their life—the questions they chose to ask, and the statistics they choose to report—are ultimately as consequential as their intellect in the outcome. The same can be said for human subjects of (participants in) research. Therefore theories and modes of inquiry that reflect an integral approach are useful toward a Gaian methodology. Arts-Based Research

(ABR) can be considered a Gaian Methodology because the arts intrinsically reveal holonic truths (Wilber, 2000, p. 40). Patricia Leavy, author of *Method Meets Art: Arts-Based Research Practices*, writes, "Arts-based practices help qualitative researchers access and represent the multiple viewpoints made imperceptible by traditional research methods" (2009, p. 15). ABR accepts the revelations, wisdom, and empowerment of art processes as valid without apology. In the place where science and art meet, Gaian methodology has its greatest impact and reveals complex and paradoxical truths. Arts-based research and embodiment's balance between science and art represents an innovation from conventional research methodologies.

We are made of the same substances as Earth, we are *adamah* (earth, in Hebrew)—the same root word for soil as for the first human (Landsman, 2010). Our bones are minerals, our bodies mostly water and salts. We are made of the same matter as all other living things. We are earth and water, air, and fire. If the elements do not work together, we have no vessel for spirit or soul to inhabit. We embody systems that are intricately and integrally connected and cannot function without one another. Earth is the same. Our bodies and the earth contain both evidence for empiricism and mystery. What is clear is that it is not simply a divine joke or coincidence—we are all made of the same matter. Author, scientist, and artist Andrea Olsen writes in *Body and Earth: An Experiential Guide*, "What is out there is in us, and what is in us, is out there" (2008, p. xi).

Embodiment is an important concept in Gaian methodology, it is the piece of the methodology that is tangible; it is the meeting ground of art and science within the methodology, and it is often accompanied by a sense of wonder. Embodiment is how we engage and act out our lives on Earth in the present. Gaian methodologies recognize the role of dynamism and creativity in science, art, and the sustainability paradigm. Alan Lightman, in his book, *A Sense of*

the Mysterious: Science and the Human Spirit (2005) reflects on the connection between art and science and quotes Albert Einstein from an article first published in 1931, "The most beautiful experience we can have is the mysterious. It is the fundamental emotion which stands at the cradle of true art and true science" (p. 42). Some of the ways that humans reveal their embodied nature is through ceremony, community rituals, and the visual and performing arts.

Humans dance to express the inexpressible, connect with heaven and earth, to embody the earth's energy and radiate it. When drumming, the drummer brings air to life, pumping the blood, connecting us to the earth and bringing the fire of spirit—all the elements in motion. In *Dance, Human Rights, and Social Justice: Dignity in Motion* (2008), editors Naomi Jackson and Toni Shapiro-Phim discuss how dance is "multi-layered" and embodies various human needs:

> Dance holds the power to create a sense of community and shared perspective, displays sensuality and sexuality, embodies memories in a tangible medium, sustains and communicates cultural values that are held dear by a group, and expresses deeply felt emotions, including the agony of loss and the exuberance of life and/or transcendence of spirit. (p. xix)

Dancing is one of the best examples of embodiment in action. We are earth, we are dancing earth; we are embodied earth, dancing our stories in time and place for our ancestors, our children, and the ineffable simultaneously.

In *Dazzle Gradually* (2007), a series of essays and articles by Lynn Margulis and her son Dorion Sagan, the authors unite intricate scientific facts with mundane human metaphor, as in the essays "An Evolutionary Striptease" and "The Riddle of Sex," exploring aspects of evolutionary biology. The authors are able to connect the microcosm of microbes to the macrocosm of the Gaia Hypothesis. Embodiment serves as an endless reservoir of metaphor for Gaian methodology: dance, spiritual practices, living a consciously sustainable life; all involve embodying aspects of the Gaian Hypothesis and integrating them into life on earth, scientifically,

spiritually and artistically. True Gaian methodologies reveal themselves in the fruits of embodiment.

Roots, Stems, Flower, and Seeds of Embodiment as Gaian Methodology

The **roots** of embodiment are found in the composition of the human body. According to Ed Uthman, MD and Diplomate, American Board of Pathology,

> oxygen is the most abundant element in the earth's crust and in the body. The body's 43 kilograms of oxygen is found mostly as a component of water, which makes up 70% of total body weight. Oxygen is also an integral component of all proteins, nuclei acids (DNA and RNA), carbohydrates, and fats" (Emsley, 1998)

The **stem** of embodiment is how we grow in relationship to Gaia. Did we grow up with experiences in nature? What kind of spirituality did we grow up with, one that taught us stewardship, or domination, or balance and respect? How have we developed side by side with Gaia, sharing elemental composition? The stem of embodiment is the how our relationship with Gaia has been and is presently experienced. The stem is how we have been educated and are educating future generations.

