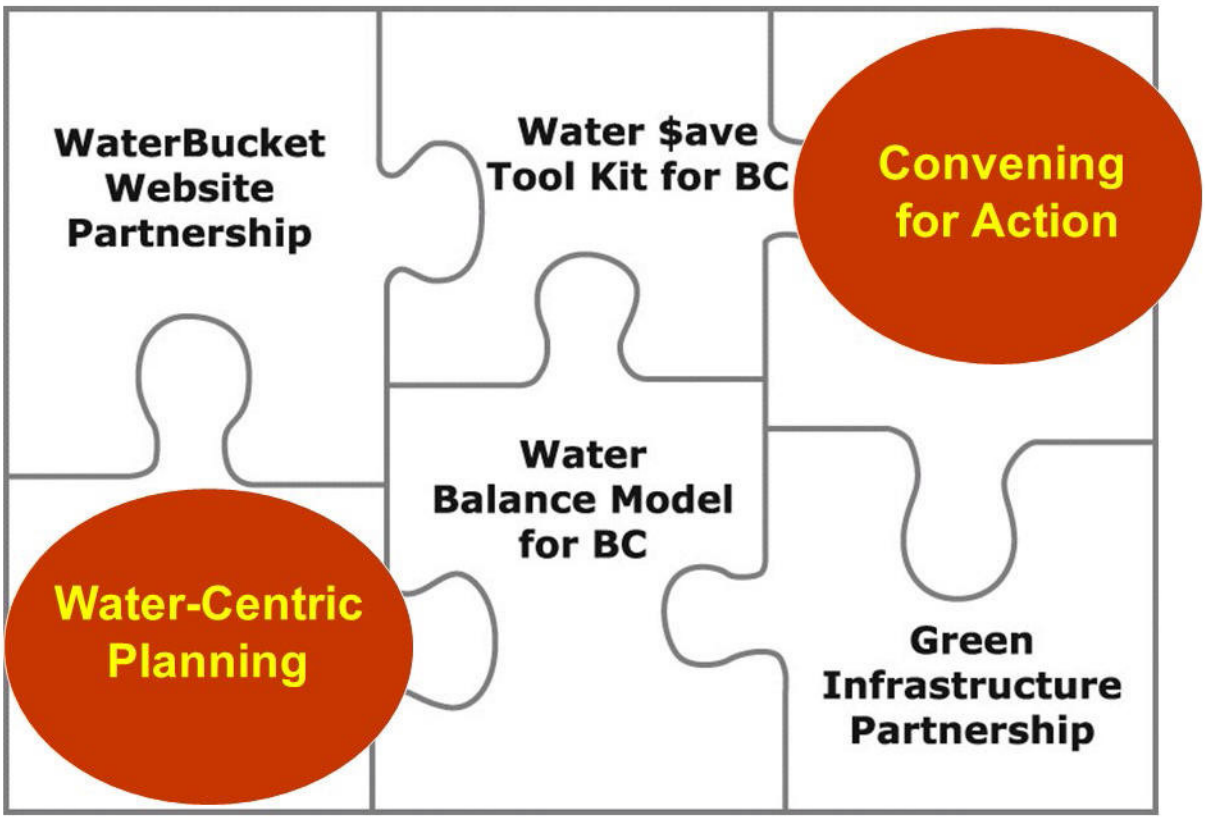
WATER OUT = WATER IN

Penticton Workshop Launches Convening for Action initiative for 'Achieving Water Balance'

April 2005



Elements of the Water Sustainability Action Plan for British Columbia

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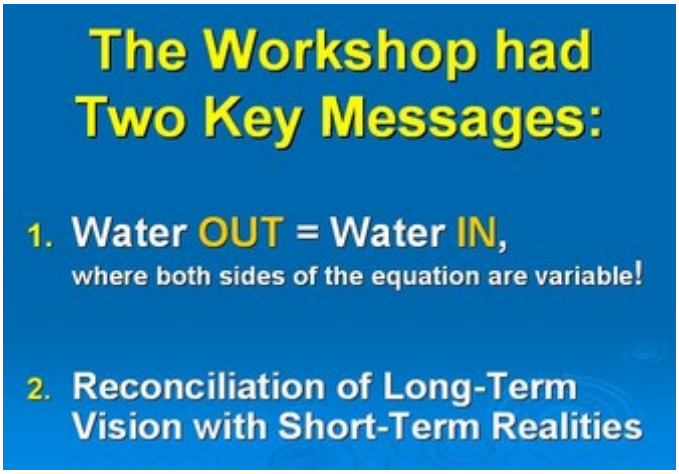

