

## Blue Ecology and climate change: interweaving cultural perspectives on water, an indigenous case study

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**Abstract** The author proposes that we re-examine climate change from a Blue Ecology or “water first” angle: What is happening to the world’s water in the context of climate change? The author proposes the acknowledgement of water’s central functional and spiritual roles in our world, and urges us to apply both indigenous and science-based understanding as we develop collaborative climate change mitigation strategies. A definition of Blue Ecology, consistent with the UNESCO-IHP’s (2008) definition of water, is proposed, and also a Blue Ecology water cycle to be interwoven with Western science’s hydrological cycle. Finally, the author offers recommendations for hydrologists and water managers to implement Blue ecology.

**Key words** Blue ecology; Blue ecology water cycle; culture; indigenous perspective; interweaving; climate change

### INTRODUCTION

Cultural knowledge cycles, accumulates, and shape-shifts through generations, just as water, the transitory element, cycles through the oceans, land and sky<sup>1</sup>. Just as the mighty rivers of the world are the sum of the mountains’ trickles, streams, creeks, other rivers and lakes, so too, our global understanding of water can be the joining of diverse cultural streams of thought and perspectives on water management. As the rivers of human knowledge flow across the world’s landscapes, a diversity of cultural tributaries interweave, streaming with their own enhancing qualities of clarity, flow, and experiences. Each stream has its own history, flavour and voice, and yet it has the potential to form a larger whole<sup>2</sup>.

Now in the 21st century, with 1.1 billion people lacking access to clean water, how has humanity come to know and describe water, in the face of threats from climate change and population growth (United Nations, 2006)? Climate change, “it’s all about carbon emissions into our atmosphere, right?” “Greenhouse gases”, “carbon dioxide”, “methane”, “carbon credits” and “emission targets”—these familiar phrases encompass the discourse of climate change. Eminent leaders advise: “there’s too much carbon, go carbon neutral”. But, how does climate change relate to water?<sup>3</sup> Today, how would an indigenous Elder or a Western hydrologist answer the question *What is water?*<sup>4</sup> Furthermore, how would their answers influence how water managers plan to mitigate the challenges of population growth or climate change? I propose we re-examine climate change from a new angle: how would the indigenous perspective on water inform what is happening to the world’s water in the context of climate change?

The amount of water in the world is constant, although its form, availability, and quality are not. Water is a transformer, a shape-shifter. I submit that the rhythm of water’s transformation (phase changes between solid, liquid, and gaseous states) in our world is undergoing a significant change, at a significant rate. Milly *et al.* (2008) observed “substantial anthropogenic change of the Earth’s climate is altering the means and extremes of precipitation, evapotranspiration, and rates of discharge of rivers”<sup>5</sup>.

According to some First Nations’ (i.e. indigenous) oral history, significant shifts in climate have occurred at other times (see Robinson, 1961; Cove & MacDonald, 1987) for examples from the Tsimshian peoples). For instance, when Raven stole the Sun from the Chief-of-the-skies to illuminate the dark Earth, and then, also through trickery, Raven brought freshwater in his spoon-shaped beak, this heralded a time of great change. So change, in and of itself, is not worrisome. Perhaps, however, we incorrectly presuppose that we fully understand the triggers and dynamics of climate change, and most critically, we may be too confident in the resilience of our ways of knowing Earth Mother (e.g. through Western science). If we do not fully understand climate

change, do we have time, given the increasing rate of change, to adapt our thinking? Climate change has a long history, as some indigenous peoples believe water pre-existed creation when the Earth was dark. The Creator gave us the gift of life and water with the precept that we show respect and restraint. However, the relatively recent and growing human disrespect for water has led to our disharmonious earthly existence. Indigenous Elders emphasize the importance of teaching our youth to know and respect water's central spiritual and functional role in our lives. Also, they offer Western science a focusing opportunity: *think of how we treat the water first, since healthy water means a healthy body and ecosystem.*

## ETHNOGRAPHIC RESEARCH METHODS

The research methodology used here is an integrative narrative approach. Elders, respected in their community as knowledge keepers, were interviewed independently using the same set of questions, centred around the central research question: *What is water?* The methodology consisted of the following four components:

- (a) Field site: First Nations communities in British Columbia, Canada<sup>6</sup>.
- (b) Primary data collection: Seven years (2000–2007) of independent face-to-face interviews with Elders from the Gitksan, Syilx, Stl'atl'imx, Nlaka'pamux, and Secwepemc nations. Elders include Dr Mary Thomas (a highly respected traditional ecological knowledge keeper of the Secwepemc nation), Dr Mary Louie (spiritual leader of the Syilx or Okanagan nation), Mildred Michell (Nlaka'pamux nation), Nathan Spinks (Nlaka'pamux nation) and Albert Joseph (a long time guide outfitter and Stat'at'imc nation member residing with the Bridge River Band)<sup>7</sup>. The Elders gave written permission for the use and publications of their taped interviews.
- (c) Secondary data collection: A literature search on North American First Nations perspectives on water was conducted to cross-check and cross-reference themes identified in the primary data. Literature was also reviewed to compare Western science's perspective on water.
- (d) Community verification: Preliminary drafts of papers were presented to both First Nations and Western science communities to verify results.

