

Panarchy, Transformation, and Place: Exploring Social Change and Resiliency Through an Ecological Lens

Nicholas Stanger & Joy Vance Beauchamp

PREFACE

We are new parents. We sleep in sporadic chunks. We eat, write, clean, and do laundry with one hand.

This paper is my first foray into writing since the birth of my son and the content is also partially about him. It was written while taking turns comforting, feeding, and changing diapers. For this paper, I will call my son, Sam. Despite the indulgence and gushing of new parents, the change that he brought to my wife's and my life was substantive. In this paper, I describe one small change that occurred because of Sam's entry into our world in order to introduce concepts of complexity theory and transformation. I outline my wife's and my choice in naming Sam and the changes and resistances we witnessed within my family (resulting from our name choice) as a basis for an introduction to complexity theory language. Expanding on the concepts of transformation and change, this paper then explores some data from my PhD dissertation, in which I looked at complexity theory as a tool to describe human connection to place and learning. I use examples taken from my interviews to examine the ways in which returning to childhood and adolescent (trans)formative places demonstrates the elements of panarchy theory as a tool to describe change within social systems. First, however let's start with the story from my wife's and my perspectives of Sam coming into the world:

WHAT IS IN A NAME?

The experience of becoming parents has been awe-inspiring; It is an experience that has been well catalogued by far more eloquent writers than us. Yet, we felt compelled to write about our experience and remark on the changes that Sam has introduced to our lives as a preamble to the concepts presented in this research paper. The story of naming Sam helped us understand the process of change, something we had been looking at through a systems thinking and complexity theory approach called, panarchy. Originally designed to describe the connections among chaos theory, complexity theory and ecological system management, 'panarchy' is a term that "explains the evolving nature of complex adaptive systems" (Holling 2001, 392). Complexity theories were responses to the reductionist thinking that was occurring in many science and social science spaces, where pragmatism and structuralism was winning the theoretical battles of the late 20th century. Instead of accepting change as a process toward

some panacea of equilibrium, Panarchy theory posits that multiple equilibria may exist in any system:

Panarchy is the structure in which systems of nature (for example, forests, grasslands, lakes, rivers, and seas), and humans (for example, structures of governance, settlements, and cultures), as well as combined human–nature systems (for example, agencies that control natural resource use) (Gunderson and Holling 1995) and social-ecological systems (for instance, co-evolved systems of management) (Berkes et al. 1998), are interlinked in never-ending adaptive cycles of growth, accumulation, restructuring, and renewal. (Holling 2001, 392).

With socio-ecological systems being only recently used in examining processes of change (Stanger 2011), our interest was exploring the relevancy of panarchy as a lens through which we can see change at many scales. First, however, we would like to talk a bit more about the change we saw from Sam entering our lives.

We can categorically state that Sam’s birth was extraordinary, in that, he arrived into this world in a very ordinary (if not wholly common), yet almost inconceivable way. It is the same way that most of us did. We can also state that we experienced a new sense of being-ness, as we went from being a couple, in one instant, to being a family in the next; something we have heard other new parents describe but only truly understood as we lay together, bathed in oxytocin, deluded by sleepless nights and garnished with an extra sparkle. More than once we have found ourselves telling total strangers about Sam...oh wait...we are doing it again, this time by text!

Embedded in our transformational experience of the birth of Sam was another transformation that extended beyond the biophysical change of adding a new member to our family. This smaller change and resistance to that change resulted from the name we chose to give him. His first and middle name are presented as pseudonym here for purposes of privacy: Samuel Fredrick Stanger Beauchamp.

Like many new parents, we decided not to learn the sex of Sam before he was born. Consequently, we had chosen a few names for either sex, but had reserved the real naming decision until after we met him. So on the second day of his life, sitting on our front porch, soaking in the September sun, we put together a few of the boy’s names we liked and came up with Samuel Fredrick. It ‘fit’ instantly. Nick then proclaimed (in the way he sometimes does) that, “it was time for the pattern of patrilineal nomenclature to be disrupted” and offered that we give Sam Joy’s last name (Beauchamp) rather than his (Stanger). To maintain a connection to his family history, we opted to include Stanger as one of Sam’s middle names.

And so it was that Samuel Frederick Stanger Beauchamp came into this world. The naming of Sam, which was a seemingly normal event, was punctuated by repeated playing of Sam Cooke's "A Change is Gonna Come." This song foreshadowed the change that was about to ensue as we announced his presence to our families and friends.

It was in this moment of baby bliss that Nick received a message from his parents, who were quite unhappy that we had opted for Joy's last name, stating "people will be confused as to who the father is" and noting: "He is your son, Nick!"

These statements made us wonder whether we had gone too far in transgressing social norms, and yet, as the parental replies echoed through Nick's head, (which, at that moment was steeped in theories of systems thinking), we realized that this was a quintessential example of the friction that is often brought about by change. This friction, Nick realized, was mirrored in some of his doctoral data, specifically in the research that looks at place and place-connections.

PANARCHY THEORY AND SOCIAL SYSTEMS

Having experienced the friction that change can bring first-hand with Sam's naming, I decided to explore this concept in the broader contexts of transformation (the change that places can have on us throughout our lives) and solastalgia (the friction and pain that occurs when we see a place change). Let me begin by introducing some definitional language on which this paper draws.

After completing an undergraduate degree in ecology, a Master's degree in environmental education and communication, and a PhD that looks at connection to place, I have been exposed to many theories of change and development. Yet, as I puzzle over the complexities of change in my own life, research, and teaching, I continue to return to one of the obscure theories that was introduced to me during my studies in the Faculty of Forestry at the University of British Columbia: "panarchy".

Panarchy theory is a systems-thinking adaptation of ecological and complexity theories that is used to explain and explore the process of adaptation and change within all systems, be they ecological or sociological. Rejecting the notion that there is a simple equilibrium for systems, panarchy acknowledges the complexity of dynamic states of equilibria for ecological, societal, and economic systems (Gunderson & Holling 2002). Panarchy theory is useful because it provides a succinct and descriptive model for describing all systems using ecological characteristics. What makes it particularly unique in the world of sociological research is that it can be used in human systems providing descriptions of how humans move and adapt through multiple equilibria of thought, expression, and behaviour at individual and societal levels (Carreiro & Zipperer 2011; Varey 2011). The theory suggests that human society, even in this time of human-induced ecological crises, has elemental ecological resilience, such that humans

are implicitly adaptive, often at the expense of the very systems that have sustained them. Humans, like other mammals, are ultimately seeking more than self-sustaining behaviour, they are seeking a community-sustaining behaviour where they maintain their cultural norms, societal comforts, and continued shared-experiences of living. That human thought and behaviour is situated and interrelated within ecological systems is a comforting concept. However, like E.O. Wilson’s (E. O. Wilson 1984) Biophilia Hypothesis states, using panarchy as a description of social systems has yet to be explored extensively.