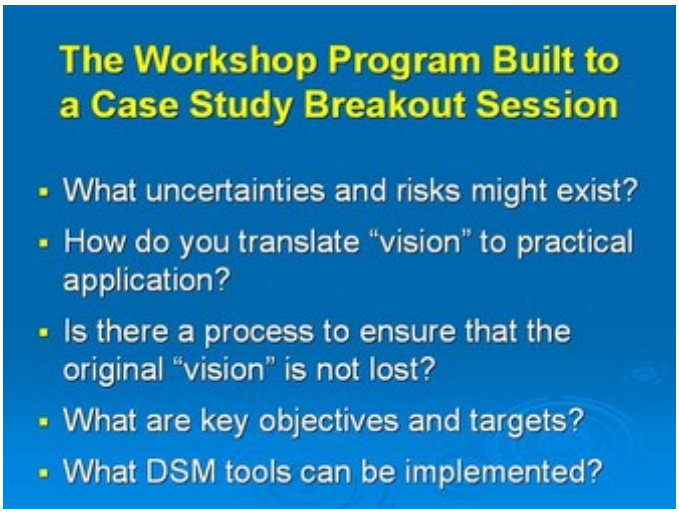

"Demand Management Strategies – Achieving Water Balance": A Workshop on Dealing with Uncertainty and Managing Risk

WATER OUT = WATER IN:

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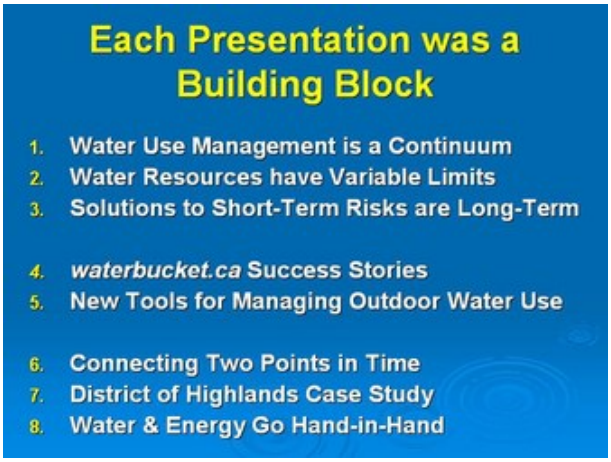
Background: After the Convening for Action (CFA) initiative was unveiled in February 2005 at a conference organized by the Canadian Water Resources Association, the Penticton Workshop in April 2005 was the first regional event organized under the CFA umbrella.

This 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.

The Penticton Workshop was an adjunct to the Annual Conference of the BC Water & Waste Association (BCWWA), and was organized by the Water Sustainability Committee of the BCWWA in partnership with the former Land & Water British Columbia (LWBC) and the formed Ministry of Water, Land & Air Protection. The workshop was co-moderated by **Kim Stephens**, **P.Eng**., Program Coordinator for the Water Sustainability Action Plan for British Columbia, and **Wenda Mason** of LWBC.



Building an Informed Community of Practice: According to Kim Stephens, "The workshop was an important first step in changing the way practitioners approach water supply planning. We introduced a number of key concepts that we intend to build upon:

- the water balance equation:
  Water OUT = Water IN
- reconciliation of long-term vision and short-term reality
- choice of language (lingo)
- retirement planning analogy
- water/energy nexus

