



the partnership
for water sustainability in bc

Watershed Blueprint Case Profile Series

Town of Comox – A ‘Beacon of Hope’

*for Citizen Science in Action &
Reconnecting Hydrology and Ecology
through the Water Balance Approach
to Land Development*



SEPTEMBER 2019

Note to Reader:

This publication is the 8th in the Partnership's "Watershed Blueprint Case Profile Series".

To download a PDF copy of this Watershed Case Profile, as well as any of the others in the series, visit the Rainwater Management community-of-interest on the waterbucket.ca website at:

<http://waterbucket.ca/rm/category/showcasing-british-columbias-watershed-based-approach/watershed-case-profile-series/>

Or go directly to the following link:

https://waterbucket.ca/rm/wp-content/uploads/sites/5/2019/09/Comox-Beacon-of-Hope_Sep2019.pdf



DEDICATION: This Watershed Blueprint Case Profile recognizes the passion, commitment and perseverance over many years on the part of Town of Comox local government staff and volunteers in the Brooklyn Creek Watershed Society to improve where they live. Working together, they are making a difference. The "Comox story" is indeed a blueprint for what the phrase **hard work of hope** means in practice. Comox is truly a beacon of hope.



PHOTO CREDIT: Cover image features members of the Brooklyn Creek Watershed Society. Photo taken at the site of the former Brooklyn Creek Elementary School where a riparian corridor has been acquired and restored as part of the Brooklyn Creek Channel Enhancement Project.

Town of Comox – A ‘Beacon of Hope’

What the Reader Will Learn

*British Columbia is at a tipping point. Will local governments bridge the gap between policy and new standards of practice, **reconnect hydrology and ecology**, create greener communities, and adapt to climate change?*

*The Partnership has identified Comox as a **beacon of hope** because the Town’s experience shows what is possible when a local government has a strong working relationship with the stewardship sector, and leads by example to implement responsible **water balance management**.*

*The Town’s journey comprises three building blocks. Over the past decade, experience gained and lessons learned through the Lower Brooklyn Creek channel enhancement project and Northeast Comox land development planning process have been integrated into the **Draft Anderton Corridor Neighbourhood Concept Plan** for Middle Brooklyn Creek.*

The Draft Anderton Corridor Concept Plan is precedent-setting because it demonstrates how application of the Ecological Accounting Process (EAP) approach helps managers change practices and adopt new strategies regarding the protection and enhancement of ecological systems in the stream corridor and riparian zone, and throughout the entire creekshed.

The Town is reconnecting hydrology and ecology by embarking on a systems approach on all levels. The approach includes amending bylaws, training staff, educating the development community and homeowners, creating new procedures, and formalizing roles and responsibilities.

*By taking action to reconnect hydrology and ecology, Comox is moving along a pathway that ultimately leads to a **water-resilient future** where flood and drought risks would be reduced, and ecological services would be sustained.*



Kim A. Stephens, MEng, PEng,
Executive Director
Partnership for Water Sustainability in BC
September 2019

ACKNOWLEDGMENTS:

The Partnership for Water Sustainability in British Columbia gratefully acknowledges the financial support of the Province of British Columbia through the Ministry of Municipal Affairs and Housing; as well as the support of our regional district partners in the *Georgia Basin Inter-Regional Education Initiative* (IREI).



Educational Goal

Build practitioner capacity within local government context to implement a whole-system, water balance approach known as ***Sustainable Creekshed Systems, through Asset Management.***

Mandate

Provide value through collaboration and partnerships.

About the Partnership for Water Sustainability

The Partnership for Water Sustainability in BC is a non-profit society that delivers services in collaboration with government. It originated as an inter-governmental partnership, formed in 2002 to fund and develop the Water Balance Model as a web-based decision support tool.

*When the **Water Sustainability Action Plan for British Columbia** (Action Plan) was released in 2004, the Water Balance Model for BC was the centrepiece initiative. Action Plan experience informed development of **Living Water Smart, British Columbia's Water Plan**, released in 2008, as well as the parallel **Green Communities Initiative**.*

The Partnership for Water Sustainability embraces shared responsibility. It is the hub for a "convening for action" network in the local government setting, and delivers the Action Plan initiatives through partnerships and collaboration.

*The Partnership for Water Sustainability plays a bridging role among the provincial government, local government and community stewardship sector. As steward for **Stormwater Planning: A Guidebook for British Columbia**, released in 2002, the Partnership builds on this foundation document through the *Beyond the Guidebook* initiative.*

Regional Districts supporting the IREI

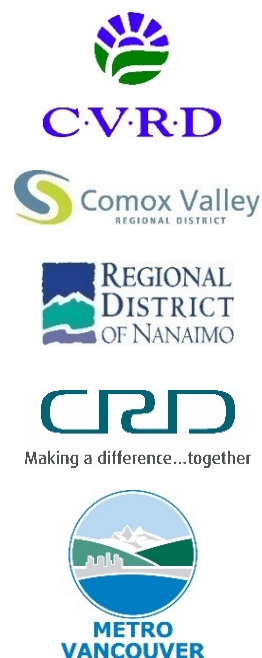


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Section Theme	What the Reader will Learn	page
Living Water Smart in the Town of Comox	Brooklyn Creek is a creekshed of provincial interest. For the past decade, the Town's journey related to changing land development practices, valuing ecological services and investing in stream restoration has been guided by BC's <i>Living Water Smart</i> vision. The journey is ongoing, and is a building blocks process for incremental change.	1
Brooklyn Creek Channel Enhancement	Brooklyn is the first demonstration application for testing the <i>Ecological Accounting Process</i> (EAP) concept. The process resulted in a breakthrough in philosophy and approach vis-à-vis valuation of ecological services: look through the worth lens to understand how communities decide how much to invest in creekshed restoration.	5
Northeast Comox Land Development	Risk management is the over-riding objective. Opening minds to accept changes in practice is challenging. So, the Town took on responsibility for providing <i>whole-system, water balance</i> training for engineers. What is unique about NE Comox is the Adaptive Management Plan for performance monitoring and making operating changes.	12
Middle Brooklyn Creek Urban Design Concept Plan	The <i>Draft Anderton Corridor Neighbourhood Concept Plan</i> integrates lower Brooklyn Creek and Northeast Comox building blocks experience. In mid-project, the results of the Brooklyn EAP analysis led to a rethink, such that the plan focus is now on enhancing the package of ecological services (environment, recreation, drainage).	18
Creeksheds As Local Government Infrastructure Assets	The Comox experience provides working examples of what reconnecting hydrology and ecology looks like. Asset management has traditionally been about hard engineered assets such as waterlines, sanitary and storm sewers, and roads. Yet, creekshed systems are also 'infrastructure assets' that provide core services.	22



IMAGE SOURCE: https://commons.wikimedia.org/wiki/File:Vancouver_Island_contour_map.png

Vancouver Island Demonstration Region

A program deliverable for “Sustainable Watershed Systems, through Asset Management”,
Implemented under the umbrella of the Georgia Basin Inter-Regional Education Initiative

Living Water Smart in the Town of Comox

‘Living Water Smart’ vision transcends governments

*Released in 2008, “Living Water Smart, British Columbia’s Water Plan” was the provincial government’s call to action, and to this day transcends governments. The vision: **we take care of our water, our water takes care of us.***

Over the past decade, the hard work of hope has resulted in a policy, program and regulatory framework that enables community-based action in order to adapt to the New Reality – warmer, wetter winters and longer, drier summers.

Living Water Smart successes are defined by collaboration and a “top-down / bottom-up” approach. Collaboration for the common good interweaves the efforts of decision-makers and community advocates.

A Beacon of Hope

For the past decade, elected representatives and staff in the Town of Comox have quietly and without much fanfare been on a journey. With the aid of hindsight, their experience shows what the phrase **hard work of hope** means in practice, and what it involves to **lead by example**.

Whether or not Council and/or staff consciously always thought about it, the Town’s journey related to land development practices, ecological services and stream restoration has been guided by the Living Water Smart vision, in particular this lynch-pin Living Water Smart target¹:

“All land and water managers will know what makes a stream healthy, and therefore be able to help land and water users factor in new approaches to securing stream health and the full range of stream benefits.” (Reference: page 43)

The Town’s journey is ongoing, and involves building blocks. This Watershed Case Profile takes stock of milestone moments along the way, with a focus on lessons that can be replicated. The Partnership has identified the Town of Comox as a **‘beacon of hope’** because of the precedents it has established when implementing the twin pillars of the *whole-system, water balance approach* to land development.

The twin pillars are the **Water Balance Methodology** and the **Ecological Accounting Process**.