The acknowledgement of the complexity of overlapping and adaptive systems can frame the beginning of an approach to understanding how change occurs at the individual, societal, and ecological levels. This concept is not without context, of course; for many years, environmental psychologists have suggested that time, space, scale, and relationships affect the ongoing influencers of human thought (Ackerson 2000; Taylor, Segal & Harper 2010). However, it is a new approach to describe adaptations within social systems (be they individual or societal behavioural change) by interweaving environmental psychology and panarchy theory. Yet, through this adoption of panarchy theory in social sciences, researchers can tap into the underlying inquiry of this form of complexity theory: how can we examine the resiliency of human social systems? We will come back to this question later in the paper. First, let us look at the components of panarchy theory.

Panarchy theory describes systems as having five interrelated components: holarchy, scale, time, cycles, and cross-scale dependency (Gunderson & Holling 2002). Table 1 further describes these concepts:

Term	Description
Holarchy	All systems are a nested complexity of other systems. Each component of a system has functional inter- and intra-relations to each other and to other systems
Scale	Systems are scale dependent with all sizes existing concurrently (small to big - microscopic to cosmological)
Time	The scale and interrelations of all systems exist in discrete and diverse time sequences.
Cycle	There are four stages of adaptation in all systems: growth, conservation, release, and reorganization.
Cross-Scale Dependency	Systems are complex in both their variables but also their interactions in highly dependent relationships. There are some levels of predictability in these states.

Table 1. Five components of panarchy theory described.

How are these terms contextualized? Returning to the story of our son's name, we describe how each of the components of panarchy were involved.

Holarchy

When looking at how social systems change, even small changes count. All elements of a system are nested within each other. Changing the order of our son's name, so that his last name was matrilineal, triggered my parents to react in fear, anger and frustration. They saw the social norm as one of patrilinearity and thus believed that not choosing to follow protocol represents weakness. Of course, our rationale of the name-order change was to intentionally intervene on patrilinearity, thus disrupting the current equilibrium. Though a name order is a relatively small change, it affected other elements in the system such as the behaviour of my parents and our friends. If names have functions in our society, then adapting them will affect other elements within that system, even if they appear unrelated. Systems within other systems are known as holarchy.

Scale

According to an online world population clock, as of the minute I am writing this paragraph, there are 7,268,969,083 people on Earth, and 172,207 births during this day. In comparison to this staggering number, Sam's birth was a very small scale phenomenon, thus the scale at which we attempted to support a matrilineal change in naming systems was also very small. However, the critical element is the acknowledgment of the interactions within and among systems, regardless of the scale, since a system such as this holds common elements that are represented in larger systems. As Donella Meadows (Meadows 2002) suggests, systems thinkers must "get the beat" of a system before trying to understand its interactions.

It is also worth noting that small scale change can have far-reaching effects, especially in societies so governed by digital media sharing. Many of our friends in Canada and beyond, have commented on Sam's name and our choice of matrilinearity. This seemingly small-scale change both represents a larger system of change (in this case to matrilineality) and also stimulates broader change through the interconnectedness of human relationships and the technological collapse of space and time.

Time

Perhaps one of the most frequently dismissed components when considering the change of systems is time. Time as it relates to the naming of Sam has multiple interpretations. In the immediacy of the announcement of Sam's name, my parents reacted quickly, stating that they did not like his name. After a few days, they had warmed to it, and now, one year later, they use his name without thinking about their initial reactions. Transformations and adaptations of

social systems require time. Now, our son is known, without question, as Sam Frederick Stanger Beauchamp.

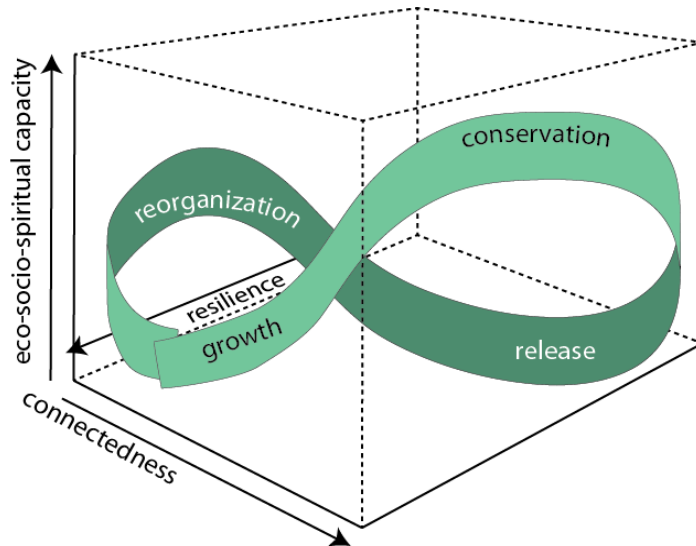


Figure 1. Three dimensional panarchy model showing the relationship among potential, connectedness, and resilience within an adaptive cycle (Holling 2001).

Names, of course, extend beyond the letters on a birth certificates. We carry names throughout our lives, though they may change and adapt as we grow as individuals. Names represent different forms of our lives. So in the case of Sam's name, a systems thinker can consider the multiple interpretations of his name throughout different temporal periods in Sam's life: as a baby, toddler, child, adolescent, adult, parent, and grandparent.

Cycle

All systems go through cycles. In Figure 1, there are four stages of ecological dynamics within the adaptive cycle: growth, conservation, release, and reorganization (Gunderson & Holling 2002). These stages exist within the three dimensional space constructed by the interaction among x-axis: connectedness, y-axis: eco-socio-spirital capacity, and z-axis: resilience. Below, each stage is explained as it relates to ecological systems thinking and I provide illustration through the analogy of Sam's name (in italics):

Growth

Growth occurs in a system through a rapid expansion of a population where there is a plethora of ecological niches.

With exposure to eco-feminist theory, decolonizing methodologies, and human rights and equity research (various niches), we were growing to a point where when we had a child, we were determined to make a small adaptation to the normal societal naming pattern.

Conservation

Over time, in an ecological system where biodiversity and complexity of interactions increase and create further connectedness, systems reach a conservation stage that represents the carrying capacity and equilibrium (of which there may be many).