The **flower** of embodiment is how we manifest our embodiment of Gaia in our lives. Do we live within a sustainable paradigm? Are we living a sustainable life in harmony with fellow humans, other species, and earth? Are we able to dance our stories, inhabit our art, create ceremonies? Are we involved with healing the earth, with ecojustice and social justice? The flowers of embodiment are acts of kindness, healing, and love in action. The flowers of embodiment are the blossoms of healthy lifestyle, healthy food, healthy soil, and healthy governance. The flowers of embodiment are art and science, religion and philosophy, meeting together with respect and coming up with holistic solutions to sustainability issues.

The **seeds** of embodiment are the witnesses. The audience member who walks away breathless and inspired, community members reinstated through ritual, those healed through intuitive deep listening to body wisdom. The seeds of embodiment are the experiences of wholeness and of non-duality that resonate throughout our being and teach us indisputable truth. These seeds grow from generation to generation, taking root once again in our knowledge that we are made of earth and return to earth, and that with this knowledge comes a responsibility of relationship and reciprocity.

Section 6. Organic Inquiry as a Kind of Gaian Method

Jeanine Canty

> …to call synchronicity…Walking the shaman's path is like having an ongoing dialogue with Nature or with the invisible world, or with the Goddess, in which you are asking a question, receiving the information, processing the information, and asking the next question. (Clements, et al., 1999, p. 18, citing Noble, 1991, p. 171)

As Gaia is often depicted as the feminine life force of the earth, it is natural that Gaian methodologies are situated in both feminine ways of knowing and the natural unfolding of the living world. Organic inquiry (also known as organic research) is one such methodology. Organic research arose in the mid-1990s through the innovation of four women (Jennifer Clements, Dorothy Ettling, Diane Jennett, and Lisa Shields) who were working on or who had just completed graduate degrees and could not find a research methodology that fully honored their inquiries. As a result the women formed a group sharing aspects of their "…teaching, writing, and daily life" (Clements, et al, 1999, p. 55). The orientations of the methodology were distinctly feminine, honoring the experiences and modes of expression of women in a way that had been previously unacknowledged. Moreover the methodology is distinctly earth-based in its

innovative, experiential approach in letting wisdom arise through engagement with both seen and unseen aspects of the living world. Organic inquiry allows us to participate with earth wisdom to seek insights, a sustainable approach that possibly reaches beyond most of our spheres of rationality.

The authors recognize three components of feminist research that informed their methodology. First, is "…the valuing of women's experience…" (Clements, et al, 1999, p. 63). Feminist research honors the stories and lives of women, noting that they have different forms and interests than masculine methodologies which tend to be linear and standard. In contrast, feminist research allows for a diversity of experiences, intra and interpersonal relationships, and topics of interest to women. The second component is "…that feminist research is designed specifically for women" in that it brings issues central to women to the forefront and affirms the use of subjective feelings and other forms of expression that are closely aligned with feminine wisdom (Clements, et al, 1999, p. 64). However, while organic research is strongly oriented towards women, its methods and research participation do not exclude men, yet call to honor and employ women's knowledge. It is perhaps the most qualitative approach within qualitative methods with its sanction of feeling, intuition, and sacred knowledge. Third, feminist research recognizes the "…equality of the researcher and the participant," stressing a non-hierarchical relationship. With organic research, the participants are often the change agents for the researcher instead of the researcher collecting their information within a prescribed format or outcome (Clements, et al, 1999, p. 65). While organic inquiry is heavily feminine, it goes beyond feminist research due to its emphasis on both earth and transpersonal wisdom.

Organic research is heavily influenced by synchronicities which are most easily defined as "meaningful coincidences." The term synchronicity was formally introduced by Jung,

illustrating a connection between our inner psychological processes (both conscious and unconscious) and the unfolding events of the outer, signifying a mutual causal relationship between the two (Combs & Holland, 1996, p. 66). Jung (1973) includes the following criteria when describing synchronicity: it employs sensation and intuition, it is not measurable by "the unaided intellect," and it is must be as open as possible and align with nature. This affirms both the feminine and natural intelligence within this universe and moreover points out the need to examine both our unconscious and conscious minds. Similarly, organic research requires "an expanded consciousness…that digs out old ways of thinking to allow for the sacred to emerge on all levels from the everyday to the transcendent" (Clements, et al, 1998, p. 117).