The Genesis, Or, Know One’s History: In June 2008, Comox Valley local governments embraced an invitation to be a demonstration region for a *regional team approach* to collaboration, guided by the Living Water Smart lynch-pin target (see above) for watershed health.

Provincial intervention and regional district restructuring spurred inter-governmental cooperation in the Comox Valley. Provincial action:

- created the Comox Valley Regional District;
- mandated development of a Comox Valley Regional Growth Strategy and a Regional Water Supply Plan; and
- resulted in implementation of the *CAVI-Convening for Action on Vancouver Island* program for peer-based learning and sharing.

And so the Living Water Smart journey began for Town of Comox staff.

¹ https://waterbucket.ca/wcp/wp-content/uploads/sites/6/2017/11/livingwatersmart_book.pdf, June 2008



Lynn Kriwoken

Executive Director,
Ministry of Environment
and Climate Change

For more than a decade, Lynn Kriwoken has personified continuity, commitment and leadership in bringing the Living Water Smart vision to fruition. In 2008, she provided this perspective at the first of the Comox Valley Learning Lunch Seminar Series:

“While legislative reform is a foundation piece, collaboration takes place outside the legislative framework.”

“Living Water Smart is about motivating and inspiring everyone to embrace shared responsibility.

“Influencing behaviour and attitudes is at the heart of moving from awareness to action.”

Building Blocks Process

Three building blocks in the evolution of an incremental process for implementing a whole-system, water balance approach in the Town of Comox are:

- Lower Brooklyn Creek Channel Enhancement
- Northeast Comox Land Development (Queens Ditch)
- Draft Anderton Corridor Neighbourhood Concept Plan (middle Brooklyn Creek)

For more than a decade, Brooklyn Creek has been a ‘creekshed of interest’ to the Partnership. It provides a textbook illustration of cause-and-impact when urban land development alters the water balance.

Brooklyn Creek: Three local governments share jurisdiction over the creekshed. Historically, the three have had distinctively different land management strategies; along with very different views of the worth of Brooklyn Creek’s ecological services. Only where it flows through the Town of Comox has the creek been preserved within a riparian corridor. This corridor is a regional amenity (park) destination.

Brooklyn Creek is the first provincial demonstration application of EAP, the Ecological Accounting Process. EAP focuses on **social values**, which describe what the community thinks ecological services may be worth, based on uses the community makes of them. This is the core of the **natural commons concept**.

Northeast Comox: One of the few areas remaining in the Town for large-scale subdivision, Northeast Comox abuts the Brooklyn Creek drainage area, and drains down to Queens Ditch (in the lowlands). Queens Ditch is well-known because flooding led to a 1990s lawsuit.

During the period 2008 through 2011, the annual *Comox Valley Learning Lunch Seminar Series* familiarized Town staff with the whole-system, water balance approach.

In 2011, a development proposal provided the opportunity for the Town to implement the approach. The risk management implications of the Queens Ditch legal history necessitated action by the Town.

Anderton Corridor: The *Draft Anderton Corridor Neighbourhood Concept Plan* is a melding of Brooklyn Creek and Northeast Comox experience. The middle reach of Brooklyn Creek would be restored, over time, as a condition of development. A transformational dimension of the plan is recognition that **ecological services are core municipal services**.

**Brooklyn Creek headwaters
originate at the Home
Depot site in Courtenay**

**Anderton
Corridor**

**Northeast
Comox**

to Queens Ditch



Source: Google Earth

Comox Peninsula

Leading By Example



Marvin Kamenz

Municipal Planner
Town of Comox

Marvin Kamenz coined the term **"package of ecological services"** to describe the many advantages the community expects to receive from a creekshed, now and in the future:

"The Ecological Accounting Process (EAP) focuses on the worth of ecological services to residents, rather than their imputed value. Thus, worth deals with real numbers which local governments need to deliver outcomes.

"The worth of a creekshed is defined as a package of ecological services made possible by the hydrology. Looking through the 'worth lens' proved transformational."

The Town of Comox journey demonstrates that it takes years of sustained commitment and grinding perseverance to bring about incremental changes in planning and engineering practices. There is no shortcut to 'getting it right'. The Town is leading by example.

Staff Continuity is Key: The Town's experience also demonstrates the value of staff continuity, particularly when that continuity is coupled with an underlying passion for their work, guided by the common good. Also, continuity goes to the heart of corporate memory. Having direct knowledge provides an informed basis for recognizing opportunities that align with the community's vision.

Another hallmark of the Comox experience is a willingness to be proactive in establishing expectations – for example, the Town held a training course for drainage land development engineers.

The table below encapsulates the defining characteristics of the Town's building blocks process. At each milestone on this journey, staff continuity has made it possible to learn, evolve and raise the bar - beginning with the *Brooklyn Creek Channel Enhancement Project*, and progressing to the breakthrough concept that is the **package of ecological services**.

BUILDING BLOCK	DEFINING CHARACTERISTIC
Lower Brooklyn Creek Channel Enhancement Project	Environmental Protection
Northeast Comox / Queens Ditch	Rainwater Management
Middle Brooklyn Creek Urban Design Concept Plan	Package of Ecological Services

Package of Ecological Services: Each building block is described in detail in the sections that follow. The notion that there is a 'package of ecological services' was an unforeseen outcome. It crystallized when the *Brooklyn Creek EAP Demonstration Application* shed new light on the Town's partnership with the Brooklyn Creek Watershed Society.

The concept was immediately incorporated in the urban design for the Middle Brooklyn Creek reach. In mid-project, the Town changed the approach to rainwater management to focus on the protection and enhancement of the 'package of ecological services'.

Brooklyn Creek Channel Enhancement



Al Fraser

Parks Superintendent
Town of Comox

"When I look at the definition of partnership, and put it into the context of how it applies to the Brooklyn Creek storyline, the word that resonates most with me is participation."

"Council members are passionate about what they see, and are supportive of funding requests."

"The Town's financial commitment then leverages other sources of funding. This has a snowball effect. More citizens get involved when they see volunteers working in the creek."

A Creekshed of Provincial Interest

Partnership interest in Brooklyn Creek dates back to 2008, when it was included in the curriculum for the first annual *Comox Valley Learning Lunch Seminar Series*. Hosted by the City of Courtenay, the 2008 Series was part of the early rollout and capacity-building for *Living Water Smart*. In 2008, the Town of Comox was in the initial stages of implementing the Brooklyn Creek Channel Enhancement Project.

View Creeksheds Through an Asset Management Lens: In 2012, the Partnership identified Brooklyn Creek as a key Vancouver Island case study² for demonstrating the financial impact, and hence the unfunded drainage liability incurred by a local government, when the natural water balance is short-circuited by land development.

In 2014, the Partnership implemented the *Georgia Basin Inter-Regional Collaboration Series*. The program involved Metro Vancouver plus four Vancouver Island regional districts. The Comox Valley workshop day featured Brooklyn Creek. The unfunded infrastructure and stream restoration liability resulting from the historical pipe-and-convey approach to land development in Brooklyn provided a stark contrast with the whole-system, water balance approach that by then was guiding development planning for Northeast Comox.

In 2017, under an asset management program funded by the governments of Canada and British Columbia, the Partnership selected Brooklyn Creek as a demonstration application for testing the *Ecological Accounting Process* concept. The attraction was the opportunity to work with long-term financial data, and contrast the life-cycle costs of drainage practices with the benefits of natural assets.

An Unforeseen Outcome: There was an 'aha moment' soon after the EAP project commenced – view the collaboration between the Town and the Brooklyn Creek Watershed Society through a **social lens**. Their collaboration is a great story. What makes it exceptional is the breakthrough it inspired, resulting in a methodology keyed to the BC Assessment database to establish what a creekshed is WORTH.

² https://waterbucket.ca/wp-content/uploads/2012/05/3_Primer-on-Integrated-Rainwater-Groundwater-Management-for-Lands-on-Vancouver-Island_April-2012.pdf, April 2012



Christine Hodgson

Director
Brooklyn Creek
Watershed Society

"Brooklyn Creek flows through the Town of Comox and the Comox Valley Regional District, with its headwaters in the City of Courtenay.

"Before it enters Comox Harbour, it passes through two golf courses, urban developments, farmland and two parks.

"Our motto - 'Uniting Communities' - speaks to both human and other living creatures that use the creek corridor and watershed as their home.

"We don't own any land. We work cooperatively with people who do, or have access to it. We are very fortunate to have a great working relationship with the Town of Comox."