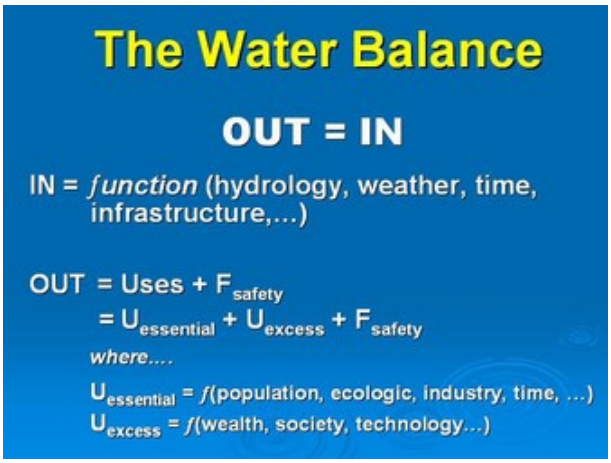
The program was carefully planned and provided a blend of policy and technical. The District of Highlands Case Study made the day real for participants. Through CFA, we are building a language and getting people involved. We are developing ideas and educating people. The bottom-line is that we are building an informed *community of practice*. Looking ahead, we envision that the workshop program will be the template for a training course and potentially a handbook." To download the workshop program, click here.

Who Attended: The workshop attracted a diverse audience of 55, primarily from the Thompson-Okanagan and Vancouver Island regions, and mostly representing smaller communities, including First Nations. The audience composition was weighted towards water system operators, but also included a smattering of elected officials and community groups. In short, there was a good mix of perspectives for the purposes of stimulating discussion in the Breakout Session.

The fact that the audience was diverse also meant that the workshop content had to be communicated in a way that would resonate with all participants. This further underscored the value of the Highlands Case Study as a learning exercise. One of the educational outcomes was that participants would be better informed and therefore should be better able to judge the type of advice they may receive in future from water supply practitioners.

MOVING TOWARDS A WATER BALANCE WAY-OF-THINKING:

In the era of the high speed computer, the current generation of water supply planners has for the most part lost sight of this guiding principle: *the essence of sound engineering is observation and deduction*. When practitioners wrap layers of pseudo-complexity around a core assumption that may be flawed, solutions to water supply needs can become convoluted and/or unsustainable. Through outreach and education, a goal of the WSC is to peel back those layers of pseudo-complexity and in so doing re-focus practitioners on basic water management principles and concepts, in particular the *water balance way-of-thinking*.



Educational Objectives: Given the foregoing frame-of-reference, insight into the educational objectives of the Penticton Workshop is provided as follows:

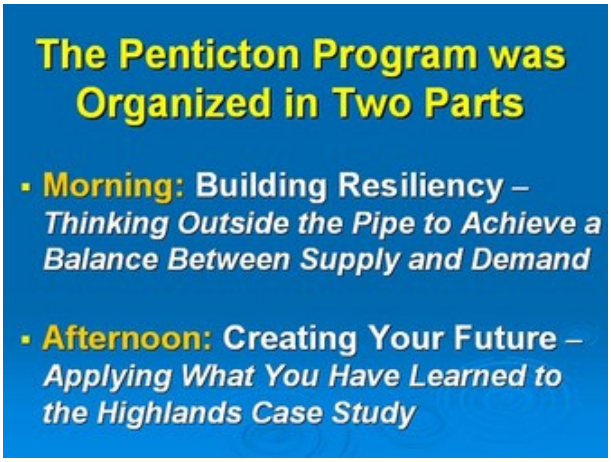
☑ **The Water Balance:** "Conventional water supply planning is typically based on a narrow understanding of engineering statistics without really understanding the role that climate variability plays. A core message is that the **OUT = IN** equation is variable on both sides. Something to think about is that in mathematics one cannot solve for two variables with a single equation. In other words, it is time for practitioners to go back to the basics and re-think how we approach water supply analysis and planning," noted **Robert Hicks**, **P.Eng.**, a workshop presenter and a Senior Engineer with the Greater Vancouver Regional District.

☑ **Understanding Safety Factors:** "To understand the **OUT = IN** equation in an engineering context, we need to think in terms of a safety margin or factor and what that actually means in practice. In a nutshell, when the service population is small and the safety factor is large, climate variability may be inconsequential. As population and water demand grow, however, the safety factor shrinks. Eventually we reach a condition of vulnerability where a small shift in the water balance can trigger a supply crisis. This has been the prevailing pattern for almost 20 years. We have effectively used up the safety factor because we have not understood climate variability," added **Ron Smith**, **P.Eng.**, another workshop presenter and a Sustainable Resource Officer with the Province.