The role of synchronicity within organic research is inseparable from the natural intelligence of the earth and larger cosmos, the realms of consciousness and creativity, and feminine ways of knowing such as intuition. Moreover, synchronicity is a form of cosmic storytelling where unfolding events can be followed and interpreted into some sort of metaphoric advice. Combs and Holland relay that synchronicities are "…best comprehended in the language of myth" (1996, p. xxxix). The use of synchronicity within organic research sanctions a feminine, earth-based wisdom that is not rational in terms of western culture and is extremely personal.

Physicist and philosopher David Bohm introduces the concept of enfoldment and the implicate and explicate order such that the implicate is the internal world of the conscious and unconscious while the explicate is the material reality of the external realm. Enfoldment is how the relationship between the implicate and explicate continually manifests (Combs & Holland, 1996, pp. 19-20). Related to the concepts found within systems theory or new science, our cosmos exists in nested levels so one event affects the entire system. Synchronicity is radical in

including our psyches within this nested order, suggesting that our conscious and unconscious motives influence both the seen and unseen reality.

The most profound piece within Jung's concept of synchronicity is the link between one's emotional attitude, what one is attracted to, and the power this emotion and attraction have in interacting with the material world. Basically, our passions have the capacity to instigate change. This concept is reinforced with Chopra's notion of synchrodestiny where one learns how to work with synchronicities as a path to fulfillment (Chopra, 2003, p. 55). Clements, et al. (1999), introduce a similar idea where, when employing organic research, one must develop an "expanded consciousness" in order to "find fertile conditions in which to grow" (p. 14).

Organic inquiry can be compared and contrasted with heuristics, a form of phenomenology. Heuristic inquiry is an extremely personal methodology where one frames a question she is passionate about in a quest for illumination. Moustakas states that this "…question is one that has been a personal challenge and puzzlement in the search to understand one's self and the world in which one lives" (1990, p. 15). Yet while it is personal, the quest ties into the social and cosmological. The researcher lives the inquiry, she becomes the interest. Heuristic inquiry has six stages. The first is the initial engagement where the researcher finds and frames her passionate question. During the second stage, immersion, the researcher plunges into the quest, contemplating all sources of data, from factual, personal, to transpersonal. Incubation, the third stage, is the point where immersion into data ceases and the researchers allows it to digest until the fourth stage, illumination, appears with a 'breakthrough into conscious awareness…an awakening…" (Moustakas, 1990, p. 29). A deep level of analysis occurs during the fifth stage of explication. Moustakas explains:

> The purpose of the explication phase is to fully examine what has awakened in consciousness, in order to understand its various layers of meaning…the heuristic researcher utilizes focusing and indwelling, self-searching, and self-disclosure, and recognizes that meanings are unique and distinctive to an experience and depend upon the internal frames of reference (1990, p. 31).

In this stage, one wrestles with the meaning in such a personal and challenging way. She is forced to look at her assumptions in full honesty and has the opportunity to transform her perspective rather than to conform this new wisdom into frames she already knows. Finally with the sixth stage, creative synthesis, the researcher puts her finding into some creative form.

Organic inquiry has the following five stages:

> Sacred: Preparing the soil
> Personal: Planting the seed
> Chthonic: The roots emerge
> Relational: Growing the tree
> Transformative: Harvesting the fruit (Clements, et al, 1998, p. 117)

However, it is important to note that these stages are non-linear, and, while they all will be present within the inquiry, their order of presence is not pre-determined. At the same time, the inquiry may unfold in a somewhat linear manner, yet is truly cyclic "constantly loop[ing] back on itself, forming beautiful and mysterious patterns" (Clements, et al, 1999, pp. 30-31). These areas mirror the natural processes of the earth and are a metaphor for how a plant or tree grows.

In "preparing the soil" or "ground," the researcher develops her expanded awareness, connecting to the "sacred" or natural intelligence of the cosmos. The researcher must tap into the creative universe invoking a mysterious power. This preparation comes before the initial engagement first stage of heuristic inquiry, establishing a relationship with the divine creativity of the universe. Relating this to synchronicity and systems theory, "preparing the soil" invokes a connection to the implicate and explicate order or the universe in a holistic, sacred form or what is called "psi" or the "noosphere," the creative energy or intelligence pervading the cosmos (Combs 2002, Argüelles 1984).