Being comfortable with each other and with social justice, and feminism, while having an interest in making a subtle statement, we came to the decision to give Sam his mother's last name. This represents conservation, since it was the strength of our relationship as a couple and our identities in our community that gave us the confidence to introduce a destabilizing element into our social and familial systems.

In this conservation stage of the panarchy cycle, the system's resilience is lower, due to its vulnerability of operating in a status, and reduced adaptability, therefore in the example of Sam's name, this small change resulted in a larger adaptation of my parents' beliefs and feelings around naming convention.

Release

The release stage occurs when a stochastic event or competitor/predator alters the conditions that supported the equilibrium, reducing the resilience and complexity of the interactions.

We had not anticipated how our slight adaptation to Sam's name would affect others. In our judgement, my parents' reaction was the actual release, since their questioning of our decision introduced uncertainty to our choice of names and destabilized our existing relationships and social norms. It also seemed that they were trying to come to terms with this name adjustment. Like most releases, we were quickly thrown into the next stage of reorganization.

Reorganization

Reorganization is the reconstruction of the ecosystem based on the available elements, such as successful organisms that survive the natural selection processes associated with the stochastic event.

Human societies operate under relatively conservative principles such as maintaining a status quo, even when all indicators point to the need for adaptation (Jost et al. 2003). This means that during reorganization, humans try to find replacements or recreations for elements of the system that are lost, before acknowledging their loss and moving towards adaptation in a new system. Climate Scientists have been pointing to this behavioural challenge for many years, calling on both individuals and governments to make changes to reduce CO2 emissions without much success (Gifford 2011).

The negative response of my parents to Sam's name required us to re-examine our motives in choosing his name and to assess how this choice fit into our new reality in which his name created strife (something we had not anticipated). My parents had to examine their response, though their process of reorganization took longer as it required a significant reorganization of values, beliefs, and norms.

Cross-scale dependency

These above mentioned components of panarchy are interconnected within any system. The scale of the effect of Sam's name and the reorganization after the naming event are all affected by each of the components. Over time, my parents' discomfort with Sam's name will likely diminish as the personal transformation process completes. The interdependent quality of this theory allows for a more holistic understanding of how systems evolve over time.

There will never be stasis regarding Sam's name and people's reaction to it. Sam may choose to change it later in life, or we may choose to call him by a nick name. However, his name acts as a function of the social system in which he is embedded.

You can see all of the components of panarchy represented within the process of naming Sam. Time, scale, cycles, and holarchy co-exist as a contextual basis of Sam and the reactions to his name.

Panarchy is most often referred to as the adaptive cycle diagram. Note that each of the stages are non-linear with the exception of the transition of release to re-organization. Release always leads to re-organization, since a true release requires the loss of elements in the system and reorganization is the inevitable restructuring. Conservation can lead to growth without a release, yet, within social systems, this would likely mean a closed negative feedback loop that continually diminishes in potential and resilience. We could have chosen to name Sam within the patrilineal structure and thus maintain an ordered growth of the social system, but we did not. Instead, we chose to intentionally create a release that might force a reorganization.

Though seemingly simple, this analogy of Sam's name through panarchy leads to the main content of this paper, understanding change within the context of social systems. Over the next two sections, I will refer back to some of the terms introduced through naming Sam to illustrate some patterns that I observed in my dissertation research interviews.

TRANSFORMATION AND PLACE

Beyond my burgeoning understanding of complexity theory as it relates to social systems, I am increasingly curious about the question of how humans relate to place. For the past three years, I have been exploring this concept and have developed a theoretical background in socio-ecological models (Stanger 2011), panarchy theory (Stanger et al. 2013a), and Indigenous ways

of knowing (Tanaka et al. 2013) as lenses through which I look at human and social systems. Thus, I have asked the question: How does learning that occurs in childhood and adolescent outdoor places inform civic, emotional, physical, and/or spiritual engagement or connectedness over the course of people's lives?

Rich Methods that Are a Little Different

Understanding the influence of place on our identity warranted the use of participatory qualitative methodologies and allowed me to employ an integrated lens of emotional, spiritual, cognitive, and ecological views within an eco-sociological theoretical framework (Berkes, Colding, & Folke 2003; Chambers 2009; Stanger 2011). In particular, I used participatory action research to engage my participants as co-collaborators, enabling a relational accountability such that I integrate panarchy theory and Indigenist (Wilson 2009) approaches into this study. As articulated by Wilson, Indigenist researchers act as allies to Indigenous peoples through decolonizing research techniques. This is something, we believe, that is important in all acts of research.

This research method does not claim to be completely objective in its nature, rather it explores the nuanced qualitative spaces through the epistemology and ontology of the authors. We acknowledge our orientations to this research as people who are interested in human connections to place and work with the participants to co-construct the meanings that they have shared with us. With environmentalist and social justice backgrounds, our plurality is towards understanding the (trans)formative moments that might have led to paradigmatic, moral, or value-based change in people. We feel that this orientation doesn't diminish the rigour of the work, but rather acknowledges our experiences and influence as part of a participatory research model (Ratner 2001).

I recruited participants to my research using a criterion-based selection process (Cohen et al. 2005), particularly unique-case sampling where participants were selected by having an attribute or characteristic that set that person apart. In the case of this research, the characteristic was being "well-known" or "exemplary" within their own community of practices.

In the summer of 2013, I identified four exemplary individuals and interviewed them in their childhood or adolescent (trans)formative places, which they determined based on the description of places that significantly affected them. My participants included Tsartlip Elder and Cowichan Sweater knitter, May Sam; National Geographic Explorer-In-Residence, Dr. Wade Davis and his wife Gail Percy; Her Honour, the former Lieutenant Governor for British Columbia, Iona Campagnolo; and Hua Foundation co-founder, Claudia Li. Before returning to their (trans)formative places, I conducted a preliminary Single Question Aimed at Inducing Narrative (SQUIN) interview (Wengraf 2001) with each participant with the intention of exploring the memories, feelings, and ideas that were elicited when remembering childhood and adolescent

places (Hollway & Jefferson 2008). The intention was to identify their predominant narratives as well as to establish a baseline memory before returning to the place. I then travelled with each of them to their selected place and conducted an open-ended interview and tour. The main intention of this process was to ask them to recount and revisit learning experiences that helped them form their current identity. Since each visit and participant experience was distinctive, I used a semi-structured interview technique that let the activities, structure, and discussion develop in their (trans)formative place. These manifested as questions such as:

- How does it feel to return here?
- Can you draw a line from the experiences you had in this place to what you do now?
- How has this place changed? Is it different from your memory?