Implementation of a Successful Strategy

Brooklyn Creek is a small 1st order creekshed, about 8 km in length, whose hydrology and ecological services have been altered and degraded by decades of land use impacts. Of three local governments with management authority over land use and conservation in the creekshed, only the Town of Comox has acted strategically for more than a decade to **maintain** (*prevent degradation*) and **manage** (*enhance*) the stream corridor and the available ecological services.³

Truly a Team Effort: The Town's actions through the parks, public works and planning departments in concert with the Brooklyn Creek Watershed Society reflect that these intervenors understand the worth of the package of ecological services provided by the creekshed:

Between 2005 and 2017, their shared vision for stream restoration led to a combined investment of more than \$4 million to acquire, maintain and manage lands harbouring ecological systems and aesthetically-connected parks, greenways, trails and other recreational assets.

Through the multi-year strategy, the Town of Comox and its collaborators have provided a working example of understanding the worth of the creekshed, its hydrology, and ecological systems. "Over eleven years, the Brooklyn Watershed Society and Town co-funded annual channel restoration projects totaling \$780,000. This number included the value of labour and services donated by volunteers," reports Christine Hodgson.



³ https://waterbucket.ca/gi/wp-content/uploads/sites/4/2018/09/Brooklyn-Creek_EAP-Demonstration_FINAL_Sep2018_low-res.pdf

Brooklyn Creek Watershed Ours to Protect and Enjoy

The Brooklyn Creek Watershed has two branches which originate north of Ryan Road and Longlands golf course. It collects rainwater over a land area covering 709 hectares before emptying 10 km downstream into the K'omoks Estuary. The main waterway is Brooklyn Creek. It is considered by many as a "community jewel" and runs through the City of Courtenay, the Comox Valley Regional District and the Town of Comox. Rainwater from the land feeds into the creek and supports fish and wildlife species including spawning populations of cutthroat trout, coho and chum salmon.

Brooklyn Creek Watershed is an urbanized watershed with ongoing residential, business and agricultural development. It also includes developed and potential green spaces which provide needed habitat for a variety of birds, native plants and small animals including otters and beavers.

Brooklyn Creek Watershed Society:

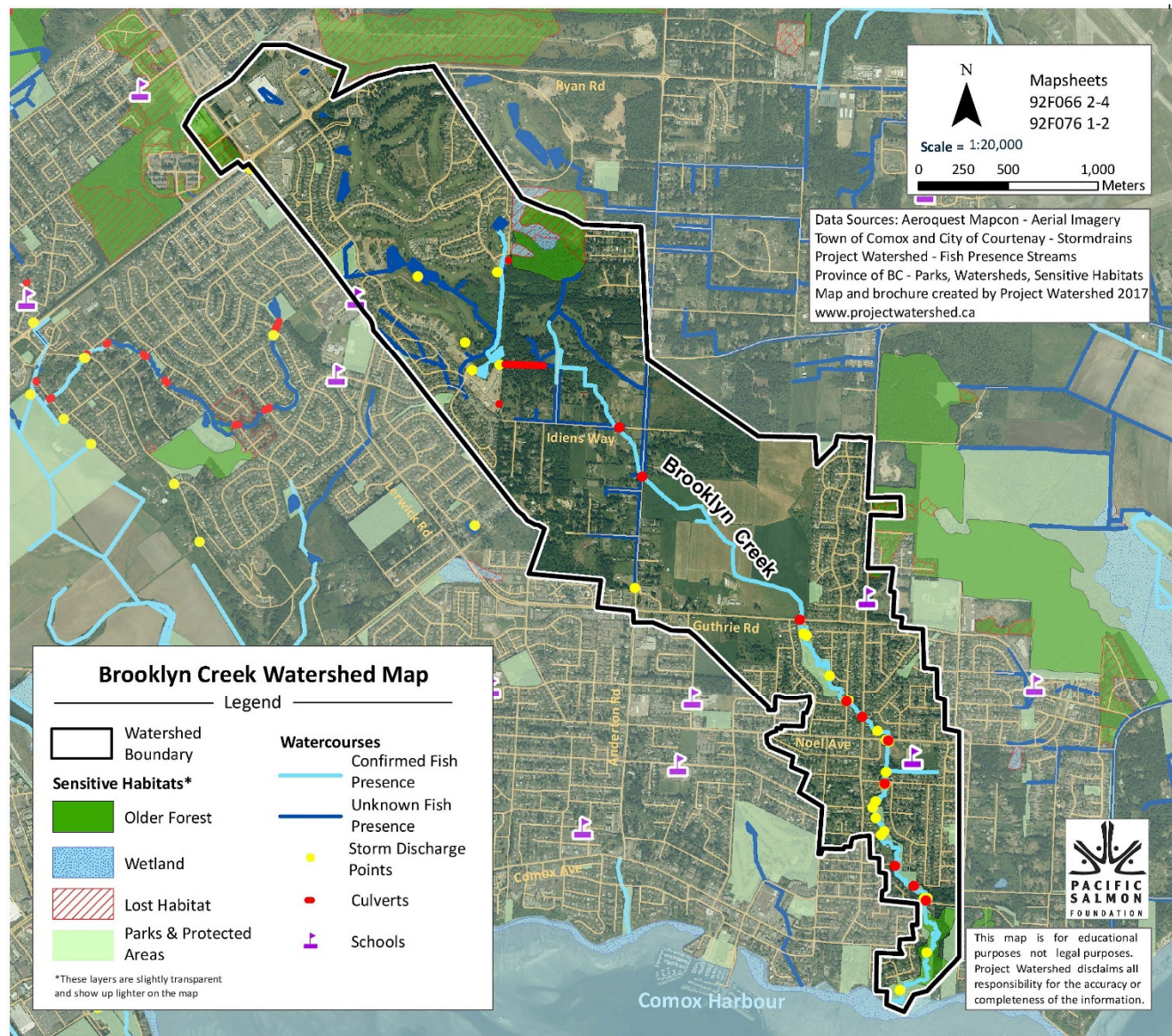


A group of local residents supporting sustainable use and preservation of the watershed through community stewardship activities and education.

Learn more, volunteer or donate at
www.brooklyncreek.ca

IF YOU OBSERVE AN IMMINENT THREAT TO THE WATERSHED OR THE CREEK CONTACT:

-  **Department of Fisheries and Oceans**
24 hour hotline: 1 800 465-4336
-  **City of Courtenay:** 1 250 338-1525,
website: www.courtenay.ca
-  **Town of Comox:** 1 250 339-2421,
website: www.comox.ca
-  **Report all polluters and poachers (RAPP):**
1 877 952-7277





Tim Pringle, Chair
Ecological Accounting
Process (EAP) Initiative

"The essence of why collaboration works is that it increases the impact for everyone – and that's the social lens for EAP."

"EAP provides metrics that enable communities to appreciate the worth of natural assets. These resources provide numerous public benefits in the form of ecological services."

*"EAP also calculates the dollar value of the land occupied by the natural commons, thus providing a basis for budgeting expenditures for maintenance and enhancement. The **natural commons** has a corollary – the **constructed commons**."*

How Communities Decide How Much to Invest in Creekshed Restoration

Natural assets are ecological services that human communities draw on to support quality of life and property enjoyment. EAP uses the parallel concepts of the **natural commons** and the **constructed commons** as a way for residents, elected persons, and practitioners to understand that ecological services deserve equal consideration.



What the 'Natural Commons Asset' is Worth: The insights yielded by the *Brooklyn Creek EAP Demonstration Application* resulted in a breakthrough in thinking, philosophy and approach vis-à-vis valuation of ecological services. A key conclusion flowing from the Brooklyn restoration experience is that the extent of use and investment in maintaining and managing a local creekshed indicates what residents and the community think ecological assets are **worth** (i.e. value in use).

Looking through the **'worth' lens** led to an approach that is in sharp contrast to the use of 'imputed' values. An **imputed value** is an assumed value given to an item when the actual value is not known or available.

As the theory of EAP evolved over the course of the Brooklyn case study, the understanding of what matters led to development of a methodology⁴ to assign a dollar value to the stream corridor. The methodology uses financial information supplied by BC Assessment as a proxy.

Application of the Methodology: The EAP analysis established a unit value of ~\$2700 per lineal metre of stream corridor 'commons' zone along the 2.5 km stream length through Comox. Applying a 1% factor to the total commons value establishes an annual budget of ~\$67,000 for maintenance and management of Brooklyn Creek ecological services.

⁴ https://waterbucket.ca/gi/wp-content/uploads/sites/4/2019/07/Primer-on-Ecological-Accounting-Process_Jan-2019.pdf

10 Key Messages to Remember about EAP

How Much to Invest?