☑ **Choice of Language:** "Given there is a need for change in the way we plan and manage water supply systems, a goal of the WSC is to facilitate a breakthrough in practitioner thinking similar to that which has recently been achieved in the practice of urban drainage," observed **Kim Stephens**, **P.Eng.**,

> "In that case, changing the language from 'stormwater management' to 'rainwater management' has had a profound influence on how drainage engineers in particular view their world. This has opened their minds to doing things differently, so that the Natural Water Balance will be protected and/or restored, by implementing source control measures that reduce the annual volume of rainwater runoff (created as a result of land development). Building on this successful precedent, the WSC objective is to accelerate the mind-shift that will see the *water balance way-of-thinking* move beyond rainwater management to embrace all components of the water cycle."

In British Columbia, school children learn about the water cycle in Grade Five. By high school they have forgotten about it. There is a parallel pattern in engineering education. The concept is re-taught in first year hydrology and then forgotten after graduation. These observations have provided an impetus for the WSC to champion **OUT = IN** as the way to re-focus water supply planners.



HOW THE PENTICTON WORKSHOP WAS STRUCTURED:

The workshop was organized in two parts and the presentations were cascading in order to elaborate on the **OUT = IN** theme. In the morning session the focus was on concepts and success stories related to *Building Resiliency*. This provided participants with a mind-map for the afternoon session when they were asked to apply what they had learned in *Creating Your Future*. Through the course of the day, the program built to the District of Highlands Case Study.

- **Part 1 - Building Resiliency:** The objective in the morning session was to set an upbeat tone and create a learning environment. The key message that linked four building block presentations was this: *When both sides of the **OUT = IN** equation are variable, think outside the pipe to achieve a balance between supply and demand*. The morning session concluded with a Panel Session that featured four success stories. This provided the audience with a sense of what is being accomplished on-the-ground in different parts of the province.

- **Part 2 - Creating Your Future:** In the afternoon session, the objective was to provide a reality check while at the same time inspiring participants to make a difference in their day jobs. The key message that defined the audience participation portion of the program was this: *When planning for the future, the challenge lies in reconciling long-term visions with short-term realities*. The takeaway part of the program was the District Highlands Case Study. This represented the merging of theory and practice. There was no right or wrong solution. Rather, the Highlands circumstances could apply anywhere.

A working lunch provided the transition from the morning to the afternoon sessions. A lunchtime presentation on emerging tools for making more effective use of water included an online demonstration of the Landscape Irrigation Scheduling Calculator that has been developed by the Irrigation Industry Association of BC.

PART 1 – BUILDING RESILIENCY:

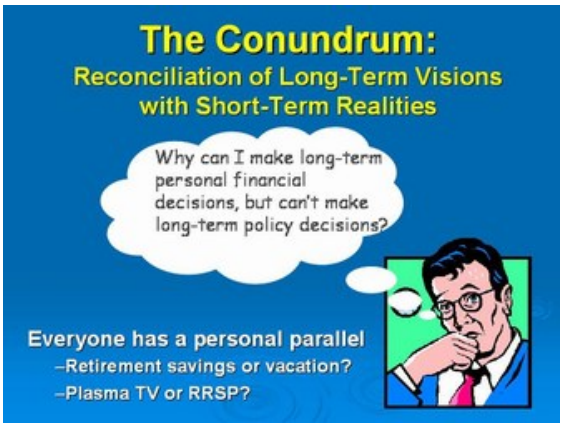
The four building block presentations and the links to associated powerpoint presentations are listed below. Also included are the synopses that informed participants ahead of time as to what they could expect in each presentation:

- ***Workshop Overview:*** **Setting the Scene to Achieve Water Balance** – The old approach of "super-sizing" has proven expensive and is no longer sustainable. The workshop will connect the dots between water resource planning, climate variability and risk management to provide an understanding of how DSM tools and techniques achieve a balance between supply and demand. *Presentation by Kim Stephens, Program Coordinator, Water Sustainability Action Plan for British Columbia*.