## RESULTS AND DISCUSSION

Water is all around and within us, in an ordinary sense; yet its ubiquity tends us to ambivalence. First Nations have for the most part maintained their reverence for water. Such reverence was once common across cultures in the Western world<sup>8</sup>. Indigenous Elder Annie York, of the Nlaka'pamux Nation, shared her reverence for water in *They Write Their Dreams on the Rock Forever* (York *et al.*, 1993): "There was a special reverence for the water. You come to a stream. You don't just go there and put your hand in and drink. You cross yourself to the four directions, and you say a prayer".

Martin Chaplin, of South Bank University, London, UK, has catalogued 66 anomalous properties of water, including its ability to exist in three different states: liquid, gas, solid; water can metamorphose like the transforming trickster raven<sup>9</sup>. Chaplin (2008) states that: "It is clear that life on Earth depends on the unusual structure and *anomalous nature of liquid water* ... it transports, lubricates, reacts, stabilizes, signals, structures and partitions. In spite of much work, many of the properties of water are puzzling". The Romans thought of water as a mischievous wild animal that governs itself, unless caged. Peter Warshall (2001) reflects on water's trickster-like behaviour: "Deny or fight waterflow's always-true-to-itself nature, and pesky water nymphs stir up trouble".

Many First Nations creation oral history cycles begin when there was just water. It is the primal substance from which coyote, for instance, emerged to create earth. Sanderson (2008) retells how the Creator gave the Cree trickster Wesakachak, the power to bring earth from beneath the floodwater, to remake the world. Syilx Elder Harry Robinson (1989) says: "God made the sun ... then after that and he could see. All Water. Nothing but water. No trees. No nothing but sun way up high in the sky". Later, Coyote created earth by diving into the water to get a grain of dirt,

which expanded into earth as we know it today. My Gitxsan creation oral tradition speaks of the flood, which describes how a people were brought by flood to live in their traditional territory. After the flood, Raven brought sunlight and then freshwater: the rain came every time that Txamsem (raven) shook his robes” (Cove & Macdonald, 1987).

Water is the element from which all else came, and therefore it is hypothesized here that water is the primary substance within the interconnected web of life. Grand Chief Dr Gordon Antoine (Nlaka’pamux) recalls how the old timers (Elders) talked about water with such fervour, that he characterized water “as akin to religion” (Antoine, 2003). Distinguished anthropologist, Mircea Eliade found, in his study of patterns in religion around the world, that water and water symbolism “fills the same function in whatever type of cultural pattern we find it; it precedes all forms and upholds creation” (Eliade, 1963). Water is powerful and yet it can be so gentle (Thomas, 2000; Joseph, 2002).

Water is a meditative medium, a purifier, a source of power, and most importantly it has a spirit. Water is alive – biotic: “Water flows, it is ‘living’, it moves: it inspires, it heals, it prophesies” (Eliade, 1958). Sanderson (2008), shares the Cree concept that water is the physical manifestation of spirit and that free flowing water, that keeps moving, is healthy water: “water must be free flowing for the salmon to come back”<sup>10</sup>. Blackstock (2001) investigates the *going to the water* ritual described by Elders & Kilpatrick (1991). Gitxsan Elder, Chief Mary Mackenzie shared during the *Delgamuukw* court case, her knowledge of how the Gitxsan *halayt* (shaman or healer) gained power and learned their songs from the waterfall. They went to the waterfall for wisdom, similar to Japanese Buddhism prayer traditions.

Elders’ identified a fundamental short coming in Western science’s definition of an ecosystem (Blackstock, 2002). Elders believes, contrary to Western science, that water is alive or biotic – it has a living spirit. Interestingly, however, early Western beliefs of the Greek philosopher Thales, also known as the “Ancient Hydrologist”, as he predates Aristotle, asserted water was the origin of all things (Biswas, 1970; Kramer, 1983). He believed that “the earth was created out of the primordial waters of Nun and that such waters were still everywhere below it” (Biswas, 1970). Thales also stated that water is the fundamental, original or primary substance. Greek philosopher Empedocles of Agrigentum postulated the concept of the four basic elements of matter: fire, air, water and earth, which Aristotle later expanded upon by adding a fifth – heaven (Biswas, 1970)<sup>11</sup>. So water, originally seemed to have a significant “life giving” importance in Western thought but now is characterized as a disorganized, non-thinking or non-willful particle in the physical world.

