

Note to Reader:

Waterbucket eNews ¹ celebrates the leadership of individuals and organizations who are guided by the vision for Living Water Smart in British Columbia ². The edition published on March 23, 2021 built on an announcement by the provincial government about BC's Drought Response Plan to tell the story of the Water OUT= Water IN way-of-thinking.

An over-arching question frames the OUT=IN storyline: *Have you the reader considered why climate change is a variable, not a driver?* The story goes on to explain why the real issues are uncertainty and risk, more specifically how we deal with the first and manage the latter.

TWO DOCUMENTS IN ONE: Included within this document is a "flashback story" about an OUT=IN presentation made in 2007.

The umbrella for Partnership initiatives and programs is the Water Sustainability Action Plan for British Columbia ³. In turn, the Action Plan is nested within Living Water Smart, British Columbia's Water Plan.



¹ https://waterbucket.ca/wscblog/

² https://waterbucket.ca/wcp/wp-content/uploads/sites/6/2017/11/livingwatersmart_book.pdf

³ https://www.waterbucket.ca/cfa/sites/wbccfa/documents/media/81.pdf

Editor's Perspective: Climate Change is a Variable

Lately, I have been thinking a lot about three interconnected ideas – the essential need for **peer-based learning**; what it means to build a culture of land and stream stewardship that is inter-generational; and how local governments would benefit from cultivating continuity of institutional memory.

We ignore the past and we reinvent the wheel, time and again. Cumulatively building on experience is the exception, rather than the rule. The explanation is that players change, experience is not passed on, and lessons learned are not carried forward. Given this reality, the Partnership fills a vacuum as an "inter-generational memory bank". At the core of the Partnership's mission is being a connector – from past to present to future.

The foregoing musings provide the context for a flashback to 2005 for the purposes of connecting past to present – specifically, BC's Drought Response Plan. The year after release of the Water Sustainability Action Plan, the Province and Partnership co-hosted the launch event for the Convening for Action in British Columbia initiative. The event also allowed the Province to fulfil a commitment flowing from the **2004 Drought Forum**.

Held in Penticton and titled Achieving Water Balance: A Workshop on Dealing with Uncertainty and Managing Risk, the session purpose was to point the way forward to the next paradigm-shift in water supply management. Designed as a technical transfer session, it shone the spotlight on the **Water OUT** = **Water IN way-of-thinking**.

Context is everything. In 2005, BC was early in the second decade of water conservation to reduce demand on supply systems. Due to recurring droughts, the emphasis had been on "water use efficiency". By 2005, however, the impacts and implications of a changing climate were top-of-mind.

The "Penticton Workshop" was the first milestone in a multi-year process to raise awareness among water decision-makers that: Ensuring a safe and adequate water supply depends on understanding the science behind the **Water OUT = Water IN equation**, as well as what this means at the operational level.

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Kim A. Stephens, MEng, PEng, Executive Director Partnership for Water Sustainability in BC

March 2021



Drought Response 2021 - restore the balance in the water balance!







Floods Affect Some of Us. Droughts Affect All of Us.

Climate Change is a Variable

With the support of Jim Mattison, former Assistant Deputy Minister of Environment, the team of Wenda Mason (Land & Water BC), Robert Hicks (Metro Vancouver) and Kim Stephens (Water Sustainability Action Plan) developed the program and messaging for the 2005 Achieving Water Balance Workshop⁴. Wenda Mason was the first manager of BC's **Provincial Drought Initiative**.

The idea for the deceptively simple **Water OUT = Water In equation** originated with Robert Hicks. An original thinker, he focussed the team on how we could <u>use the equation as a visual means to explain complexity to a continuum of audiences</u>, ranging from technical to elected. The essence of the OUT = IN messaging from 2005 is distilled as follows.



Wenda Mason Land & Water BC



Robert Hicks Metro Vancouver



Kim Stephens
Water Sustainability Action Plan

⁴ https://waterbucket.ca/cfa/files/2006/02/Penticton-Water-Balance-Workshop-Agenda-Program 2005.pdf

Both Sides of the Equation are Variable

This deceptively simple equation embodies principles and concepts for dealing with uncertainty and managing risk; and implementing an holistic approach

Water OUT = Water IN: "Climate change is not a driver; rather, it is a variable," Robert Hicks stated at the 2005 workshop. "Furthermore, climate change is only one factor to consider when we talk about sustainable infrastructure and sustainable water supply. The real issues are uncertainty and risk, more specifically how we deal with the first and manage the latter."