EAP focuses on worth rather than dollar value specifically.

EAP emphasizes social rather than financial values.

EAP employs one financial valuation process - that is, calculation of the land value of the natural commons asset.

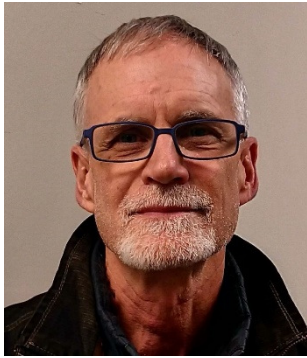
In the case of a stream, this is the ribbon of land underlying the stream itself and the adjoining set-back area required in bylaws and Riparian Areas Regulations.

BC Assessment land values are used for this calculation, thus reflecting the social commons.

Property owners purchase in locations that they think are worth their investment.

Both the calculation of the land value of the natural commons asset and the account of investment in maintenance and management of a stream are reports that can be used for budget strategy and planning as well as for asset management analysis.

1. Every urban creekshed comprises a **constructed commons** (roads, utilities, etc.) and a **natural commons** (streams, riparian corridors, etc.). Each commons is a system.
2. Hydrology is the **engine that powers** ecological services. Both hydrology and the ecological services it supports are defined as natural assets.
3. **Impaired hydrology** function results in **diminished** ecological services.
4. The **worth** of a creekshed is a **package of ecological services** made possible by the hydrology. EAP focuses on wetlands, ponds, streams and riparian areas because these natural features provide a number of services desired by communities.
5. EAP deals with **real numbers** which practitioners need to deliver outcomes.
6. EAP uses the **BC Assessment database** regarding land value to calculate the financial value of the **Natural Commons Asset** – that is, the land underlying the stream and adjacent set-back area.
7. View choices through the **worth lens** if the goal is to motivate communities to implement strategies that restore creekshed function.
8. Both the record of expenditures for maintenance and management (**calculation of worth**) and the financial value of the **natural commons asset calculation** provide financial information about ecological (natural) assets that can be included in local government financial planning and **Asset Management Strategies and Plans**.
9. Taking action depends on **what a community thinks** the creekshed is worth.
10. Distinguish between maintenance and management – because maintenance is about **preventing or avoiding** degradation, whereas management is about **improving** the condition of the ecological asset.



Nick Leone

Senior Biologist
Fisheries & Oceans Canada

At the Parksville 2019 Symposium, which featured Brooklyn Creek, Nick Leone explained why decades of in-stream restoration work have not been sustainable. So, what was Nick Leone's key message? --- Reconnect hydrology and ecology: focus on root causes and integrate restorative solutions!

"Hydrology shapes and influences our landscape. It is the connection between ecosystems and habitat. The two are different. If we are to fundamentally restore or rehabilitate creeksheds, we must first recognize and understand the essential elements that make up a dynamic landscape. It is a system. Act accordingly."

Restorative Land Development would result in Sustainable Stream Restoration

The long-term sustainability of enhancement work in lower Brooklyn Creek is subject to the cumulative impacts of historical decisions made by middle and upper creekshed managers. Past land use (development) practices throughout the creekshed considered hydrology only in a superficial manner, guided by a philosophy which included the rapid removal of any water to allow the ground surface to dry as quickly as possible following any rainfall.

Reconnect Hydrology and Ecology: The *Draft Anderton Corridor Neighbourhood Concept Plan* is the opportunity to address the root causes of 'changes in hydrology' resulting from past alterations to the landscape, and thus reconnect hydrology and ecology to restore hydrologic and riparian function in Middle Brooklyn Creek.

Brooklyn Creek was featured at the Parksville 2019 Symposium⁵ because it is a case study for the hard work of hope. Sustainable is attainable – **when redevelopment shrinks the destructive footprint while growing the restorative footprint.**

Parksville 2019 showcased citizen science in action. Engagement of community through stewardship is a credible formula to be encouraged and mainstreamed at every opportunity. Collaboration, teamwork and a recognition that the whole is greater than the sum of its parts is the energy that stokes creativity and determination. When citizen talent is aligned with a local government that is both visionary and focussed, outstanding achievements are not only possible, but realistic – as the Brooklyn Creek experience illustrates.



⁵ https://waterbucket.ca/viw/wp-content/uploads/sites/10/2019/05/Parksville-Symposium_re-cap-and-reflections_May2019.pdf

Citizen Science in Action in Brooklyn Creek

Power of Partnerships

“A common thread at Parksville 2019 is that projects would not come to fruition unless there is a philosophy of partnerships at the forefront of everyone’s mind,” stated Al Fraser.

“The participation that we have seen in Brooklyn Creek, and that continues to grow, is quite staggering. I believe that participation is borne by interest; and interest is borne by intuition, context, content and imagination.

“When I look back some 30 years and reflect on my involvement with Brooklyn Creek, I cannot help but remind myself that what we see today is truly a natural and remarkable community asset. It is loved and cared for by many. It is crafted by the determination and dedication of people and agencies willing to embrace opportunity, and work toward a common goal.

“The asset that we call Brooklyn Creek watershed stands testament to the power of partnerships and the value derived from those relationships.”



Without restorative development, however, changes in creekshed hydrology mean more runoff volume for longer periods of time!

Photo Credits: Brooklyn Creek Watershed Society

Northeast Comox Land Development



Jim Dumont

Engineering Advisor
Town of Comox

“The Town of Comox has been more than pragmatic. Council and staff have been realistic, and have received the Northeast Comox SWMP and are working on the Draft Anderton Neighbourhood Concept Plan, to meet their objectives of providing protection of public and private property from flooding while ensuring protection of the stream and fisheries resources.

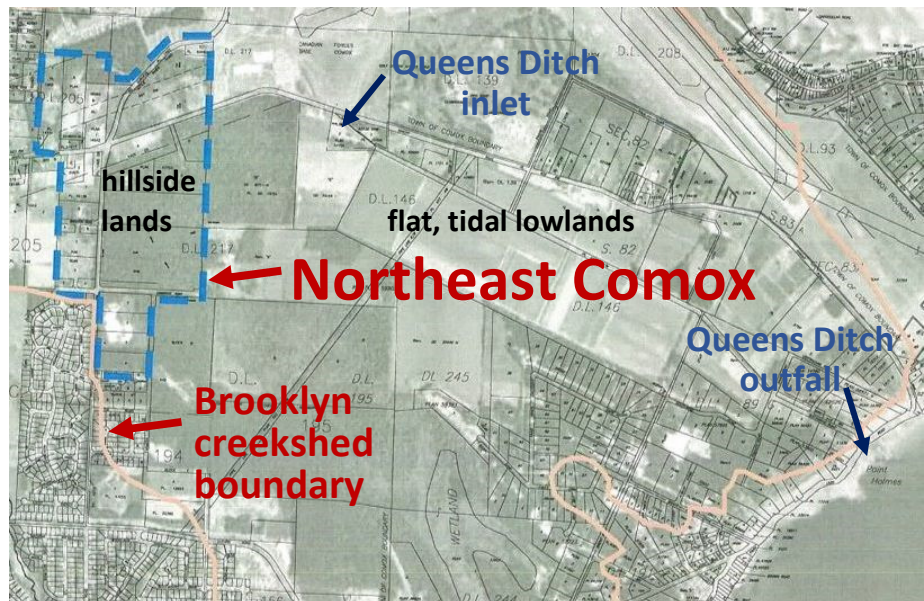
“They have recognized that the standard of practice must change and have embraced forward thinking that will allow their objectives to be met.”

Approach is Precedent-Setting

The Town of Comox has established a provincial precedent in truly applying a whole-system, water balance approach to land development in Northeast Comox. The break from historical drainage engineering practice dates back to April 2012 when Council approved Terms of Reference for a *North East Comox Storm Water Management Plan*.

Over the past seven years, an approach has taken shape that follows the direction provided by *Stormwater Planning: A Guidebook for British Columbia*⁶, released by the provincial government in 2002. The Guidebook introduced the **Water Balance Methodology** as a way to set performance targets for reducing runoff volume and mimicking the natural flow patterns in streams, and so protect property and habitat.

“The Town had the reality of a legal issue related to flooding in the lowlands where the Queens Ditch is located. The risk management implications necessitated action by the Town,” explains Marvin Kamenz. “The Town has been proactive in requiring use of practices that will fully meet the intent of the water balance approach. The process to reach a satisfactory outcome has been protracted. During this extended period, Jim Dumont played a critically important role as the Town’s technical advisor in successfully guiding the Town.”