Western or Eurocentric thought diverted away from the doctrine of intelligible essences (spiritual forces, life giving energy or having will) as held now by Algonquian people or Ancient Greeks (Battiste & Henderson, 2000). Water was used in the Old Testament to symbolize cleansing and renewal (McCabe, 1999). British philosophers Thomas Hobbs (1588–1679) and John Stuart Mill (1806–1873), according to Battiste & Henderson, contributed to the diversion. Concurrently, although not recognized by Battiste & Henderson, the Protestant Church’s reformation may have also contributed to the departure of scientific reason from mysticism. Keith Thomas (1971) examines the Protestant reform of the rituals related to holy water, for instance, as follows: “If the Church’s exorcisms and blessings could really work material effects, they argued, then holy water would be the best medicine for any sickness. That this was not the case showed that it was unreasonable and impious to expect God to assist at a ceremony designed to give ordinary water the power to bring health of mind and body, to expel spirits, or drive away pestilence. Holy water, in fact had no more virtue than well-water or river-water”. The Protestants preferred to attribute the magical healing properties of holy springs and wells to “natural means”. A detailed comparison of the First Nations and Western ecological perspectives is presented in Table 1 and Sanderson (2008).

## BLUE ECOLOGY VISION AND PRINCIPLES

Blue ecology is defined here as: an ecological philosophy, which emerged from interweaving First Nations and Western thought, that acknowledges water’s (i.e. fresh and salt) essential rhythmical

**Table 1** A comparison of between Western Science and First Nations traditional ecological knowledge using freshwater as an example.

Characteristic	Western science	Traditional ecological knowledge
Epistemology	Cause and effect Analytical Rely on observations over short term (100 years) Taxonomic Researchers are experts Recent re-emergence reverence for water <sup>12</sup>  Requires empirical proof Dichotomous: e.g. Man vs Nature, mind over matter, abiotic vs biotic	Relationship oriented Intuitive Rely on observations of very long term (1000s of years) and communication with spirit world Integrative Community are experts Ancient focus on the prime importance of water Earth Mother is an interconnected whole, a unifying approach. There is no dichotomy between living and dead
Definition of ecology	Water is implicit to the definition	Water is explicit to the definition
Water	Important but abiotic. Services the biotic world Forest hydrology focus on snowmelt, surface flow, low flow and soil moisture regime A secular hydrological cycle	Biotic, with spirit and will. The lifeblood of Earth Mother Focus on groundwater, springs, and sponge effect Blue Ecology water cycle
Water relations	Water flux is a focus of water relations in plants	Water capacitance, and the ability of the tree's aura to instill energy from the sun into sap which is shared underground.

life-spirit and central functional role in generating, sustaining, receiving and ultimately unifying life on Earth Mother. No dichotomy between the living and elemental exists in Blue Ecology: Earth Mother is an inter-connected whole. The vision of Blue Ecology is to: embrace a water-first approach to planning human interventions in the environment.

The intent of this vision is to give priority to water, over humans' financial interests. The highest sustainability test is *water-first*: planned development (e.g. real estate, urban planning, forestry, agriculture, mining, oil and gas extraction) cannot impede the functional delivery of quality water to ecosystems in a healthy rhythm. The five principles of Blue Ecology are:

- (a) Spirit: water is a living spirit.
- (b) Harmony: harmonious sustainability in a functional rhythm engenders healthy bodies and ecosystems: "the traditional understanding of water is closely connected to peace, and the principle of harmony with humankind, the elements and nature" (Sanderson, 2008).
- (c) Respect: water through ceremony, education and giving back, else Earth Mother will retaliate by taking water away.
- (d) Unity: water has the ability to connect and unify humans because of our common reliance on this basic unit of existence.
- (e) Balance: restrained and measured water withdrawals in combination with and giving back (i.e. restoration, monitoring, or ceremony) to watersheds and water.