Each visit, interview, and discussion was filmed in high quality video format using the assistance of professional film-makers. This multi-media technique helped capture the sensory and emotional experience of visiting childhood and adolescent places, which I believe is not sufficiently described through text-based interviews alone (Cohen et al. 2005).

I then invited and encouraged online interaction from the North American public. With media and web design, the interview footage of the key participants was edited and presented on the website [http://www.\(trans\)formativeplaces.com](http://www.(trans)formativeplaces.com). This website features each participant and their (trans)formative place stories and invites interaction from the public. These public interactions were to be analyzed as part of my larger dissertation research.

Analysis

For this research, I adapted Hycner's (1985) simple guidelines for using phenomenological analysis of interviews as a way of weaving video-based data collection into my research approach. In particular, I follow his recommendation to "listen to the interview for a sense of the whole" (281). Phenomenological video analysis allowed for a richer understanding of the units and clusters of statements and actions that are relevant to the research questions. This means that I listened to and watched the interviews and collected concepts of general meaning throughout each interview by using verbatim language, actions, and non-verbal cues as indicators of meaning.

Hollway (2009) has done much to help researchers understand the value of story, language, and looking beyond the words of individuals to psychoanalytically understand the meaning that shows up in interviews. By using aspects of her free association narrative method and phenomenological methodology where researchers access "latent meaning through eliciting and focusing on the associations between ideas, as opposed to exclusively on words and word clusters" (463), I engaged in a compassionate approach to interviewing. This is something that Hollway calls "experience-near" research.

WHAT I SAW FROM MY FOUR INTERVIEWS

My data collection took me on my own (trans)formative journey across British Columbia to visit the (trans)formative places of four well-known North Americans: May Sam, Dr. Wade Davis, Iona Campanola, and Claudia Li. As a preliminary stage of my dissertation data analysis, I explore each of the key participant interviews that I conducted during this journey below and point out synergies with panarchy theory as examples of transformation. I have described four components of panarchy by referring to moments that occurred within each of the interviews, when the participants exhibited moments of vulnerability or increased excitement. In May's interview, she and her four generations of family represent holarchy. In Wade's interview it is scale that is prominent. In Iona's interview, time plays a key role. Claudia's statements represents cross-scalar dependency. Each interviewee is introduced using the language derived from the interactive website [http://www.\(trans\)formativeplaces.com](http://www.(trans)formativeplaces.com) and is presented in italics.

May Sam

May Sam, a Tsartlip elder, Malahat and Khowutzun member, Great Grandmother, knitter-extraordinaire, and embodiment of generosity has helped transform her communities, with her practice of knitting, relational respect, and traditional ceremonies. Along with four generations of her family, May led me through her childhood places in the Malahat and Cowichan Valley.

May Sam's sense of place is rooted in her connection to family, food, and respect. To see the four generations of her family interacting in the three significant places she brought me to was a humbling experience. Her memories are resonant in stories of learning respect for her father as well as the land and ocean that continues to support her.

In Meluxulh (Malahat), where she was born but doesn't have any early memories, she stated that it felt good to "be home." She recounted stories of her father, single-handedly raising May and her sister. He kept a watchful eye on them while he sorted the logs in the log-booms offshore. May's older sister would look after her while she lay in an apple box on the beach.

At Lhumlhumaluts' (Cowichan Flats), May had many rich memories of the salty-brined Cowichan estuary. She was diligent about helping her family, by fetching groceries many kilometres away, collecting fresh water for drinking, and respecting the boundaries of the long-house. She also remembers being a trouble-maker, borrowing canoes to pick crab-apples along the river. Yet, her connection to this place continues to be absolute, and her memories of it were only slightly adapted by the reality of new buildings - Lhumlhumaluts' has remained relatively unchanged since her childhood.

At Tl'ulpalus (Cowichan Bay), May remembered staying in a cottage and helping her father to fish for flounder by walking in the shallows of the bay until she stepped on a fish. Then, having

found one, she would wait for her father to spear it between her toes. She also told me about one of her earliest memories of presenting her father with a gift of steamed clams that she and her sister made secretly. "That was the first time he cried. He was so appreciative of what we had done, despite breaking the rules to do it."

May's connection to place is woven with her connection to her father, and now to her own family. Her work as a knitter and supporter of language revitalization with the Cowichan and Tsartlip communities is directly influenced by her connection to these three places.

May, transformation, and Hierarchy

Having four generations of May Sam's family visit her (trans)formative places speaks to a collective approach when honouring her past. We walked through places she had not been since she was a little girl, and all the while she introduced these places to her family, who accompanied us, and acknowledged the values that she gained from these places. I was left with the impression that she would do anything for her family. Yet, she also holds her family to a high standard. She expects them to practice cultural ceremonies, to respect elders, and to embody the concept of *Khowutzun*, the name of her home:

Its Khowutzun, all of this whole area. My home, my dad, my family. My family, my daughter and my two sons, and my great-grandchildren. That's just it that is all of it. That is how I got to be who I am today.¹

May's connection to her family and place represents a nested sense of responsibility, a holarchy of responsibility. They, in turn, are responsible to her, supporting her work in and around the community. She is absolutely committed to her family prospering and also listens to their council. Much of this commitment stems from her connection to her homes in and amongst the Cowichan Valley. Her father instilled in her a strong work-ethic as well as a sense of respect. Growing up with him as a single father was not easy for May. Yet, she recounted stories of fun and adventure as a girl, reading the land as a book, deriving food from the river and ocean, and connecting with her community.

Much has changed since she was little, including the ability to eat off the land. She sees how all of the systems are related: fishing from the river, collecting berries, human society, and hard work:

So there were only three of us that lived here. Our neighbours would have to look after us when dad was at work....Everyone here at Cowichan Bay kept an eye on us when we were little. We didn't realize that we were always getting into trouble. You know, being safe with the whole community here

¹ Lhumlhumuluts' (Cowichan Flats), [http://www.\(trans\)formativeplaces.com/#may](http://www.(trans)formativeplaces.com/#may), 12:35 - 13:05.

in Cowichan Bay watching over us... To think of everything that is happening today, the violence and everything....So glad that we were okay....[May then eats the berry she has been holding in her hand]...mmm so sweet. Huy ch q'u [thank you in HUL'Q'UMI'NUM'].²

When watching the films, you can tell that May loves these places. She sees the place as more than just the geophysical descriptions, but as a series of holarchical communities that she can share with her family who walked with her through this process of remembering.