- **Building Resiliency through a Water Management Continuum** – Having options for managing water supplies and services within realistic financial and resource boundaries forms the water management continuum: from supply-side, through demand-side to the ***soft path***. Moving beyond simply doing the same with less water, the 'soft path' seeks to build resiliency. This presentation provided context for being innovative – by learning from the early DSM adopters. *Presentation by Oliver Brandes, The POLIS Project at the University of Victoria.*

- **Dealing with Uncertainty and Managing Risk: It Starts with an Understanding of Variables** - Total water resources are physically bounded within variable limits. Understanding how engineering analyses and assumptions deal with uncertainty and risk through their various interpretations of climate, climate variability, demand growth scenarios, and the physical and economic limits to system expansion were explored as part of building resiliency. *Presentation by Ron Smith, Water Allocation Specialist, Ministry of Sustainable Resource Management.*

- **Reconciliation of Long-Term Visions with Short-Term Realities: Planning to Live Within Limits -** The solutions to short-term risks are long-term: it is a continuum. This presentation will explain why commitment to the long-term is so important; and will elaborate on the differences in approaches between short-term and long-term visions. Tools and techniques to 'get from here to there' were illustrated and explored through engaging the audience. *Presentation by Robert Hicks, Senior Engineer, Greater Vancouver Regional.*



A key message in this presentation revolved around the importance of language (i.e. **"lingo"**) in communicating with decision-makers, and how messages can easily be lost in translation when language is not used effectively. A second key message related to a *retirement planning way-of-thinking* and the conundrom whereby people have no difficulty reconciling personal long-term and short-term decisions, yet are challenged when it comes to reconciling short-term political versus long-term community planning decisions.

PANEL SESSION ON SUCCESS STORIES:

Development of the ***Water $ave Tool Kit for BC*** included a survey of 200 regional districts, municipalities and water districts. The survey provided the starting point for identifying success stories and lessons learned. These are now available on the *Water Use & Conservation Community-of-Interest* on **waterbucket.ca**. The Presentation Panel was moderated by Wenda Mason of LWBC, and comprised representatives from four communities. The panelists highlighted what is being accomplished on-the-ground throughout BC.

- **Sharing Demand Management Success Stories: City of Vernon Reclaimed Water Irrigation Program** – In response to environmental issues in the 1970s, the City made the decision to implement land-based disposal of treated effluent. The current focus is on beneficial re-use of reclaimed water. Presentation by Dale Danallanko Manager, Environmental Services Section.

- **Sharing Demand Management Success Stories: District of West Vancouver Case Study** – The objective is to reduce reliance on the regional water supply. The comprehensive strategy includes implementation of a $6.5 million universal metering program in combination with education and related initiatives to reduce water use and hence water supply costs. Presentation by Ray Fung, Manager of Utilities, District of West Vancouver.

- **Sharing Demand Management Success Stories: Okanagan Valley Issues and Opportunities** – The presentation provided a broadbrush picture of the Okanagan water supply situation and highlighted the opportunities for demand-management to achieve a water balance. Presentation by Bob Hrasko, Black Mountain Irrigation District.

- **Sharing Demand Management Success Stories: Shuswap Case Study** – The focus of the presentation was on a bottom-up community initiative to change water use behaviour. Presentation by Eugene Lalonde.

OUTDOOR WATER USE – ACHIEVING WATER BALANCE:

In parts of the province, supply-side management cannot satisfy water demands. The presentation during the 'working lunch' elaborated on core principles, integrated strategies and practical tools for evolving the water management continuum: the vision is to use water savings to expand irrigated agricultural land bases and support population growth in the urban centres. *The presentation by Ted van der Gulik, Senior Engineer with the Ministry of Agriculture, Food & Fisheries* was titled **Outdoor Water Use: Strategies and Tools for Achieving the Balance.**

PART 2 – CREATING OUR FUTURE:

The focus was on the Highlands Case Study and the challenges in achieving a community vision when there is presssure to implement a 'big pipe' solution, one that potentially takes control of a community's destiny away from existing residents. The Breakout Session was bracketed by two thought-provoking presentations – the first dealt with change management; the second provided context on 'what we have learned today'.