⁶ <https://waterbucket.ca/rm/sites/wbcrn/documents/media/242.pdf>

Queens Ditch Lawsuit - A Driver for Water Balance Management

“Constructed in 1946, the Queens Ditch is the drainage outlet for the Comox air force base,” stated Marvin Kamenz at the Parksville 2019 Symposium, when he set the scene for NE Comox.

“In 1997, a property owner sued the Department of National Defence. This sent a clear message that flooding is a real concern; and that the liability for the Town of Comox is real because the NE Comox development area drains directly into Queens Ditch.

“Property owners have different and often conflicting interests. Hence, in addition to threats to sue if flooding was increased, there were threats to sue if the volume of groundwater was either increased or decreased.

“The initial development proposal for NE Comox brought to a head an issue over a consulting engineer’s responsibility to ensure a safe level of service. The issue boiled down to a difference in thinking and mind-set: short (consultant) vs long-term (Town).”

The Hard Work of Hope

The Town’s NE Comox experience underscores that the *hard work of hope* is taking place on multiple fronts. In April 2012, Council established a direction for NE Comox with approval of three distinct phases of work (as laid out in the table on the page following).

“What is unique about Phase 3 is the Adaptive Management Plan,” emphasizes Marvin Kamenz. The Plan for NE Comox may be the first of its kind. It applies guiding principles⁷ spelled out in *Stormwater Planning: A Guidebook for British Columbia*, released in 2002.

A Protracted Process: “The development approval process for NE Comox could have been done in 1 or 2 years. Instead, it has been an 8-year journey. The Town’s experience shows how hard it is to move a profession and an industry in a new direction,” reflects Marvin Kamenz.

“The time it took highlights why there is a cultural and skill-set difference between consulting engineers and a municipal engineer. One has a short-term view; the other long-term. This results in a push-pull dynamic. The municipal engineer must take into account both ongoing operation and future replacement. The risk management issues raised by the Queens Ditch lawsuit were the main drivers in changing the approach to rainwater and stormwater management.”

Legal Precedents: Prior to release of the Guidebook in 2002, provincial government lawyers completed a review of BC case law for the Steering Committee. Their review prompted inclusion of this statement in the Guidebook about liability for downstream impacts due to changes in the water balance: *These (three) cases underscore the responsibility of local government for stormwater volume management.*

“In 1990-1991, the BC Court of Appeal upheld three decisions that found municipalities liable for lowland nuisance flooding caused by upland urbanization,” recalls Peter Law, Guidebook Chair.

“Upon reading those judgments, it was clear that the judges grasped that it was a runoff volume issue. In retrospect, however, something got lost in the translation afterwards. Instead of volume, the engineering profession focussed on controlling peak flow rates through detention ponds. Two decades after release of the Guidebook, refocussing engineers on true **water balance management** is still problematic.”

⁷ Refer both to the Executive Summary and Section 9.9 of the Guidebook for guiding principles and their application

Getting It Right in NE Comox

“The plan for managing the water balance in NE Comox came out in three reports. As a lay person, there were some things that I just assumed would be done automatically. I found out to my surprise this was not the case,” stated Marvin Kamenz at Parksville 2019.

“For example, engineers like to use what is called a ‘design storm event’. But it’s hypothetical. Instead of accepting that approach for NE Comox, the Town insisted on the use of hourly data over a 42-year period for simulation modelling in both Phases 1 and 2.

“Phase 3 then established the requirement that, in order to ensure their success, all infiltration galleries and detention ponds will be operated by the Town and located on Town lands.

“A design requirement is that galleries and ponds can be easily modified, either to increase or decrease their capacity, by up to 20% to mimic the actual hydrology. System performance will be continuously monitored to determine whether systems are performing as modelled. And if not, system operation will be modified.”

Synopsis of the Northeast Comox Process for Water Balance Management	
Phase 1	What Do We Have? - How much rain is falling and where does it go?
	Phase 1 identified impacts from developments and identified general methodologies to mitigate the impacts and risks to the Town, properties, and residents.
	Phase 1 concluded that land development within the Town had, until very recently, utilized traditional “pipe and pond” stormwater management techniques. The migration to a more holistic water balance approach requires a significant commitment by the Town, development community, and eventual owners of the properties
Phase 2	What Do We Want? - What are the targets for infiltration and detention to mitigate the impact on down slope lands?
	Phase 2 identified physical characteristics of potential mitigation measures to mitigate potential impacts; ownership and location of these physical systems, whether on municipal lands or privately owned properties; and legal and administrative processes required to allow design, construction and operation of the systems.
	Phase 2 evaluated potential strategies and tools to mitigate effects of development on hydrological system; and requirements for new resources, processes and bylaws; with necessary changes including development of staff expertise, training of public work staff, formalizing of roles and responsibilities, and bylaw enforcement.
Phase 3	How Do We Get There? – What are engineering specifications for infiltration galleries and detention ponds?
	Phase 3 resulted in selection of appropriate and cost-effective measures for implementation; a location plan; design criteria and details to be used during subdivision and lot design; and an Adaptive Management Plan for monitoring and making changes.
	<p>“The Adaptive Management Plan is essential to the successful development and the mitigation of all impacts resulting from development.</p> <p>“The Plan describes the monitoring program needed to verify the operation of the mitigation systems is within the expected range demanded by the design criteria.</p> <p>“Should the constructed works fail to provide the intended benefits of mitigation the Plan will identify triggers that would lead to changes in the Plan for implementation to ensure that mitigation is successful.”</p>



Shelley Ashfield

Municipal Engineer
Town of Comox

"The Town's experience is that the weak link in drainage analyses is always the assumptions.

"A lack of explicit identification and justification of the assumptions and simplifications made in the analysis of stormwater impacts has resulted in stormwater systems that address hypothetical as opposed to actual site characteristics and development impacts.

"Learning from this experience, the Town now requires that assumptions be stated and explained. We are saying WHAT is your assumption, and WHY."

The Challenge: Bridge an Educational Gap

How water gets to a stream, and how long it takes, is not well understood among land and drainage practitioners. The flow of rainwater from cloud to stream is comprised of **three water balance pathways**: *surface runoff, horizontal shallow interflow, and deep groundwater* (aquifer discharge). Yet the latter two are routinely ignored by designers. Time, a critical factor, is also ignored.

Engineering practice⁸ for servicing of land still relies on very simple formulae and methodologies to calculate peak rates of surface runoff. Thus, it is reasonable to conclude that failure by designers to grasp and apply the science-based fundamentals of a water balance approach is perpetuating degraded urban streams.

When it rains - there is too much runoff, too fast. When there is no rain, there is too little streamflow. The consequences are: more flooding; more stream erosion; and less streamflow when needed most.⁹

Whole-System, Water Balance Training for Engineers:

Opening minds to accept changes in practice is challenging, especially when there is no direct regulatory (prescriptive) requirement at the provincial level. This reality meant the NE Comox situation called for an educational process to bridge a gap in practitioner understanding.

So, the Town's Municipal Engineer took on the responsibility, and organized a training course for local drainage and land development engineers. Taught by Jim Dumont, the course comprised six sessions over a 3-month period. 20 individuals attended. Voluntary participation required a major commitment of their time. The Town also extended the invitation to attend to all local governments on Vancouver Island.

"The Town hosted this training because the planning and design process is becoming increasingly more complex, and with greater expectations than we have ever applied to drainage infrastructure. The course was a major undertaking," reports Shelley Ashfield.