Wade Davis

Dr. Wade Davis, National Geographic Explorer-in-Residence, anthropologist, photographer, writer, father, and husband, with Gail Percy, anthropologist, adventurer, and wife, shared stories about their summer home on Ealue Lake and their experiences in the Spatsizi Plateau Wilderness Provincial Park and Mt. Edziza Provincial Park. Wade has been coming to this area of North-western British Columbia since his early twenties, as the first park ranger when it was only accessible by a rough patchwork of logging roads.

Wade Davis and Gail Percy are anthropologists by training, both with rich experiences of many cultures, yet their relationship to Ealue and the Stikine are rooted in a more human and relational approach to the land, rather than an exploration of the ethnographic landscape.

Wade stated that he will not "act the anthropologist" rather that he is working on longitudinal research with the Tahltan First Nation that is far more participatory than the countless other fly-in-fly-out anthropologists that show up into this area of Northern British Columbia.

Both Wade and Gail find a connection to this land that goes beyond the physical beauty of it alone. It evokes positive and negative memories that construct a sense of place. Wade talked about recently seeing the Stikine and Spatsizi area as a garden in which he knows all the plants and animals. This contrasts with his first arrival in the area in the mid 1970s, as a resident of Montreal, with little knowledge of the ecosystem components. His description of the land also eluded to it as a place of danger and exposure. This transition from considering the place as one that threatens him and Gail to one that nourishes them was most obvious when Wade took me out on his boat on Ealue Lake. He talked about knowing all the trails and rock formations down to the square inch, and noted that his daughters share the same knowledge, and "melt" at the mention of returning to Ealue.

Wade's view into the Ealue, Spatsizi, Edziza, and Sacred Headwaters area is nested within the socio-political and cultural landscape of Northern British Columbia. He is a stalwart advocate for its protection. With published articles and books and a series of lectures as a National

² Ibid., 6:10- 7:43.

Geographic Explorer-in-Residence, he is well-known for his advocacy work. Much of this work to protect natural and cultural systems stems from the early experiences of growing up in Montreal, where language and cultural differences fascinated him. He links these early experiences to the work as a park ranger in Spatsizi, where working with the Tahltan people enabled a deepened view of his relationship both within and among 'culture' and 'nature'. When he talks about returning to his childhood home in Point Claire in Montreal, his sentiment that "Shadows marked the ground where trees had fallen in my absence. Any new construction, I took as a personal affront" speaks to his view of how past memories and place play a role in his current life.

Wade, transformation, and scale

Wade Davis and Gail Percy are world travelers, having recently returned from living in Washington D.C., where Wade worked with National Geographic, and Gail raised their two children. The couple typically travels more than 9 months of the year. Wade has been coming to Ealue Lake and the Spatsizi area almost every year since he was the first park ranger of the Spatsizi Plateau Wilderness Provincial Park in the mid 1970s. Despite his long-term devotion to the area, what is fascinating about his relationship to this place is scale. The Spatsizi park and surrounding land is immense. It is one of the largest wildlife preserves on the planet and contains within it a requisite rich biodiversity. Yet its physical size is no match for Wade's world as an anthropologist. In his role with National Geographic, he has the opportunity to travel across the globe, to places that exist only in the dreams of most of the population. Despite these opportunities, Wade and Gail continue to return to Ealue Lake every year, devoting their summer months to living in a small lodge and hosting a few guests. They also work extensively for the protection of this area, named the Sacred Headwaters, from extractive industries; something keeps drawing them back year after year. I believe this need to return is a sense of place that represents both comfort and curiosity.

Wade and Gail describe their connection to this place as somewhere that evokes many emotions. It is where their children developed independence, where they witnessed losses and gains, and where Wade will eventually lay to rest:

I remember going into the Spatsizi [in the 1970s], being acutely aware of the danger of bears because the two parks planners the year before had been mauled by bears and the government forced us to carry around this ridiculous shotgun... Whereas now, the whole Spatsizi feels like a garden to me. I know every plant. I know the habits of every animal. I can anticipate the weather. I never feel threatened by anything. I feel like I can walk through that country with such ease. It has really become my home. In a way there is no corner that I haven't visited. That is how I feel here.... I just feel so fortunate to have had the opportunity to come to know a place in

*Canada so well and to feel so comfortable in it that it really is home. It will always be home. This is the lake where my ashes will be spread...actually I will probably put some of them on top of the mountain.*³

Wade is a consummate storyteller, yet if you watch this part of the interview, you will notice an easing of his face and rate of speaking. I think this demonstrates him speaking with more spontaneity; he is showing his heart as it relates to this place.

Wade and Gail's sense of place is deepened as the complexity of their own interactions with the place increase. This represents a function of scale. Their connection to this place was once based on the enormity of the area and are now much more specific, localized, and nuanced. For instance, Wade and Gail have many personal relationships with the local Tahltan people and support their interests in self-government and cultural connections to the land.

Wade and Gail exhibit an adaptive and ever-evolving relationship to Northern British Columbia. Their relationships to this place could be described by their increased familiarity with the ecological systems in the area and their increased interest in conservation. Thus, viewing transformation through the lens of scale can be a rich descriptor of the human relationship to place.

Iona Campagnolo

Her Honour, Iona Campagnolo, Former Lieutenant Governor of British Columbia, MP for Skeena Constituency, Radio Host, Mother, and change-agent took me to a childhood place under a dock at North Pacific Cannery that has been adapted into a historic site and museum along the Skeena Slough. Iona told me an incredible story that wove her early childhood experiences through her life as a politician, then her life as representative of the Queen of England in British Columbia.

Iona's relationship to Northern British Columbia is rich, deep, and full of stories. I felt that I could have travelled with her throughout B.C. for many months and continue to be surprised by the personal anecdotes of her relationships to particular places, families, and businesses. What I found most compelling was her ability to weave significant political events (be they regional, provincial, or national) into her relationships to place. Her acts of civility are grounded in politics. Over the course of her diverse career, she also acted as the Member of Parliament for Skeena (and was named Parliamentary Secretary to the Minister of Indian and Northern Affairs on election, where she served 2 years with Minister Judd Buchanan. Later, she was named Federal Minister of Fitness and Amateur Sport where she served for 3 years and set up the Sport

³ Wade Davis and Gail Percy on Ealue, Edziza, and Spatsizi, [http://www.\(trans\)formativeplaces.com/#wade](http://www.(trans)formativeplaces.com/#wade), 21:10 - 22:31.

and Fitness Ministries for Canada, and finally, she served as the President of the Federal Liberal Party. Her views are deeply connected to the era of Pierre Trudeau politics, and yet she can tell you the current state of regional political battles and affairs.