According to Wenda Mason, "Our original concept was to create a hypothetical case study for the purposes of the Breakout Session. As the concept evolved, however, we realized that a real-life example would be more beneficial because it would considerably help participants to wrap their minds around the issues and potential solutions. The information could be exactly the same, but there is something visual about talking about a real community. Timing is everything, and the Highlands Case Study came to our attention at the right moment. As it turned out, the scale of the Highlands Case Study provided a perfect fit with the backgrounds of our audience. It could be anywhere in smalltown British Columbia, or even a new neighbourhood in a large municipality. The principles are the same."

- **Setting Objectives & Targets: Context for Breakout Session** – To learn about actions that will lead to sustainable uses of water resources, the audience was challenged to focus on strategies that influence and change those behaviours and activities. This presentation provided a bridge between the Panel Session and the Breakout Session. It introduced the concept of short- and long-term objectives and targets where using the planning continuum provides a map that connects the two points in time. *Presentation by Erik Karlsen, Chair, Smart Growth on the Ground (and former Director of Growth Management Strategies, Ministry of Municipal Affairs).*

- **BREAKOUT SESSION: APPLYING WHAT YOU HAVE LEARNED TODAY** – Participants worked in groups to complete an exercise for a case study community that is struggling to develop an achievable strategy for managing population growth, land development and water use. Each group was tasked with resolving issues and developing a path forward in reconciling short-term realities versus long-term desires.

Moderated by Wenda Mason of LWBC, the group exercise was to brainstorm a framework for a water planning continuum that achieves water balance. The groups were asked to identify key gaps and needs so that the case study community can evolve along the water management continuum and achieve water balance. Each group reported back on their 'top three points' for short- and long-term action within the context of the exercise.

Context for the breakout session was provided in a presentation titled ***Highlands Challenge*** *by Eric Bonham, Chair of the Highlands Stewardship Foundation (and former Director of Engineering, Ministry of Municipal Affairs).*

Reconciling a Long-Term Vision with Short-Term Realities: After listening to the presentation on the challenges facing the District of Highlands, breakout groups were asked to identfy key gaps and needs so that the case study community can evolve along the water management continuum and achieve a water balance.

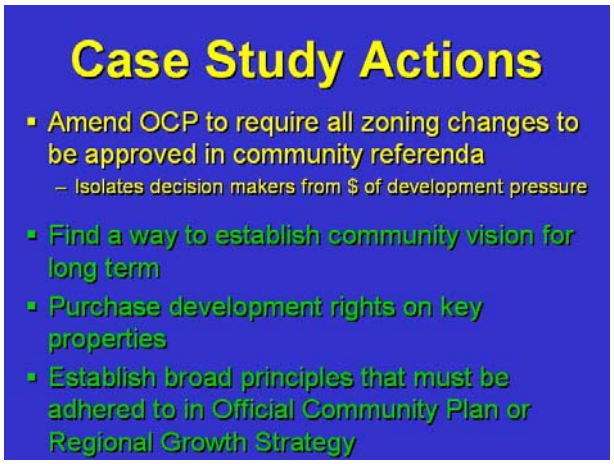
A set of five questions was provided to guide the discussion.

1. What uncertainties and risks might exist for this community?
2. How do you translate "vision" to practical application recognizing that the OCP only addresses 5 year intervals?
3. Is there an alternative or additional planning process that could be used by this community to ensure that the original "vision" isn't lost?
4. Establish some key objectives and targets for this community?
5. What demand-side management tools can be implemented to help meet the defined Planning Principles?

Each group then reported back on their 'top three points' for short- and long-term action within the context of the exercise.

More information on the Highlands Case Study is provided on pages 9 through 11.

Case Study Actions: The results of the plenary session are consolidated in the two slides below. The colour coding corresponds to the way participants were assigned to Breakout Groups. The suggested 'actions' represent the group consensus.



Turning Ideas Into Action: There was no right or wrong action item. Because the Highland circumstances could apply anywhere, the objective was to provide workshop participants with a hands-on experiencing in turning ideas into action though this three-step process:

- ☑ Challenge participants to step back from their existing paradigms (e.g. big pipe solutions, whether for water supply or drainage conveyance).
- ☑ Inform participants regarding alternatives (e.g. rainwater harvesting to augment water supply and/or reduce rainwater runoff volume).
- ☑ Give participants the tools and the experience to do things differently.