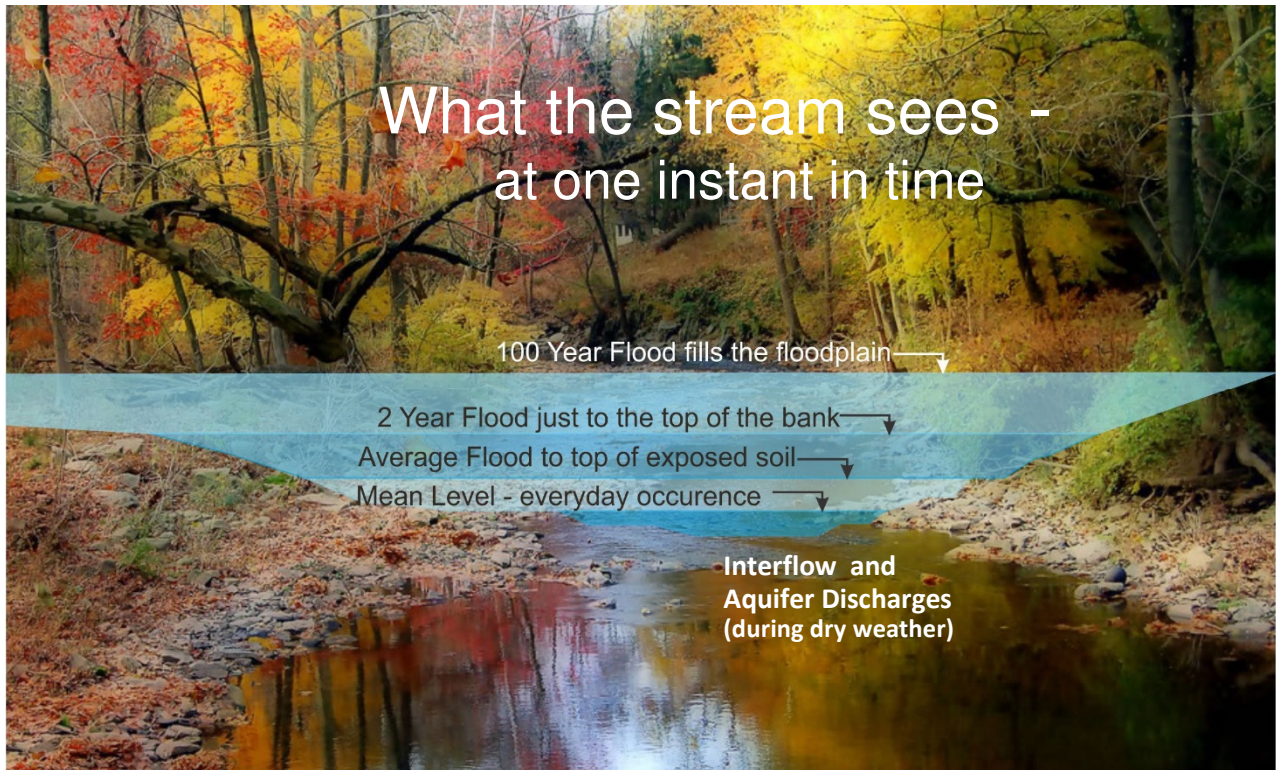
"It has taken a huge investment of effort and collaboration between the Town and local development engineers to: (1) realize and then understand the different constraints, requirements and abilities of each party; and (2) collaborate in the creation of a new approach to rainwater management. The result is an approach where assumptions and simplifications are understood by both parties and where there is mutual agreement as to their applicability to development site characteristics and the rainwater management objectives."

⁸ http://waterbucket.ca/wp-content/uploads/2012/05/4_Primer-on-Land-Development-Process-in-BC_September-2013.pdf

⁹ https://waterbucket.ca/rm/wp-content/uploads/sites/5/2018/01/Water-Balance-Approach-on-Vancouver-Island_Jan2018.pdf

Water Balance Objectives

Restore (or Protect) Creekshed Hydrology, Prevent Stream Erosion,
Enhance Summer Base Flows, Ensure Fish Survival



What the Stream Sees:

Water levels corresponding to various flow conditions, both high and low, are superimposed on the image.

The complete story requires the view to be extended in time like a movie or video. The stream and the discharges are dynamic and constantly changing. The important information in this more complete view is the duration of flow over time, and how it changes with time.

Standard engineering practice is preoccupied with the peak rates of flow for extreme events. These happen infrequently. This focus is the traditional design mindset for flood conveyance and protection. This single-purpose engineering objective does not account for the cumulative environmental impacts of all the other rainfall-days in a year. Most stream erosion is caused by comparatively small flow rates. These happen frequently and usually range between the mean annual flood and the 2-year flood event.

Because the changing climate is altering the distribution of the seasonal water balance, and hence seasonal flow patterns (and related processes), this has both high-flow and low-flow consequences for streams:

- **Warmer, wetter winters & high-flow periods** = reduced snowpack / accumulation (in high elevations) and less water in storage = more runoff volume for longer periods of time = stream channels erode = aquatic habitat degrades; and
- **Longer, drier summers & low-flow periods** = as the landscape dries out, discharges from both interflow and groundwater diminish = little or no flow in streams = streams may be unable to sustain human and/or fish needs.

Reduced dry weather flows over longer periods of time result in numerous potential impacts, including: elevated water temperatures, isolation from riparian fringe, reduced water quality, discontinuation of channel flow, and habitat isolation.

Inclusive Process Produced a Plan That Can Be Put Into Action

“When everyone involved started on the NE Comox journey, the Town strived to ensure transparency through stakeholder information sessions and many public open houses,” reports Shelley Ashfield.

*“Jim Dumont assisted the Town as we worked with the ownership group and consultants to ensure that the drainage plan would mitigate flood and environmental risks. The process and plan moved us beyond just maintaining peak flow rates. The strategy maintains the **flow-duration** relationship. This is a fundamental difference between this plan and other plans. Another difference is transparency about assumptions used in modelling drainage.*

“Over a period of years, all involved went through an intensive process as we thought through the details of implementation, line by line, including design standards and adaptive management plan.”

Implementation / Looking Beyond

The time, effort and energy it takes to change the standard of engineering practice is substantial, as the Town’s journey clearly shows. Implementing effective water balance management requires a systems approach on all levels because:

Ripple effects are cascading and include amending bylaws, training staff, educating the development community and homeowners, creating new procedures, and formalizing roles and responsibilities.

Looking ahead, the NE Comox process and outcomes establish expectations for future land development in the Town of Comox.

What NE Comox Will Look Like: “Yet the only visibly different aspect of the future developments might be the inclusion of the boulevard infiltration trench as a rain garden, or a slightly depressed swale with an appropriate planting selection. All other visual aspects of the future developments will be the same as existing development areas within the Town,” explains Jim Dumont.



The End of the Beginning: “The past 8 years have been hard work. Along the way, the Town followed an incremental process that allowed us to overcome challenges and hurdles,” reports Marvin Kamenz.

“Yet, when all is said and done, we have only just begun. Next up is implementation, with the next piece of the puzzle being financing of the infrastructure and cost recovery so that development can proceed. Aspects to be reconciled are the land and construction costs for detention ponds, plus the operation and maintenance costs.”

“As we proceed with next steps, the most challenging will be educating staff, developers, consultants, and home owners of the new standards, procedures, policies and guidelines,” adds Shelley Ashfield. “Changing engineering standards is a journey in itself. To ensure success, the Town will need to adopt the design standards, update existing subdivision servicing specifications, establish a number of bylaws, and implement a cost recovery program.”

Middle Brooklyn Creek Urban Design Concept Plan

A Rethinking of ‘Core Services’

“Everything was proceeding quite fine until Tim Pringle completed the EAP analysis for lower Brooklyn Creek,” stated Marvin Kamenz at Parksville 2019. “That was the moment when we realized that ecological services are not just an add-on. They are, in fact, core services.

“Utilities, roads, parks and recreation take up the bulk of a municipal budget. Once we made the mental transition to view ecological services as core municipal services, and looked at the municipal budget differently, we then asked ourselves: how can we do things better?”

*“We stopped work on the rainwater management plan and changed the plan focus to the **Package of Ecological Services** – how can we get the best package for them? All plan elements were redesigned; and residential density was concentrated to maximize public access.”*

Culmination of Building Blocks Process

The neighbourhood concept plan for middle Brooklyn Creek is the culmination of a whole-system, water balance approach that has evolved over the past decade. The *Draft Anderton Corridor Neighbourhood Concept Plan* integrates lower Brooklyn and NE Comox building blocks experience.

The outcome of plan implementation would be an enhanced **package of ecological services** (environmental protection, recreation and drainage) for future neighbourhood residents in middle Brooklyn Creek, while protecting those same values in lower Brooklyn Creek.

At the start of the planning process, lessons learned from NE Comox were top of mind for the Town of Comox. Accordingly, water balance management was driving concept plan development, with an emphasis on detention ponds and infiltration galleries.

Then, in mid-project, lessons learned from the lower Brooklyn Creek EAP analysis were introduced into the Anderton Corridor planning process. The notion that the neighbourhood plan should focus on protection and enhancement of the *Package of Ecological Services* resulted in an abrupt rethink by Comox staff and consequent redesign.

What Triggered the Rethink: Marvin Kamenz singled out this statement (on page 38 of the EAP report) to explain what resonated with the Town, and so changed the Town’s approach to development:

“The package of ecological services concept refers to the combined range of uses desired by the community. Thus, a strategic plan that supports this diversity will appear worthwhile to the greatest number of interested parties.”

The basis for the statement is the observation that the community or residents confirm the worth of the enhanced creekshed by using its trails, greenways, park areas, fish viewing sites, etc. Council members and other intervenors receive feedback from the community which indicates a strong level of support for the enhancement work.