What is most poignant for me however, is her long-view of the history in Canada. This extends well beyond the comings and goings of 1970s politics or even the founding of Canada. Her connection to place is deeply related to her connections to First Nations peoples, be they Tsimshian, Gitksan Wet'suwet'en, Haida, or Nisga'a. She has worked tirelessly to support rights and titles claims, and treaty negotiations. Despite no longer living in Northern British Columbia, she considers many of these community members to be her closest friends. These political and First Nations relationships, combined with a sense of place and her 'steel-trap-mind' of memories created a rich revisiting of places throughout British Columbia.

Iona, Transformation, and Time

One particularly (trans)formative place that I visited with Iona was underneath the wooden sidewalk at North Pacific Cannery, suspended above the inter-tidal zone along the Skeena River, where she spent ten years of her life, from age seven to age seventeen. She talked about a memory of connecting with local First Nations kids who had come with their families to work at the cannery:

Underneath the sidewalk, you see, it didn't really matter what race you were. This is where I learned a lot about their lives. Some had been forced to go to residential schools. Others, their parents had refused to allow them to go to residential schools and we went to school together...So it was here that I heard first the Northern Protocol: 'I acknowledge with respect the Tsimshian First Nation on whose traditional territory we are.' And I used that everywhere I went for a very long time after that. And now I hear it enough that I am satisfied that it has gotten through.⁴

In these inter-tidal discussions, Iona reported experiencing a form of decolonizing diplomacy, where empathy and equity created life-long friendships. Notice in the film that she played with the sedges, pointed under the pilings, and periodically recalled names of her young friends and recounted where they now worked.

On reviewing the video footage, I could see that returning with Iona to this place was a visceral experience for her. She was comfortable underneath the sidewalk; she sat on a stump, her facial expression relaxed, and she paused many times to look around during the interview. Throughout our time at North Pacific Cannery, she wove together her early memories of people, the role of the landscape, its ecology, and the cultural interactions as functional drivers

⁴ Under North Pacific Cannery, [http://www.\(trans\)formativeplaces.com/#iona](http://www.(trans)formativeplaces.com/#iona), 0:00 - 1:20.

for her self-identity and motivation. One particular narrative stream that relates to her lifelong support of First Nations rights is her support of the Nisga'a treaty.

After 100 years of Nisga'a governments trying to negotiate a settlement with the Crown, Canada, and British Columbia, this modern treaty was finalized in 2002. Iona was a great supporter of this process, and the final positive outcome stemmed from her influence, and as she articulates, from her early relationships with young First Nations. Not only did the activities and landscape of the North Pacific Cannery influence her actions, but she suggests that it is "these kinds of places" that influence many of the people who ended up working on the Nisga'a Treaty and other related projects.

The component of time is clearly evident when using panarchy theory to describe the transformation in Iona that stemmed from this place. Consider that at age seven, as she negotiated the complex interactions of childhood, she was also witnessing extreme inequalities, where First Nations and Japanese friends were treated with prejudice and exclusion. During the 1940s, First Nations faced (and continue to face) debilitating racism and colonialism in Canada, disallowing any form of political gatherings, practice of culture, and the tragic separation of families (Smith 2005). Japanese people were also subject to an exclusionary prejudice by being interned during World War II, an inhuman activity that has left many Japanese families in Canada still struggling to recover (Sunahara 2000). In that same era, underneath the rickety wooden sidewalk, an equity and respectful space was formed that, without her knowledge, influenced Iona's devotion to First Nations for the rest of her life.

These moments could be labeled as *release events* within the adaptive cycle, since they were the stochastic or critical events that precipitated a release, or change in her values, and ways of living, and broke current social norms. For Iona, the release stage, and the subsequent growth stage can be plotted from this experience in the mid 1940s through today. The culmination of her work, (and perhaps the equilibrium stage) is found in the Final Nisga'a Agreement and the realization of a functioning Nisga'a Lisims government:

I think it is important that we say that each generation is supplanted by a new generation with new responsibilities and a wholly new set of challenges to face, but they are here and they have the great tradition to fall on. I am very hopeful as I sit here [in front of the Nisga'a Lisims Administration Building].

Iona finds hope in seeing her friends' sons and daughters working in the administration of the new Nisga'a Government. This hope is part of a growth that has culminated over the course of her life, finally reaching a place of ease and conservation in her mind. This next generation is now working on their own projects, and in effect are adapting through their own panarchy cycles.

Under the docks of the North Pacific Cannery, Iona ends her statement by sharing her emotional response to returning to this (trans)formative place: "So this is it, the sacred place for me....and it makes me sad....to think that they [her friends] are almost all gone." This place is sacred to her as it represents the hope that was actualized 60 years later in her life, and in the same breath, it brings back feelings of longing. This is what Glen Albrecht (2010) calls solastalgia, the pain caused by the loss of a place of solace or the events that occurred there. This place still moves Iona to tears and continues to play a role in her life. Subsequently, it plays a role in many other people's lives too, due to her influence and actions over the course of her life.

Claudia Li

Claudia Li, the co-founder of the Hua Foundation and Sharktruth.org, took me back to her childhood home in Burnaby BC to rediscover her connection to place. With memories of her grandma, smells of tomatoes, and the discomfoting realization that memory can play tricks on perception, Claudia leads us through an experience full of emotion, connection, and healing.

For twenty years, Claudia has lived within a few blocks of her childhood home but she had never ventured back to her childhood backyard. Her memories connected to her recently passed grandmother, a first generation immigrant from Hong Kong.

I asked Claudia to take me somewhere that would be a natural setting for a pre-interview. She suggested the Burnaby Mountain Conservation Area, where she walks with her mother every week. This site gave us a vista over Burnaby, Burrard Inlet, North Shore Mountains, and in the distance, Vancouver Harbour and the City of Vancouver. Claudia told me about her grandmother and one of her first olfactory memories: the smell of the tomatoes that her grandmother grew in the backyard. Claudia described an idyllic setting of sunny afternoons after school being mesmerized by the tomatoes and her grandmother's stories. "Bliss" was the word that emerged when Claudia recounted the memory of her grandma and her childhood backyard.

I asked her to draw the yard as a way of helping her reconnect with this place.⁵ Depicting her memories of this (trans)formative place sparked some new memories, including how this place related to the larger landscape context near the North Shore Mountains. Claudia's drawing became a visual representation of her running down the steps of this house and looking for her grandma.