"A constant challenge for planning is not to prevent past events, but instead is to use past experiences to inform and create flexible strategies for the present and the future. Furthermore, this need for flexibility is not restricted to the immediate scope of the problem at hand; but must also consider the broader juggling of evolving local government priorities and service demands."

"This leads to the challenge of assessing problems with sufficient complexity to arrive at flexible and resilient solutions, while at the same time not being overwhelmed and paralyzed by over-analysis."

"Given the variability of the factors behind 'Water Out = Water In', this relationship always will represent a snap-shot in time as its' inputs shift, evolve and change over time."

A Shrinking Safety Factor

Climate change has aggravated an existing vulnerability in BC. Over time, the safety factor has been shrinking. While it rains a lot in BC, we do not have an abundance of supply when demand is greatest. In addition, the mountainous nature of BC's geography is that BC communities are typically storage-constrained, and what storage they do have is measured in weeks to months.

When the water resource is large and water demand is small, variability is not that noticeable. But when the demand (Water OUT) is large relative to the available resource, a variation on the supply side (Water IN) magnifies the perception of impact. In many cases, BC communities are operating on narrow margins.

Variability > Uncertainty > Risk: How do you solve the OUT = IN equation when both sides are variable? After all, it is mathematically not possible to solve for two or more unknowns when one has a single equation.

The inherent variability creates uncertainty which in turn creates risk. There is multiple what if combinations and permutations to consider in the OUT = IN equation. Thus, a key message is that the future will always be different than expected.

Need for Flexibility

The variability of the factors behind
'Water Out = Water
In' means that the inputs shift, evolve and change over time.

Where to Focus Resiliency Efforts

Because many factors are in play within the OUT = IN equation, an over-arching goal for sustainable water supply management would be to build in resiliency that addresses risk.

If communities are vulnerable on the IN side of the equation, then it would make sense to **build in resiliency on the OUT side**. There is no silver bullet. Communities need to do many little things. Over time the cumulative benefits of doing many things do add up. Consider, for example, the role of soil depth in reducing **water need** and preventing **water runoff**.

From Past to Present to Future: There is a direct line from the "2005 Penticton Workshop" to the recently launched BC Landscape Water Calculator⁵, the newest tool in the Partnership toolbox. As a foundation piece for the next generation of water conservation programs, use of the tool would help local governments build resiliency on the OUT side of the Water Balance equation.



CONTINUE READING:

The second document within this document is a reprint of a story originally published in 2007 about an OUT=IN presentation at a workshop hosted by the Fraser Basin Council.

⁵ https://bcwatercalculator.ca/landscape/irrigation

How to Adapt to a Changing Climate in British Columbia



A Presentation at a Fraser Basin Council Workshop on Preparing for Climate Change in the Fraser Basin

Held on November 6, 2007

By

Kim A Stephens, MEng, PEng, Water Sustainability Action Plan for British Columbia



Introduction

In November 2007, the Fraser Basin Council (FBC) hosted a workshop in Vancouver on adaptive decision-making, water management and climate change. The workshop explored links between climate change adaptation strategies and decision-making processes in the Fraser Basin.

The workshop was titled *Preparing for Climate* Change in the Fraser Basin: How Can our Water Management Systems Adapt?

The workshop featured a panel session comprising four speakers representing diverse fields of thought. The panel member included **Kim Stephens**, Program Coordinator for the Water Sustainability Action Plan for British Columbia. He provided a water resource practitioner's perspective with a presentation titled Dealing with Uncertainty and Managing Risk: How we can adapt Water Management Systems.



Climate Change is a Variable

The panel was challenged to respond to a hypothetical climate change / water crisis scenario set in 2030. Kim Stephens opened his presentation by stating that the real issues are uncertainty and risk, more specifically how we deal with the first and manage the latter.

According to Stephens, "Climate change is not the driver; rather, it is a variable. Furthermore, climate change is only one factor to consider when we talk about sustainable infrastructure.

"The key is to focus on what you want to do. Because many factors are in play, the objective is to build in resiliency to address risk," stated Stephens, "We have to know where we want to go. Then we can figure out the steps to get there. To adapt water supply systems, the question boils down to: how much water do we need, and how can we make efficient use of what is available?