During "planting the seed," the researcher develops her personal story in relation to the topic. This is a key component to organic research as the area of interest is extremely personal to the researcher. This also helps to flush out the subjective and objective assumptions the

researcher holds. Additionally, in pulling out one's story in areas held important to the researcher, there is a clear passion invoked and the trigger required for synchronicity manifests. Clements, et al, advocate that the researcher's story should be used "as a point of beginning and as a filter for the other stories she will gather" (1999, p. 26). They suggest that the researcher keep a journal during the inquiry that develops her story and adds and further develops context to the co-researchers' (participants') stories. The use of story brings the question into the personal realm opening up one's experience to the larger experiences of the participants.

The "chthonic" refers to the underground process that occurs once a seed has been planted, yet before the sprout emerges above ground. Chthonic connects with the emergence of the roots below ground. According to Clements, et al, Jung related the chthonic with the feminine to which intuition, synchronicities, dreams, and other aspects of the creative mystery are attuned (1999, p. 35).

According to Jungian theory, Feminine spirituality draws its power from the earth, and the body. It is a force that spirals down into the soul of an individual, and the earth. Feminine spirituality has a descendant function. The feminine is the nurturing, receptive, instinctual, compassionate, life-and-death aspect within the psyche of each woman and man (Clements et al, pp. 35-36). This phase is also related to the process of gathering nutrients and correlates with the immersion and incubation phases of heuristic inquiry. Here initial stories are collected and the transpersonal experiences emerge that will inform the participants and patterns of the inquiry. It is during this phase that the research design may change in evolution with the knowledge that starts to emerge.

In the "relational" phase, the plant or tree sprouts above ground. Here, the researcher continues to collect and develop her story and those of the co-researchers, yet instead of the

researcher being the only interpreter, the co-researchers equally influence the path of the study through their own transformational awareness. This allows for participatory meanings to surface, shaping both researcher and co-researchers.

This all culminates with "harvesting the fruit" during the "transformative" phase where the researcher narrates the inquiry results and knowledge. It is similar to the creative synthesis stage of heuristic inquiry, but goes further in looking at aspects of transformation. The written or creative narrative documenting the inquiry is not the fruit itself. Instead the fruits are the resulting transformations that occur in the readers as a result of viewing the stories and consciously and unconsciously comprehending these and relating these to their own stories.

In terms of sustainability, organic inquiry has vast potential for bringing earth wisdom, specifically wisdom beyond the human world, into our quests for ecological healing. All too often the pursuit of sustainability leaves out the voice of the earth whose wisdom exceeds that of humans. While the practices within this methodology may extend beyond many of our comfort zones, it offers a radical shift in finding wisdom beyond the merely human realm.

Section 7. An Example of Earth Research: Ranching Women as Ecojustice Educators

Noël Cox Caniglia

> *It is the nature of any organic pattern to be contained within a larger one. And so a good solution in one pattern preserves the integrity of the pattern that contains it.* (Berry, 1981, p. 7)

From the perspective of Gaian Methodology, Berry's observation may suggest an opportunity to consider conducting transdisciplinary research within the context of an ecosystem in order to explore the complexity of sustainability as a living practice. Research with this focus

has, under the torchlight of critical synthesis and analysis, the potential to reveal the holographic nature of the interrelationships between organic (including humans) and inorganic systems. Such was the case with the research described below that used a feminist lens for ethnographic inquiry and examined the stories of land-based women in relation to their ecosystem.

The emerging academic field that guided this study was Sustainability Education. This research explored the perceptions of elder *ranchers* from desert bioregions of Southwestern United States. It examined this culture and revealed the ranchers' sense of place and the role these elders played as *ecojustice educators* when passing on local expert knowledge, cultural values, and pathways to wisdom to future generations.

For the purpose of this study the term *rancher* referred to women who ranch. If references to male ranchers are made, the gender was noted. The term was chosen intentionally to avoid otherwise pejorative assumptions that men are ranchers and women can only be termed ranch wives. Such a patriarchal assumption, that a *rancher* is male, tends to covertly relegate a woman's role in ranching to a footnote in the description of this way of life. In the context of this study the *ecojustice educators* recognized multiple ways of knowing (including intergenerational knowledge and wisdom) and actively supported the renewal of these. They built the lessons they taught on an *ecocentric* paradigm that valued integral living and non-living systems and recognized humans as a *part* of those systems.