In the case of Brooklyn Creek and its riparian corridor, intervenors and residents want this landmark ecological system in their community and they want to continue enjoying the services it provides.

Application of NE Comox and Brooklyn EAP Experience

“The first change in approach arose out of the NE Comox planning where risk management was the overriding objective,” states Shelley Ashfield. As Municipal Engineer, she is active in, and approves anything related to engineering practice.

“The Town was not willing to entertain any development in middle Brooklyn unless there was a demonstrated program that would eliminate any increased risks to the Town; be they flooding or environmental.

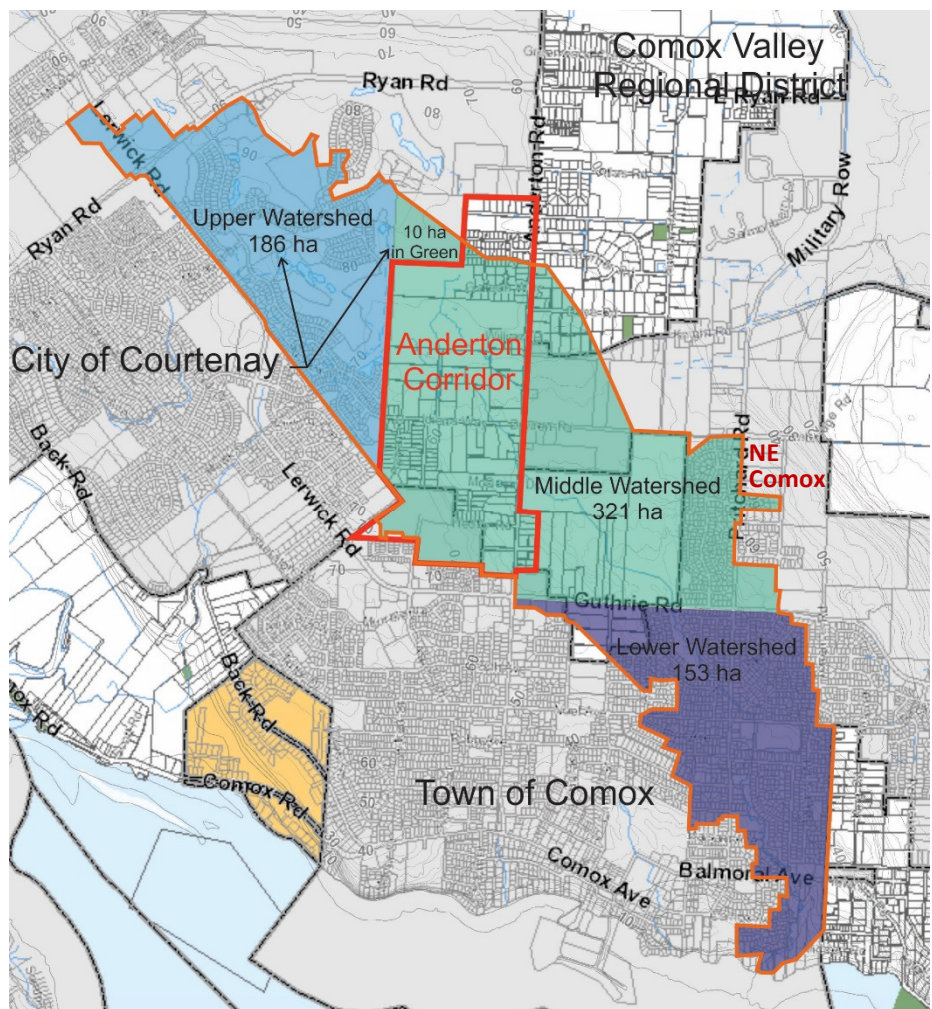
“When the EAP analysis then connected the creek to the concept of it being an asset of the Town, this provided Staff with one more way to link the stream to the health of the community. The concept of the stream as an asset allows the Town to include it in the plans to manage all of the Town’s assets on behalf of the community for future generations.”

Draft Anderton Corridor Neighbourhood Concept Plan

The image below tells a story in two ways: it shows the comparative sizes of the three creekshed zones; and it shows the locations of the two development areas. It is significant that the area covered by the *Draft Anderton Corridor Neighbourhood Concept Plan* is almost double that for NE Comox - that is, 150 hectares versus 80 hectares.

The ultimate benefit of the Town’s building blocks process is reflected in the timelines for the two development areas: protracted versus quick. Also, the EAP analysis has accelerated implementation of a creekshed restoration vision.

“The continuous factor is the Brooklyn Watershed Society,” notes Marvin Kamenz. “The streamkeepers were ahead of the Town in the middle zone. With channel enhancement now completed in lower Brooklyn, their focus has shifted to restoring the middle section.”



What a ‘Package of Ecological Services’ Means

A creek comprises the stream corridor and the riparian zone. Both support ecological systems. The creek itself is a hydrologic system.

The surrounding zone and interrelated ecological systems work with the hydrology to provide a range of ecological services including moderation of water temperature, habitat for terrestrial and aquatic life, wetlands, ponds, nesting places, woodlands.

From a human settlement point of view, a creek is an amenity that can be enjoyed in association with parks, greenways & trails.

A creek supports salmon and trout; it is a landscape feature; it is part of the urban woodlands, harbours heritage trees and nesting sites; and it is the focal point of outdoor classroom activities, walking, jogging, cycling, wildlife viewing, etc.

A creek zone adds value to nearby properties and attracts visitors from other local government areas. A municipality also uses the creek for stormwater conveyance.

Urban Design & Package of Ecological Services

The Town’s approach to the *Draft Anderton Corridor Neighbourhood Concept Plan* is precedent-setting for four cascading reasons:

- The guiding philosophy for municipal asset management is that **‘ecological services = municipal core services’**.
- The plan is directly influenced by the principles and strategy for use of **EAP, the Ecological Accounting Process**.
- The plan recognizes that **hydrology is the engine** that powers ecological services.
- The urban design would protect and enhance the **package of ecological services**.

In summary, and with the *Draft Anderton Corridor Neighbourhood Concept Plan*, the Town of Comox has established a provincial precedent for a neighbourhood planning process and outcome that are founded on the **twin pillars** of the *whole-system, water balance approach* to restorative land development. Introduced on page 1, the twin pillars of sustainable creekshed systems are the Water Balance Methodology and the Ecological Accounting Process.

The Twin Pillars: The EAP approach looks at the entire system at the catchment or creekshed scale. Key to the approach is the idea that every urban creekshed comprises a ‘constructed commons’ and a ‘natural commons’ (see pages 8 and 21). By reviewing historical land use impacts, EAP ascribes changes to the overall hydrology.

The technical focus of EAP is on creekshed hydrological conditions and the dependent ecological (water balance) services thus provided. These services sustain natural systems and human settlement. The Water Balance Methodology is the analytical tool.

The social focus of EAP observes the uses that residents and community make of local ecological services which are drawn from the natural commons assets. EAP looks at the history of intervenor initiatives because this helps understand this aspect of human nature: **“what is this worth to me / us?”** Taking action depends on what the community thinks the creekshed is worth.

As the *Draft Anderton Corridor Neighbourhood Concept Plan* clearly demonstrates, the EAP approach helps managers change practices and adopt new strategies regarding the protection and enhancement of ecological systems in the stream corridor and riparian zone, and throughout the entire creekshed.

Synopsis of EAP Approach

Town of Comox projects enabled testing of foundational concepts (such as the constructed and natural commons) that underpin EAP.