Stephens then referred to the **2005 Penticton Workshop** that the Water Sustainability Committee of the BC Water & Waste Association held in partnership with the former Land & Water BC (LWBC) and the former Ministry of Water, Land & Air Protection.

He explained that the 2005 workshop provided him with a frame-of-reference for answering the question that had been posed to the panel. "This is a subject matter in which the Water Sustainability Committee has invested considerable time to develop a philosophy and an approach," elaborated Stephens.

In 2005, the Penticton full-day technical transfer session connected the dots between water resource planning, climate variability and risk management; explored the tools and techniques available through demand-side management; and gave participants 'hands-on' planning practice to demonstrate how to achieve a water balance without relying on new sources and infrastructure.

Reconciliation of Long-Term Visions with Short-Term Realities

Kim Stephens used **Slide 1** from the 2005 presentation by Robert Hicks to provide what he called a 'point of departure' for the Fraser Basin audience.

"Retirement planning is something that most people understand and do intuitively," commented Stephens, "So why is it that when it comes to community and/or resource planning, we are seemingly incapable of overcoming the gap between long-term and short-term thinking?"

Stephens noted that the objectives for water systems and infrastructure planning are similar to those for retirement planning, namely:

- Maximize return on investment.
- Minimize risk.
- Recognize financial limits (savings and withdrawals).

"Yet we struggle to make long-term decisions related to dealing with uncertainty and managing risk when it comes to sustaining the very infrastructure that our communities depend upon for life support," summarized Stephens,

"Robert Hicks of Metro Vancouver characterizes the disconnect in thought between retirement planning and water management as a **conundrum**."

A conundrum is defined as a paradoxical, insoluble, or difficult problem; a dilemma.

Sound-Bites to Keep in Mind

Slide 2 provided the road map for the presentation by Kim Stephens at the Fraser Basin Council workshop.

"These three bullets reflect the essence of what I have observed in my 30-plus year career," Stephens told his audience.

"The average person may presume that the water management knowledge foundation is solid, thereby providing a platform to do better. But if there is a structural problem with the basic thinking of those who actually make the planning decisions, then a likely outcome is: Houston, we have a problem. I have seen too many of those situations."

Slide 1



Slide 2



Key Message #1: Teachable Moments

In speaking to **Slide 3**, Stephens observed that water is something that the population-at-large has always taken for granted, but that changed in 2003.

"My 30-year career has been defined by floods and droughts, but the public memory has always been short," commented Stephens,

"When every possible natural disaster happened in 2003, and they have continued to happen, it finally caught the attention of the public."

"There was a realization that maybe, just maybe, there are forces beyond man's control. We had the teachable moment because people were reachable. The **teachable moment** creates the window of opportunity to change behaviour."

"Reachable, teachable – that's the sequence," he added, "Reachable means people have their minds open and are receptive to the teachable lesson (moment). They're listening!"

To emphasize his point, Stephens said he was reminded of 1991 when there was a reachable-teachable moment related to the need for water treatment in British Columbia. He explained that there was sudden alarm because of the exponential increase in boil water advisories.

He asked a rhetorical question: "Were conditions actually worsening – for example, as indicated by "beaver fever" outbreaks – or was it that we now had the technology to look for things at an incredibly microscopic scale after not having thought about them in the past and/or not having paid attention?"

Key Message #2: Clear Thinking

When he introduced **Slide 4**, Stephens prefaced his remarks by stating that he is an optimist: "The glass is half-full and the water level is rising." He said that his purpose in providing three illustrations of typical engineering-planning practice was to make the make the point that 'clear thinking' is not necessarily the norm.

Layers of Complexity: "We practitioners sure like to make things complicated. It seems to be our nature. In fact, it is a real challenge for practitioners to explain things simply."