⁵ You can see the representation of the yard she drew and the film of her drawing it online at <http://www.transformativeplaces.com/#claudia>

Claudia's visit back to the backyard was emotional: "I know it is my childhood memory, and I know it is kind of tricking me". She said she felt sad that her "memory bubble" had burst. "The yard seemed so much bigger in my memory...it seemed so vast and grand." Yet, when asked about how to connect her memory of the place to her work as an activist now, she explained that her connection to place and to her grandmother is the basis for her joy, love, and appreciation of life. She also indicated that this house was not all filled with rosy memories, and that to experience deep joy, one also needs to experience some darkness. There was something about this place, she said, that gave her this diversity of feeling-experiences.

After the filming was done, I asked Claudia, "how was that for you?" She replied, "healing." She didn't explain this statement to me, but I surmised that this place was the site of some hard memories relating to her family. She had avoided returning to this place until I asked her to go, but it seemed that revisiting her childhood home brought positive memories of her grandmother and helped her process some of the harder memories of this time.

Claudia, Transformation, and Cross-Scale Dependency

So much of Claudia's interview focused on her reverence for her grandmother that, at one point, I asked if she felt like her grandmother, now passed, was still present in her life. She stated that she could sense that her grandmother was here still and at the same time, returning to this place made her appreciate her community that is currently alive:

I feel like I should have done more to share some of these memories when she was still around...I know regret's not a good way to live by. But it just reminds me that you never know what you have until you lose it...It encourages me to reach out to my elders and try to make sure that I can do that with them while they are still around...I think a big part of being able to do that is to let go of all the crap that is between you and the other person so that you can show them love. So yeah, so mostly it is a memory of joy. But I think in some ways to experience really true deep joy it is often tied to some sense of deep loss or sadness or pain. When you are in the darkness and you see just a tiny bit of light, its just that much greater.⁶

Claudia's relationship to her childhood backyard is not necessarily rooted in the ecology of the area or the stunning vistas, but it is a connection to her grandmother and the wisdoms she shared. This memory of her grandmother represents an interrelationship of generations, where this backyard provides the context for rich and visceral memories. Throughout the interview, Claudia was visibly moved. Watch the first few seconds of the interview as she walks into the backyard. She makes quiet exclamations and her hands curl as she looks visibly

⁶ Claudia Li visits her childhood home in Burnaby, <http://www.transformativeways.com/#claudia>, 8:46-10:17.

worried. She exclaimed that “it looked different” and that she was having “lots of memories.” I asked her to reenact her memory with her grandmother and this led her to talk about her earliest memory of smell (6:15 - 7:40). It is the smell of tomatoes, even in a grocery store, that transports her to this spot, her childhood backyard, with her grandmother.

Claudia traced her current work as an activist with the Asian Canadian communities back to the teachings of her grandmother. That sense of love, peace, and awe she experienced as a young girl with her grandmother is something she keeps close to her heart in her work. She frequently brought up feeling bliss from the memory of this place. She described this as a very deep appreciation for life and noted that this appreciation is not only for people and the family - but for the larger world. She understood this memory as a function of joy, love and appreciation for other lives and for the Earth as a whole. By understanding the connections to her ancestors and bringing this learning forward to her community, her experience exemplifies a cross-scalar dependency. She sees the value of tradition as shown through her reverence to her grandmother, yet seeks to find new ways to support her culture to embrace more sustainable behaviour as shown by her work with sharktruth.org and the Hua Foundation.

ECO-SOCIOLOGY, TRANSFORMATION, AND CONSERVATIVE SOCIAL SYSTEMS

Whether it is my parents’ resistance to change in the naming standard of our newborn or the reorganization of May, Wade, Iona and Claudia as they returned to their (trans)formative places, human change is patterned and complex. We believe that the concept of panarchy, a concept traditionally used in ecology, can be applied to social systems to explore the stages that humans go through as they transition and change.

The process of naming Sam provided insights into the friction of release, and thus opened our eyes to using panarchy to describe even this small moment in our personal social systems. This experience renewed our commitment to understanding transformation through panarchy theory, in which all human systems, be they developmental, relational, and biophysical, can be described through the components of this model.

May’s relationships with her family are also her relationships to land. She believes she is *Khowutzun* meaning everything. This even includes her cultural practices, family, and the places where she grew up. This understanding of the nestedness of systems is a holarchical understanding and suggests an acknowledgement of the complexity.

Wade and Gail’s connection to place has become increasingly nuanced as they continue to return to Northern British Columbia. These relationships to place are scalar, in that they are both large and small at the same time. They connect to the enormity of the topographical expanse that is the Spatsizi, in a way that is also discrete, pithy, and subtle. They work with

local First Nations, collect food from native plants, and see layers of personal history among the valleys and peaks of their summer lodge.

Iona's experience under the sidewalk at North Pacific still resonates with her. This experience was a form of release that occurred more than 75 years ago and has contributed to her reorganization and growth in this present day. Time played a critical role in Iona's development as a human. She sees a full circle that connects her under-the-sidewalk-experience with the visit to the Nass Valley and her friends and colleagues at the administrative building of the self-governed Nisga'a Nation.

Claudia's connection to her ancestors, and her understanding of the need for change in her cultural communities represents cross-scalar dependency. Without the relationships with family, community, and culture, she would not be able to have a voice in these places. This appreciation derives from early experiences with her grandmother, tending to her tomato plants. She is driven by the respect she has for her grandmother and the sense of bliss that she experienced working with her in the garden. None of the components of this social system can exist without the ecological system in her mind. To connect with the Asian Canadian communities in Vancouver, BC, she must simultaneously recognize social, cultural, ecological, and spiritual belief systems which all interact and inter-relate with each other.

The adaptive cycle model could be considered the most useful component derived from panarchy theory within social sciences. Notice that for each of the examples we have introduced, including the naming of Sam, the stage-based process provides descriptive language for the transformation that has occurred (Stanger et al. 2013b). For instance, in the case of naming Sam, one could say that the system described is in the release stage (the process of naming with Joy's last name) with some movement to reorganization stages (the process of accepting his name and understanding how it fits into our socio-cultural matrix). In another example, Iona's process has likely reached a place of conservation, where she has reorganized her thoughts, attitudes, and belief systems over her personal and political career until she felt hopeful and comfortable with the current attitudes and approaches of the Nisga'a Nation in British Columbia.