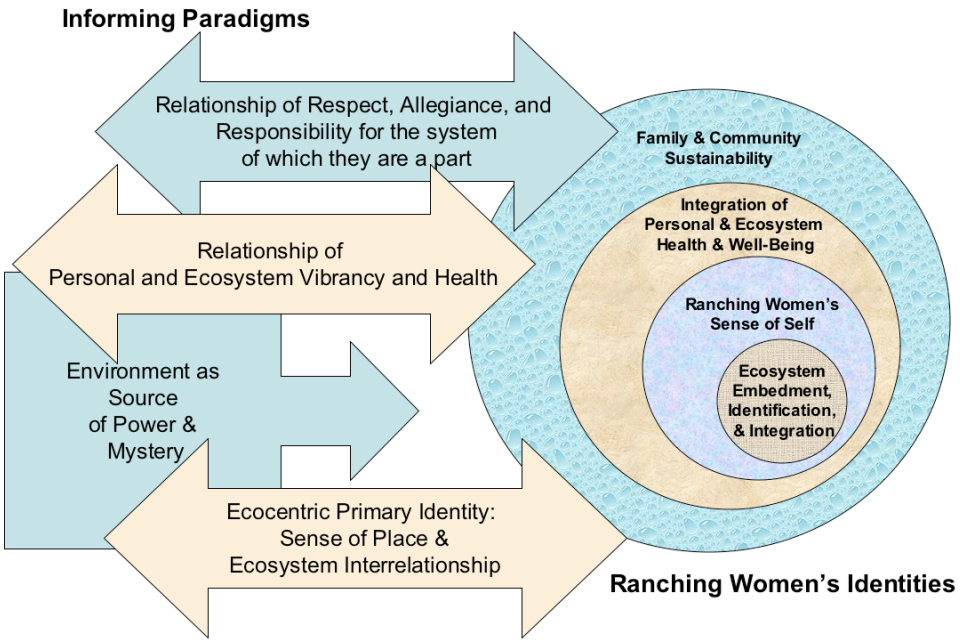

Figure 6 Ranching Women's Identities and Informing Paradigms

Combinations of surveys and in-depth interviews were used to gather narratives from these women. The research critically examined the underlying messages emerging from their narratives; the subtexts, themes, subthemes, and content categories emanated from either within the context of a particular story or as a result of sharing the story within a particular social or ecological context. The ethnographic methods used within this study were based on the intersection of two significant ideas within feminist research methods, the idea of multiple voices and relative truths of rhizovocality (Jackson, 2003) and the reflexivity of Feminist Standpoint theory (Harding, 1987, 2004). Feminist Standpoint theory demands the "strong objectivity" that results from self-reflexivity. This type of reflexivity is based on the analytic attention to the researcher's personal (social and ecological) context and role in envisioning, designing, implementing, and analyzing research. The term *rhizovocality* is derived from the combination of rhizome and vocality. A rhizome is a horizontal, root-like stem of a plant that is usually found

underground and often sends out roots and shoots from its apex (e.g., iris, aspen, & Bermuda grass). Vocality refers to the participants' and the researcher's authentic voices within the research process. Rhizovocality is based on the acceptance of conflicting and evolving ideas of voice. The feminist voice is not unified; rather it is "circular, interconnected, and deterritorializing" (p. 693). This concept of difference emerging in unique ways from an underlying unity echoes the words of Wendell Berry and reflects similar ideas within the Gaia Hypothesis/Theory. In congruence with this idea of rhizovocality, the ranchers interviewed had that same type of complex and contradicting voice, both individually and considered as a group, as well as an ecocentric unity of understanding. Analysis and interpretation of the data revealed subtexts of *ecojustice education* and *sense of place*. Each of the two subtexts were first analyzed separately for themes and subthemes and then analyzed jointly for common content categories. Within the *ecojustice* subtext, initial emerging themes included: lessons gleaned from observing and participating with Nature; the importance and influence of rain on human perspectives; decision-making and positive practices were contextually based on the more than human natural environment; shared external challenges to the ecosystem and to the ranching community; respect for human and more than human natural environment; and informal teaching and learning on the ranch: stories shared within ranching families and values passed down through the vehicle of those stories. Within the *sense of place* subtext, initial emerging themes included: significant sacrifices made in order to continue ranching; changes and challenges within ranching community relating to shifting paradigms; characteristics of the ranching lifestyle; and interrelationships developed between the ranchers and the more than human natural environment (including their spirituality).