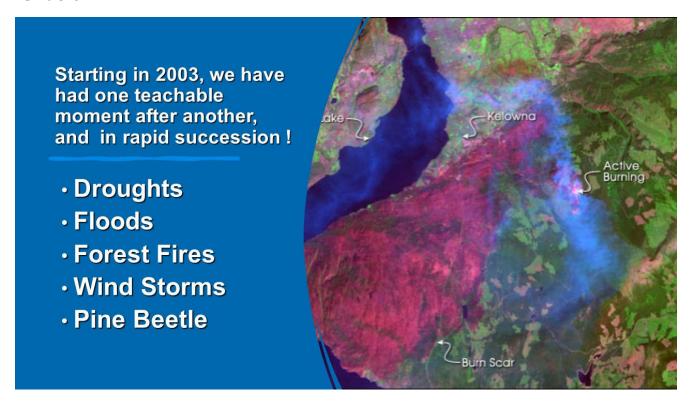
He provided an example from his conversations with elected representatives who express frustration with technical people. "How do they expect us to make an informed decision when we don't understand what they are talking about," he quoted one regional leader.

He also referred to the onion analogy and peeling back the layers to get to the core assumption. "In my career, I have seen many instances of simplistic assumptions underpinning major project decisions. Often, when you ask the 'why are we doing this' question, those assumptions do not stand up to scrutiny," he elaborated.

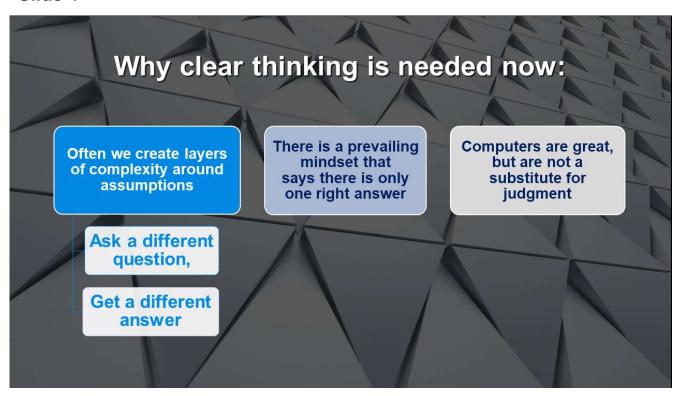
One Right Answer: "We have a culture of expecting one answer; and this ignores uncertainty," continued Stephens, "Engineering standards are the epitome of the *singular answer* mindset.

Stephens commented on the collaborative effort involved in preparing his Fraser Basin Council presentation. His brainstorming with other members of the Water Sustainability Committee, notably Robert Hicks, had resulted in them reflecting on engineering education.

Slide 3



Slide 4



"We asked ourselves whatever happened to the decision tree of way-of-thinking for dealing with the reality that the answer is only as good as the data, such that you present ranges to deal with uncertainties," he asked rhetorically.

"The key message is that the future will always be different than expected...because there are so many decision points along the way that influence the outcome."

Computers versus Human Judgment:

"Too many people mistake precision for accuracy," observed Stephens, "Models are a great help if the results stimulate a person to think about the implications of the assumptions, but watch out when a person believes the model is reality."

To illustrate his point, Stephens then told an anecdote about the time he was invited to speak to local governments in Australia: "Peter Coombes of the University of Newcastle made the point that good engineering is about observation and deduction, and we have forgotten that."

Key Message #3: Water OUT = Water IN

The meat of the presentation by Kim Stephens was contained in the signature **Slide 5** for the Water Sustainability Committee. First unveiled at the 2005 Penticton Workshop, it was then published in *Convening for Action in the South Okanagan: Moving Towards a Water Balance Way-of-Thinking and Acting* in February 2006.

It has also been presented at a variety of forums, both technical and non-technical, including the keynote address at the World Water Day 2006 hosted by UBC-Okanagan and the June 2006 meeting of the elected representatives steering committee for the South Okanagan Regional Growth Strategy.

According to Stephens, ensuring a safe and adequate water supply depends on understanding the science behind the **Water OUT = Water IN** equation, as well as understanding what this means on the ground...at the operational level.

Because of his engineering background, Stephens used a safety factor analogy and pointed out that the safety factor has been shrinking over time:

"When you have a large water resource versus a small demand, variability is not that noticeable. But when the demand is large relative to the available resource, a small variation on the supply side magnifies the perception of impact. In many cases, BC communities are operating on narrow margins."