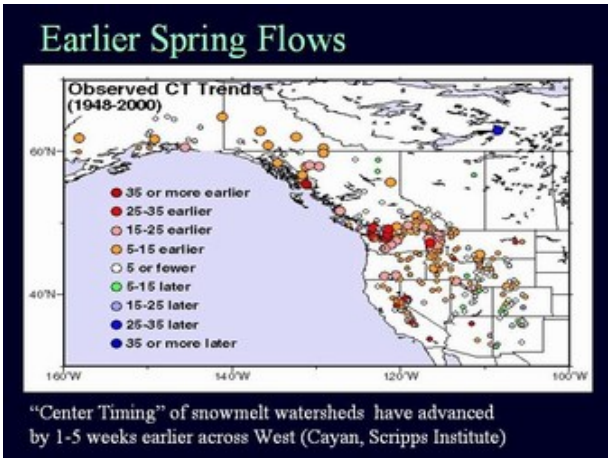
"WSC workshops not only introduce new paradigms and demonstrate new practices, they engage participants in exploring steps that are appropriate to their settings to carry these forward to promote water stewardship and achieve more sustainable outcomes", explained Erik Karlsen, who is collaborating with Kim Stephens in co-leading the CFA initiative.

CFA is building an informed *community of practice.* According to Kim Stephens, "The focus of CFA is on education as the means for shifting practice in British Columbia to address water use as an integral part of land use. CFA places emphasis on practitioner education so that practitioners will be more informed and will then become more responsive. An integral part of the education process is to create a picture of what the future landscape can look like. If we agree on where we wish to be in one or two generations, then we can map out the route to get there."

- **Water-Energy Nexus and the 'Continuum' for a Resilient Future** – The focus of the concluding presentation was on the ***water/energy nexus***. We get energy from water, and we use energy to supply, treat and use water. Water use involves significant energy inputs which must be considered.

  The key concerns between the water and energy industries are the same; and the issues are similar. One difference is that the energy industry tackled demand management much sooner than the water industry.

  This presentation provided an overview of lessons that the water industry can learn from the energy industry; provided context on the implications of climate change; and introduced the ***water/energy nexus*** project that the Canada Mortgage & Housing Corporation (CMHC) has commissioned for the Greater Vancouver region. The project will provide an analysis of the 'energy intensity' of water in Vancouver, as well as an initial exploration of opportunities for securing multiple benefits through integrated management strategies. *Presentation by Dr. Robert Wilkinson, Director, Water Policy Program at the University of California (Santa Barbara)*.



Earlier runoff in the Spring is the consequence of climate change. As illustrated above, the impact is concentrated in southern British Columbia.

Looking Back to Look Ahead: At the 2002 Annual BCWWA Conference, the Water Sustainability Committee foreshadowed rainwater harvesting in British Columbia: "It is not a matter of IF but WHEN." Three years later, 'rainwater harvesting' has become part of the language. Similarly, the Water Sustainability Committee anticipates that 'water/energy nexus' will also be part of the language of practitioners within the next couple of years.

CASE STUDY – THE HIGHLANDS CHALLENGE:

The District of Highlands, located on the edge of the Western Communities in the Capital Regional District (CRD), is subject to continuing development pressures northward from Langford. However, the community has its own vision, united as it is by landscape – rocky uplands and dense coastal forests. This shared terrain has shaped a building and road pattern with a small 'footprint" on the land, along with a unique rural lifestyle. These values are clearly identified in the Official Community Plan (OCP), furthermore, the District of Highlands is identified in the Regional Growth Strategy (RGS) as a greenbelt area, located outside of the Urban Containment Boundary.

Long-Term Growth Scenarios:

Given this vision how will the District of Highlands address future growth? There are three possible scenarios:

- No future growth. Not a realistic option. However a limited and as yet undetermined groundwater resource will determine limits to growth before severe water shortages are experienced without connecting to the CRD water and sewer system.
- Unfettered growth would result in development dependent upon centralized infrastructure resulting in suburbia, contrary to the aims of the District of Highlands OCP and the Regional Growth Strategy.
- Measured growth. Selective development based upon groundwater availability that meets the planning goals of the District of Highlands.