When applied to social systems, we can see the value of using language that is grounded in ecological terminology. In other papers, I have suggested that ecological language is sometimes exploited incorrectly to create weak or misleading arguments (Stanger 2011). We believe that because panarchy was developed by ecologists for the purpose of understanding the role of resiliency within all systems, it provides a strong research-based lexicon for social sciences (Holling 2001). In the three-dimensional diagram (Figure 1), notice that the z-axis, resilience, is increased through the process of reorganization and early growth. Holling calls this "the adaptive capacity" of a system, something that my four interviewees demonstrate with their

discussions of how their places have transformed them. As they reorganized from the experiences they had (and are having) in those places, they were able to acknowledge new combinations of the way they thought, thereby increasing their ability to take on new paradigms, belief systems, and even worldviews. These cognitive and emotional adaptations play directly into their active lives, ultimately leading to their involvement in civic engagement and to their resiliency as humans.

Panarchy theory represents a new horizon in socio-ecological theory and can be beneficial in helping us to understand the ways in which change occurs. Also, being an ecological model, based in place, it is useful in describing the important role that place has on the transformation of people. Be it naming a new human or reconnecting with an important place, systems are constantly changing. We have a choice as humans to pay attention or to ignore these changes. I believe that by paying attention not only will our human lives be better, but we will live better on this planet. For we will finally start living in recognition that everything is truly connected.

We encourage readers to explore their own connections to place by watching the videos on the website: [http://www.\(trans\)formativeplaces.com](http://www.(trans)formativeplaces.com). This website allows for you to engage in telling the story of your (trans)formative experience by pinning a marker on the interactive map and uploading video, pictures, stories, songs, and other prose onto the site.

BIOGRAPHY OF THE AUTHORS

Nicholas Stanger and Joy Beauchamp are both environmental educators who hail from the Salish Sea. After welcoming their new son into this world, Joy took a maternity leave from her position with the British Columbia government, where she worked to improve the energy efficiency among homes and businesses. She holds a Master's degree from Royal Roads University in which she focused on how environmentalists maintain their well-being. Nick works as an Assistant Professor in environmental education in Huxley College of the Environment in Western Washington University. He received his Doctorate at the University of Victoria and was a Social Sciences and Humanities Council Doctoral Fellow. He is also the former Chair of the board for the Child and Nature Alliance of Canada, a group that seeks to connect organizations, families, and youth with nature-based experiences. All three of them live in Bellingham, Washington.

BIBLIOGRAPHY

- Ackerson, David. 2000. "From Romanticism to Deep Ecology: The Continuing Evolution in American Environmental Thought." *Taproot* 12, no. 3: 8-11.
- Albrecht, Glenn. 2010. "Solastalgia and the Creation of New Ways of Living." In *Nature and culture: Rebuilding lost connections*, edited by Sarah Pilgrim and Jules N. Pretty. Washington, DC: Earthscan publications.
- Berkes, Fikret, Johan Colding, and Carl Folke, eds. 2003. *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change*. Cambridge: Cambridge University Press.
- Carreiro, Margaret M., and Wayne C. Zipperer. 2011. "Co-Adapting Societal and Ecological Interactions Following Large Disturbances in Urban Park Woodlands." *Austral Ecology* 36, no. 8: 904-915.
- Chambers, Joan. 2009. "Critical Discourse Analysis: A Research Methodology for the Analysis of Environmental Education Materials." In *Diversity in Environmental Education Research*, edited by D. B. Zandvliet. Rotterdam, The Netherlands: Sense Publishers.
- Gifford, Robert. 2011. "The Dragons of Inaction: Psychological Barriers that Limit Climate Change Mitigation and Adaptation." *American Psychologist* 66, no. 4: 290-302.
- Gunderson, Lance H., and C.S. Holling, eds. 2002. *Panarchy: Understanding Transformations in Human and Natural Systems*. Washington, DC: Island Press.
- Holling, C.S. 2001. "Understanding the Complexity of Economic, Ecological, and Social Systems." *Ecosystems* 4, no. 5: 390-405.
- Hollway, Wendy. 2009. "Applying the 'Experience-Near' Principle to Research: Psychoanalytically Informed Methods 1." *Journal of Social Work Practice* 23, no. 4: 461-474.
- Jost, John T., Jack Glaser, Arie W. Kruglanski, and Frank J. Sulloway. 2003. "Political Conservatism as Motivated Social Cognition." *Psychological Bulletin* 129, no. 3: 339-375.
- Meadows, Donella. 2002. *Dancing with Systems*. <http://www.sustainer.org/pubs/Dancing.html>
- Ratner, Carl. 2002. "Subjectivity and Objectivity in Qualitative Methodology." *Forum: Qualitative Social Research* 3, no. 3.
- Smith, Linda T. 2005. *Decolonizing Methodologies: Research and Indigenous Peoples*. London: Zed Books Ltd.
- Stanger, Nicholas. 2011. "Moving 'Eco' Back into Socio-Ecological Models: A Proposal to Reorient Ecological Literacy into Human Developmental Models and School Systems." *Human Ecology Review* 18, no. 2.
- Stanger, Nicholas, M. Tanaka, L. Starr, M. Farish, M. Abra, and V. Tse. 2013a. "Emotional Transformation Through the Lenses of Panarchy Theory and (trans)formative Inquiry." Paper presented at the Canadian Society for the Study of Education Annual Conference, University of Victoria.

- Stanger, Nicholas, M. Tanaka, L. Starr, and V. Tse. 2013b. "Winter Counts as (trans)formative Inquiry: The Role of Creative Imagery as an Interpretation of Adaptive Change." *Complicity* 10, no. 1/2: 87-110.
- Sunahara, Ann G. 2000. *The Politics of Racism: The Uprooting of Japanese Canadians during the Second World War*. Accessed 2011, http://www.japanesecanadianhistory.ca/Politics_of_Racism.pdf
- Tanaka, M., X.N. Claxton, D. Wiseman, D. Donald, and N. Stanger. 2013. "Teacher Education and Indigenous Pedagogy: Imagining Possibilities." Paper presented at the Canadian Society for Study of Education Annual Conference, University of Victoria.
- Taylor, Duncan M. et al. 2010. "The Ecology of Adventure Therapy: An Integral Systems Approach to Therapeutic Change." *Ecopsychology* 2, no. 2: 77-83.
- Varey, William. 2011. "Viability of Psychological Panarchy: Thought as an Ecology." *Systems Research and Behavioural Science* 28, no. 5: 509-525.
- Wilson, Edward O. 1984. *Biophilia*. Cambridge: Harvard University Press.
- Wilson, Shawn. 2009. *Research is Ceremony: Indigenous Research Methods*. Toronto: Fernwood Publications.
- Worldometers Real Time World Statistics. 2013. *Current World Population*. Accessed October 29th, 2013, <http://www.worldometers.info/world-population/>