It is not surprising that because this research was based on orality, specifically the use of story as narrative and story as a means of creating the mythopoetics of this culture, it accessed different ways of knowing than what might not have been possible solely within a textual or quantitative framework. Significant aspects of the elders' experience with the ecosystem cannot be digitalized, specifically the ranchers' ecocentric values. This study's emergent themes were closely related to several of the conceptual frameworks in Gaian Methodology: Ecophilosophy, Complexity theory, Ecospirituality, and Multisensory Embodiment. The concepts of Ecophilosophy, specifically the ranchers' ontological view of the world from an ecocentric perspective, were fundamental to the findings. The study paralleled ideas within Complexity theory in that the research examined multiple patterns and interrelationships emerging within the ecosystem; specifically, this was related to the ranchers' way of knowing. The Ecospirituality experienced by the ranching participants, as analyzed and interpreted from the data, grew as a result of their intimate, daily, and long-term engagement with the earth (or what they commonly called the "country"). The idea of Multisensory Embodiment is consistent with the words of Wendell Berry (1981) and is pivotal to the holographic relationships between the ranchers and the ecosystem of which they were a part.

While I contend that ecological positionality contributes (at least) equally to the shaping, situating, and construction of knowledge as do culture, ethnicity, gender, race, and power relations, this particular study with ranchers can only point to this possibility and open the door for further research. Listening to, recording, transcribing, and analyzing elder ranchers' voices were practices consistent with not only Gaian Methodologies but also a number of central themes within feminist research: putting women at the center of the research process, bowing to the

participant's voice as the voice of the expert, and creating new knowledge that are *for* women not just *about* women.

The transdisciplinary study sketched here serves as an example of Gaian Methodology. The study's findings mirrored the holographic patterns of which Berry wrote as well as the self-regulating planetary feedback systems in the Gaia Theory. Through generations of working and living as a part of their ecosystem, the ranchers had developed values that reinforced sustainability for their ranching livelihoods as well as for the enrichment of the more than human natural environment. Good ranchers had figured out that quick fixes do not work, that the whole of the ecosystem was greater than the sum of its parts (including its human species). Their patterns of knowing and ways of being had created an informal, ecojustice feedback loop that reinforced the fact that nurturing their ecosystem also, ultimately, translated to protecting their viability as ranchers economically and on a familial and community level.

Conclusion

Marna Hauk

> "'What is life?' is a linguistic trap. To answer according to the rules of grammar, we must supply a noun, a thing. But life on Earth is more like a verb. It is a material process, surfing over matter like a slow wave. It is a controlled artistic chaos, a set of chemical reactions so staggeringly complex that more than four billion years ago it began a sojourn that now, in human form, composes love letters and uses silicon computers to calculate the temperature of matter at the birth of the universe." (Margulis, 2002)

As Margulis articulates, academic research itself is an expression of the living Earth. Through the course of this paper, we have explored Gaian Methodologies. We have demonstrated their breadth as a convergence of six coursing streams of research, a transdisciplinary approach that crosses and synthesizes science, complexity, philosophy, wisdom

traditions and ethnography, embodiment, ecopsychology, and ecospirituality. We have distilled four characteristics that unify Gaian Methods, as mandates for researchers and campuses to "embed and embody," "connect and collaborate," "extend and extol," and "thrum and thrive." We have explored how emergence establishes the need for truly transdisciplinary approaches, and how Gaian Methods, sparked by the Gaia Theory, help drive research innovation, including catalyzing social justice and sustainability. Examples of effective Gaian methodologies explored include applications of the Gaia Theory as method, embodiment and dance, ecopsychology, organic inquiry, and multivalent, rhizovocal ethnographies of cattle ranching women as ecojustice educators.

We invite you to participate and partake in the groundswell of sustainability and global social justice research that leverage insights from planetary presence for research design and participatory action. The accompanying presentation also provides details about how to connect and collaborate and embed and embody in this work, and the groundswell of research innovation continues at http://www.earthregenerative.org/gaiamethods. We leave you with these inspiring words of Jon Kabat-Zinn, a reminder that our research can move from and demonstrate how we are "an intimate part of this animate and sensuous world" (2005, p. 200):

> The world feels our seeing, and sees us right back, even the trees and the bushes, even the rocks. And certainly, if you have ever spent a night alone in the rain forest or the woods, you will know that the quality of your seeing and of your being are felt and known by more than the human world. You will sense that you are definitely being seen and known as you really are…you are an intimate part of this animate and sensuous world.

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