The measured growth option appears the most likely scenario that addresses the long term vision and the planning goals of the community. The planning goals are identified as follows:

1. To protect the natural environment
2. To retain and strengthen the rural character of the Highlands
3. To support economic diversification that is consistent with Highlands' rural character and the natural environment
4. To ensure the long-term economic sustainability of the Highlands community.
5. To provide basic, affordable public services and facilities
6. To encourage involvement in a healthy rural community, including planning decisions

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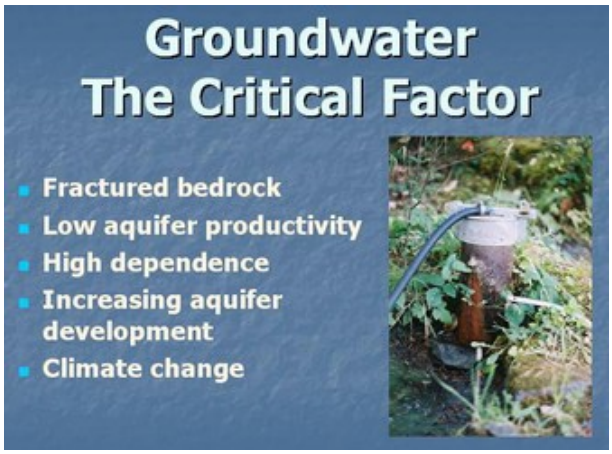
Water Supply: The District of Highlands is highly dependent upon groundwater for its domestic supply. Each household has its own well and on-site sewage disposal system. Of the 650 residences 608 are on domestic well with the balance dependent upon surface lakes or streams for their supply.

A recent groundwater baseline study identified that a number of domestic wells within the Highlands were experiencing water quantity and/or quality problems usually in the summer months when the water levels in the wells are at a seasonal low and the domestic demand is high. Groundwater in the District of Highlands is directly related to precipitation and well yields are influenced by the size and densities of fractures within the bedrock.



Concern has been expressed by several homeowners that further development, coupled with climate change, could adversely affect their water supply. As demand increases for groundwater, surface water bodies including lakes wetlands and streams will also be impacted hence affecting the ecology of the area. It is recommended that a monitoring well network be established.

Removal of natural vegetation and increase in paved areas due to development will reduce the natural infiltration to the aquifer

Water Conservation: The requirement for water conservation is obvious, however the challenge will be to design a program to fit the particular needs of the Highlands Community given that there is no centralized system and each household has its own independent supply.

The Highlands Stewardship Foundation is developing a water conservation program for consideration by council that will also embrace energy conservation including well and sewage disposal management at the household level. This "close loop" model, if successful would have application for other areas of the province where no centralized system exists. Clearly education and incentives strongly supported by elected officials will play a large role in the success of the initiative.

Climate: Indications to date suggests that climate change in the Highlands area could result in longer drier summers with wetter winters and limited snowfall. As a result during long dry summers, water from the groundwater for domestic or commercial use has to be withdrawn from storage in the fractured rock. Fire hazard is a natural outcome of the climate change scenario which may accentuate more frequent fire outbreaks if the ground is not well saturated during winter and spring rains.

Politics: At the time of the Penticton Workshop, the District of Highlands was in the midst of processing an application from Bear Mountain Inc. for a golf course in the Highlands. This is a major development which includes an 18 hole golf course, 150 homes, hotel, lodge and some 150 cabins. An application for amendment to the Urban Containment Boundary (UCB) will be sent to the CRD to allow for extension of the CRD water supply to service the development. This raises concern in the community that the "big pipe" may be carried further into the Highlands. The community is divided on the density being proposed and some elected officials on the CRD Board from neighbouring municipalities have expressed concern on amending the UCB.

The Highlands is at a critical stage in its development and must clearly identify its future plan regarding density limits and land use planning goals. Without such a long range plan on-going development will eventually exceed the available groundwater source and water and sewer infrastructure will be the necessary alternative.

Objective: To ensure that short term decisions do not impact on the long range vision of retaining the integrity of greenspace in the Highlands for the benefit of all residents and visitors alike in the Capital Regional District.