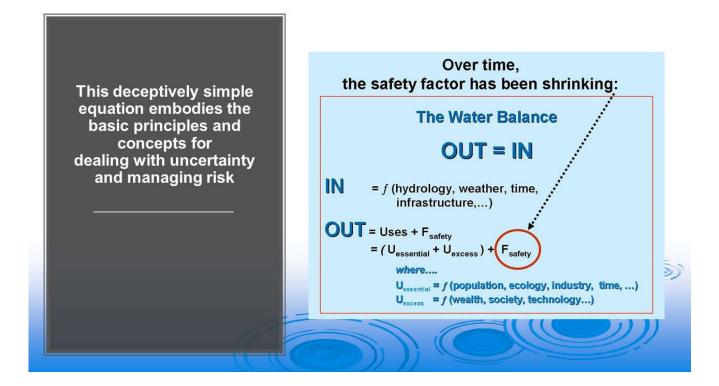
Stephens again asked his Fraser Basin Council audience a rhetorical question: "How do you solve the OUT = IN equation when both sides are variable? After all, it is mathematically not possible to solve for two or more unknowns when you have a single equation."

"The inherent variability creates uncertainty which in turn creates risk. There are multiple what if combinations and permutations."

Stephens then drew upon his career experience to illustrate the nature of water supply for communities large and small in British Columbia. "While it rains a lot in BC, we don't have an abundance of supply when demand is greatest. In my experience, many communities have been vulnerable for decades because we typically tap small creeks and we have few major groundwater aquifers. In short, the issue is already one of *under supply*."

"The nature of the British Columbia geography/topography is that we are typically storage-constrained, and what storage we do have is measured in weeks to months."

Figure 5



"We already have an efficiency issue, and climate change is aggravating an existing vulnerability," Stephens added, "So, if we are vulnerable on the IN side of the equation, then we have to build in resiliency on the OUT side. But where will we do that, keeping in mind that everything is in flux?"

He answered his own question by explaining that "We look for the little things that will yield cumulative benefits – for example, requiring a foot of soil for all development sites so that there is a sponge that reduces *water need* and prevents *water runoff*."

Build Resiliency Incrementally

Kim Stephens concluded his presentation with **Slide 6** that he said came out of a conversation with Jamie Swanson, an engineer who formerly was on staff with the Cowichan Tribes on Vancouver Island.

Stephens prefaced his remarks by reflecting on his experience as a project manager:

"The essence of project management is that an effective project manager has to operate on two tracks: one track is the big picture, which is the destination; the other track comprises the details, because if you don't take care of the details you can easily be derailed."

"Jamie's example of the big picture was protection of the Cowichan River, and the smallest piece was the engineering standard that he developed for the foundation drain around the Band Administration building."

"When it comes to dealing with uncertainty and managing risk, there is no silver bullet. We need to do a whole bunch of little things because the flip side of a problem is an opportunity; hence, the flip side of a cumulative impact is a cumulative benefit. Over time the benefits accumulate."

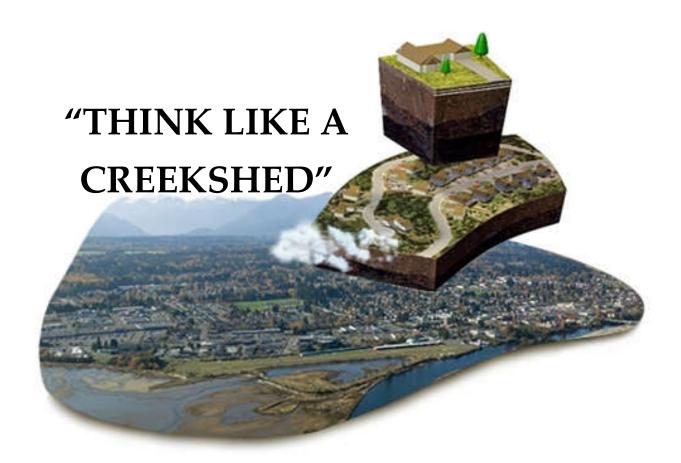
Kim Stephens wrapped up his presentation by pointing out to the Fraser Basin Council audience that this **cumulative benefits way-of-thinking and acting** had closed the loop on the retirement planning opening thought.

Figure 6

In conclusion, we can create our future if we keep in mind that...

To get to the big picture... start with the smallest pieces

To deal with uncertainty and manage risk.... build resiliency incrementally



A creekshed is an integrated system:

The need to protect headwater streams and groundwater resources in BC requires that communities expand their view - from one that looks at a site in isolation - to one that considers HOW all sites, the creekshed landscape, streams and foreshores, groundwater aquifers...and PEOPLE....function as a whole system.