## BLUE ECOLOGY WATER CYCLE

Hero of Alexandria was a second century BC Greek mathematician and water works engineer. He gave us insight into an archaic view of the hydrological cycle where: "Water also, when consumed by the action of fire, is transformed into air; for the vapour arising from cauldrons placed upon flames is nothing but the evaporation from the liquid passing into air". He characterizes the igneous earth as exhaling dew and warm springs (quoted in Woodcroft, 1851). Hydrologists understanding of the hydrological cycle has now evolved into a more sophisticated model as

shown in Oki & Kane's (2006) global cycles or the multilingual depiction on the United States Geological Survey's (2008) website. The hydrological cycle deserves much deeper study and reflection at all educational levels, especially at elementary and high schools. It is critical that there be a universal understanding of water cycles in order to preserve and protect the water on our planet. First Nations Elders, such as Albert Joseph or the late Mary Thomas, teach that water is our lifeblood, the forest a sponge, and springs a place of spiritual power and clean water. Elders teachings are summarized in the Blue Ecology water cycle (Fig. 1). Five principles of Blue Ecology and water's central spiritual and ecological roles are also represented. This intuitive cycle is meant to exist side-by-side Western science's analytical hydrologic cycle. The *Blue Ecology hydrological cycle* represents some British Columbia indigenous peoples' view of the origin of water, and water's relationship with the four connected worlds (listed in order, from outer to inner circles in Fig. 1)<sup>13</sup>:

- (a) Sky world (i.e. spirit world): The model highlights the rhythmical role of the sun and moon, and how water is a gift from the spirit world (e.g. creator, god, etc.). Balance and harmony are achieved, through respect, recognition of water's spirit and giving back, as well as by the understanding that all four worlds are connected by water.
- (b) Earth Mother: All beings on earth are connected to each other by the transitory element, water. Our human health is directly dependant upon the health of the waters that flow through our land and bodies. If the water is sick, so too are we.
- (c) Water world: Water has a spirit. Water is always moving and connecting in rhythms. Fish are part of the water, as is all aquatic life, the two are one.
- (d) Under world: Water, the lifeblood, seeps, trickles and connects underground, like capillaries under human skin. Water is purified here<sup>14</sup>.



Fig. 1 Blue Ecology water cycle and principles, designed by Michael D. Blackstock.

## SUMMARY AND CONCLUSION

Now that we have shifted our gaze on climate change to water, let us focus on the language of recent news reports—"melting Arctic ice", "melting permafrost", "salt water influx into freshwater aquifers", "receding glaciers", "shifting ocean currents", "drought", "water stress", "higher rainfall", "floods"—and you begin to see the pattern. Climate change is about water and its trends in transformation from one state to another. The sun is the engine of the hydrological cycle; the

clouds are the arbiters of energy (Herring, 2002). In the complex, interconnected web of life, Blue Ecology is a means to focus, with new watery eyes, on the current crisis of climate change. A new culture of water is needed in order for humans to adapt<sup>15</sup>.

The United Nations (2006) predicts that by 2025 two out of three people in the world will not have enough water, and today, unclean water is the second biggest killer of children. Hydrologists and water managers can help build a brighter future by rediscovering the meaning of water, and interweaving the predominant Western analytical models with the more intuitive indigenous models. Blue Ecology's philosophy is meant to be the bridge between these two cultural ways of knowing, but given the urgency of climate change, how can Blue Ecology be implemented? First, water needs to be acknowledged by Western science for its central functional and spiritual roles in our world. Recently, the UNESCO-IHP Expert Advisory Group on Water and Cultural Diversity drafted a provisional statement on their definition of water: "the essential lifeblood of our planet with the power to generate, sustain, receive and ultimately, to unify life" (UNESCO-IHP, 2008)<sup>16</sup>. This definition explicitly acknowledges the central functional role of water, which through its movement connects all beings. An exemplar is Blackstock's (2002) re-definition of a forest ecosystem as: "a segment of the landscape, composed of relatively uniform climate, soil, plants, animals, and micro-organisms, which is a community complexly interconnected through a network of freshwater hydrological systems".

Secondly, hydrologists and water managers (e.g. water caretakers) could promote, adopt and enshrine global water policy that recognizes a nation's responsibility to take care of the water that travels through, under, over and across its boundaries in a respectful and balanced way. Water caretakers, of all nations, can ensure that current and future generations have certain, unencumbered and predictable access to water<sup>17</sup>. The first question asked when contemplating human development impacts should be *How does it affect the water?* The highest environmental assessment test for development planning is the water-first principle: planned development (e.g. real estate, urban planning, hydropower, architecture, forestry, agriculture, fishing, aquaculture, mining, oil and gas extraction, etc.) cannot impede the functional delivery of quality water to ecosystems in a healthy rhythm<sup>18</sup>. Water managers, water works engineers, architects and hydrologists could design water works flow to mimic the healthy natural meandering flow of water (see Schwenk, 1996).

Finally, we need to teach children and, for that matter, learn ourselves how to respect and celebrate water's role in our world. Hydrologists are encouraged to embrace the companion Blue Ecology water cycle that is meant to *enhance* Western science's hydrological cycle by providing a holistic cultural context. Hydrologists and water managers could also communicate complex climate change impacts to the public, using common sense terms. Hydrologists and water managers can use the hydrological and Blue Ecology cycles to help explain how and why the climate is changing, since climate change is as much about water, as it is about carbon.

Water is a core human interest upon which we can build collaborative cross-cultural climate change strategies. Thirst, the dry throat, is a primal experience shared by all beings, and we are all unified by our reliance on water. No longer is our goal "sustainable development"—to plan for a high standard of living for our children. Our goal must now be "sustainable survival"—to plan and behave in a cross-culturally collaborative manner that ensures children, generations from now, can *survive with dignity* in a world where respect for water and our climate is ubiquitous. Global water issues and challenges can be solved because humanity has a collaborative potential that can be mobilized around the common interest of taking care of the water, and because nature is tenacious. There is hope for future generations if we take a water-first approach to setting global priorities.

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## NOTES

- <sup>1</sup> Gaston Bachelard (2006 translation) characterizes water as the transitory element in his book *Water and Dreams*.
- <sup>2</sup> The term *interweave*, means that both indigenous and Western science ways of knowing are treated as equals, and through collaboration people from both cultures interweave their perspectives to solve very complex sustainability problems, which could not be solved independently. The word “Elder” is capitalized out of respect for their knowledge, as we would capitalize “Dr”, for instance.
- <sup>3</sup> Although world population growth is an equally important environmental change vector, it will not be discussed here.
- <sup>4</sup> The terms indigenous and First Nations are used interchangeably in this paper to mean the first peoples of a nation.
- <sup>5</sup> As a result of their climate change studies, Milly *et al.* (2008) declared the demise of a core assumption in water resource management called stationarity: “the idea that natural systems fluctuate within an unchanging envelope of variability”.

- <sup>6</sup> This case study is focused on some indigenous perspectives in British Columbia, Canada, and does not purport to encompass the diversity of indigenous perspectives around the world. However, refer to Sanderson (2008) for both Maori and Canadian First Nation perspectives which are thematically very similar to those presented here: “*Te Huirangi’s teachings led to a critical examination of the meaning of water and the meaning of life itself. The concept of relationship and the interrelationship of humanity explained by Te Huirangi was consistent with my understanding as a Cree of all things being connected, humanity’s relationship with the natural world.*”
- <sup>7</sup> See the following web-site for a map of the indigenous nations: <http://www.bced.gov.bc.ca/abed/map.htm>.
- <sup>8</sup> Eliade (1958) provides a good discussion of cross cultural reverence.
- <sup>9</sup> Martin Chaplin, South Bank University, London, UK, has an exhaustive description of each of the sixty-six anomalies of water at <http://www.sbu.ac.uk/water/>.
- <sup>10</sup> Theodor Schwenk (1996 translation) primary premise in his book *Sensitive Chaos: The Creation of Flowing Forms in Water and Air* is that meandering water is healthier: “*The rhythm of its meanders is part of the individual nature of a river ... In comparison, a river that has been artificially straightened out looks lifeless and dreary.*”
- <sup>11</sup> Water is also one of the five elemental principles (water, earth, fire, wood, and metal) of early Chinese philosophy (Kramer, 1983).
- <sup>12</sup> The Holy See, representing one billion members of the Roman Catholic Church, recently characterized water a “a common good of humanity” (Walker-Leigh, 2003).
- <sup>13</sup> “Creation was like a fog, like a cloud, and like blowing dust, when the mountains emerged from the water” (Popul Vuh).
- <sup>14</sup> The Qur’an (47, 15) reflects a similar notion: “Paradise is a garden with rivers flowing from the centre, each with its own properties”.
- <sup>15</sup> A brief suggested reading list (full citations are in reference list) for water managers and hydrologists, which would help expand their current cultural exposure to water would include, in the following order: (1) Eliade’s *Patterns in Comparative Religion*; (2) UNESCO-IHP’s (2008) brochure; (3) *Sensitive Chaos* by Schwenk; and (4) ) the dense but fascinating tome *Water and Dreams* by Bachelard.
- <sup>16</sup> The author is a member of this UNESCO team.
- <sup>17</sup> This paper does not examine the very important topic of water as a basic human right. Although in the rights based context the Blue Ecology water-first principle does apply. Water is a primary and basic human right.
- <sup>18</sup> In parts of the world, climate change will result in water being the most valued “commodity” produced from forested lands (Thompson, 2007) necessitating a change in our management priorities and approaches.