Constructed Commons

*Communities rely on a range of services such as schools, roads, underground utilities and parks to support life-style and property enjoyment. These are **commons**. Through taxation, they are maintained and managed in order to ensure the availability of desired services.*

Natural Commons

*Communities also use and rely on numerous services provided by another type of commons: **natural assets**. The natural commons host ecological services such as stream systems, wetlands, riparian zones and natural habitat.*

PHILOSOPHY
EAP, the Ecological Accounting Process, provides metrics that enable communities to appreciate the worth of natural assets in order to improve maintenance (prevent degradation) and management (enhancement).
EAP is an evolution of green infrastructure ideas and practices that had their genesis in the 1990s, and is a point along a “green infrastructure continuum”
Natural assets provide ecological services which support quality of life and property enjoyment.
EAP uses the concept of the natural commons to understand how the community (local government staff & politicians, property owners, stewardship sector) use or expect to use ecological services. The natural commons are features of a watershed (creekshed) that can be used / enjoyed by all residents and property owners for social, aesthetic and economic purposes. A social contract exists: The community can expect the natural commons to be maintained and managed. EAP informs communities about the condition of their natural commons, investment that has been made, and the value of the land underlying natural commons.
STRATEGY / AUDIENCE
Work with community (stewardship sector, property owners, politicians, businesses, external funders, professionals working in local gov’t context) Describe the uses (package of ecological services) the community draws from the natural commons: EAP focuses on the stream (as defined in the <i>Riparian Areas Regulations Act</i>) Calculate the financial investment made (if any) in the creekshed or reaches. Assess condition of the hydrology by applying Water Balance Methodology
Acknowledge TEV (Total Economic Value); reference and use concepts of worth applied to the both natural commons and constructed commons.
Analysis based on entire creekshed ecological system – because lasting management (enhancement) would not be successful unless based on a whole system perspective and strategy.
DELIVERABLES
Creekshed profile, includes perceptions of risks and opportunities Water Balance Methodology analysis of the condition of the hydrology Calculation of the worth of the creekshed based on community investment Statement of the value of the land in the commons asset zone

Creekshed as Local Government Infrastructure Assets

Asset Management

Asset management has traditionally been about hard engineered assets such as waterlines, sanitary and storm sewers, and roads. Yet, watershed / creekshed systems are also “infrastructure assets”.

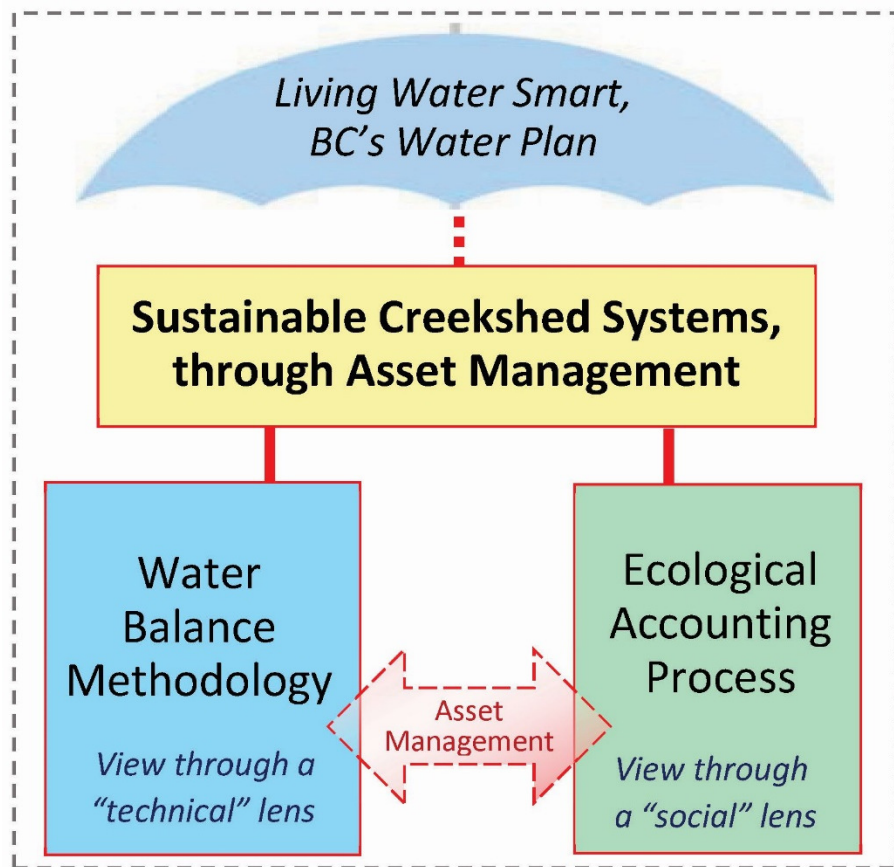
*Trees, soil, green spaces and ‘water balance pathways’ contribute to a municipal service function. These assets provide **hydrologic integrity** for a healthy creekshed system.*

Hydrologic integrity is a driver for maintenance (prevent degradation) and management (enhancement) of nature’s water balance services in the same way that engineered assets (and services) are managed.

By managing the built and natural environments as integrated systems, local governments would incrementally move towards a water-resilient future as an outcome.

Twin Pillars of Sustainable Creeksheds

In summary, the Town of Comox ‘twin pillar’ experience provides working examples of what the water balance approach to **reconnecting hydrology and ecology** looks like in practice. This experience aligns with what was envisioned when *Sustainable Creekshed Systems, through Asset Management*¹⁰ was released in 2015. This, in turn, aligns with and supports *Asset Management for Sustainable Service Delivery: A BC Framework*, released in 2014.



Hydrology is the Engine that Powers Ecological Services

Twin Pillars of Restorative Land Development

¹⁰ <https://waterbucket.ca/wp-content/uploads/2017/10/Beyond-The-Guidebook-2015.pdf>

RECONNECT HYDROLOGY & ECOLOGY: “Whole-System Approach” (4 Steps) to Integration of Built & Natural Environments				
	1. <i>WHAT</i> is the issue? – “Call to Action”	2. <i>SO WHAT</i> can be done? – “Core Building Blocks”	3. <i>NOW WHAT</i> can we do? - “Desired Outcomes”	4. <i>THEN WHAT?</i> – “Mainstreaming”
Under each step, Cascading Key Messages define “What Really Matters”				
	<i>Success in Solving “In Your Face” Problems Would Mean:</i>	<i>Integrating Natural Assets into Asset Management Relies on Understanding that:</i>	<i>There are Paybacks When a Community “Gets it Right”:</i>	<i>Restorative Development Results in Sustainable Stream Restoration:</i>
1	Less flooding	Hydrology is the engine that powers ecological services	AVOID an unfunded and unaffordable financial liability for drainage infrastructure	Require ‘design with nature’ standards of practice for drainage and servicing of land
2	Less stream erosion	Three pathways by which rainfall reaches streams are “infrastructure assets” that provide “water balance services”	ADAPT to a changing climate to restore the water balance and reduce risks	Shrink the destructive footprint while growing the restorative footprint
3	More streamflow when needed most	Taking action depends on what a community thinks a creekshed is worth.	REDUCE life-cycle costs for drainage infrastructure	Demonstrate what is achievable thru a restoration imperative
Below, each “Problem Statement” establishes Context & defines the Central Issues in the 4-Step Process				
	Recognize that it is necessary to “get it right” with respect to planning, engineering and asset management standards of practice – especially as they relate to and impact upon creekshed health and restoration - because “getting it right” would mean the sustainable and cumulative “community benefits” would then ripple through time	Acknowledge that there is a problem with current standard practices for servicing and drainage of land - and that these practices are the root cause of degraded urban streams – because “getting it wrong” results in an unfunded and unaffordable infrastructure liability that is then a financial barrier to restoration of creekshed function	Re-focus local government business processes on outcomes so that they align with provincial policy, program and regulatory framework for Living Water Smart - which encompasses both the <i>Whole-System Approach</i> and <i>Sustainable Service Delivery</i> - and thereby achieve desired outcomes that would have tangible community and financial benefits	Get it right , province-wide. B.C. is one of the last places on the planet where it is still possible to transcend the climate debate and lead by example. B.C. has enough remaining natural capital to protect and restore its way back to true sustainability. Improve where we live.

On Transitioning from Stop-Gap to Long-Term

A goal is to ‘get it right’ in the stream channel.

The challenge in ‘getting it right’ is to move from stop-gap remediation of problems to long-term restoration of a properly functioning creekshed.

Flowing from Living Water Smart, three landmark provincial initiatives came to fruition in 2014. They are game-changers.

Together they provide a platform for integrated and coordinated actions.



A Closing Perspective

The provincial government has long recognized that communities are in the best position to develop solutions which meet their own unique needs and local conditions. Thus, British Columbia's regulatory environment for urban creekshed protection is outcome-based and relies on collaborative processes to implement changes in practice.

The legacy of *Living Water Smart* is a provincial policy, program and regulatory framework that recognizes the connections between land and water – because what happens on the land matters.

Commitment and Perseverance: British Columbia is at a tipping point. Will local governments bridge the gap between policy and new standards of practice, **reconnect hydrology and ecology**, create greener communities, and adapt to climate change?

The Town of Comox experience shows what is possible when a local government has a strong working relationship with the stewardship sector, and **leads by example**. It is for this reason that the Partnership describes Comox as a **beacon of hope**. By taking action to reconnect hydrology and ecology, the Town is moving along a pathway that ultimately leads to a water-resilient future where flood and drought risks would be reduced, and ecological services would be sustained.

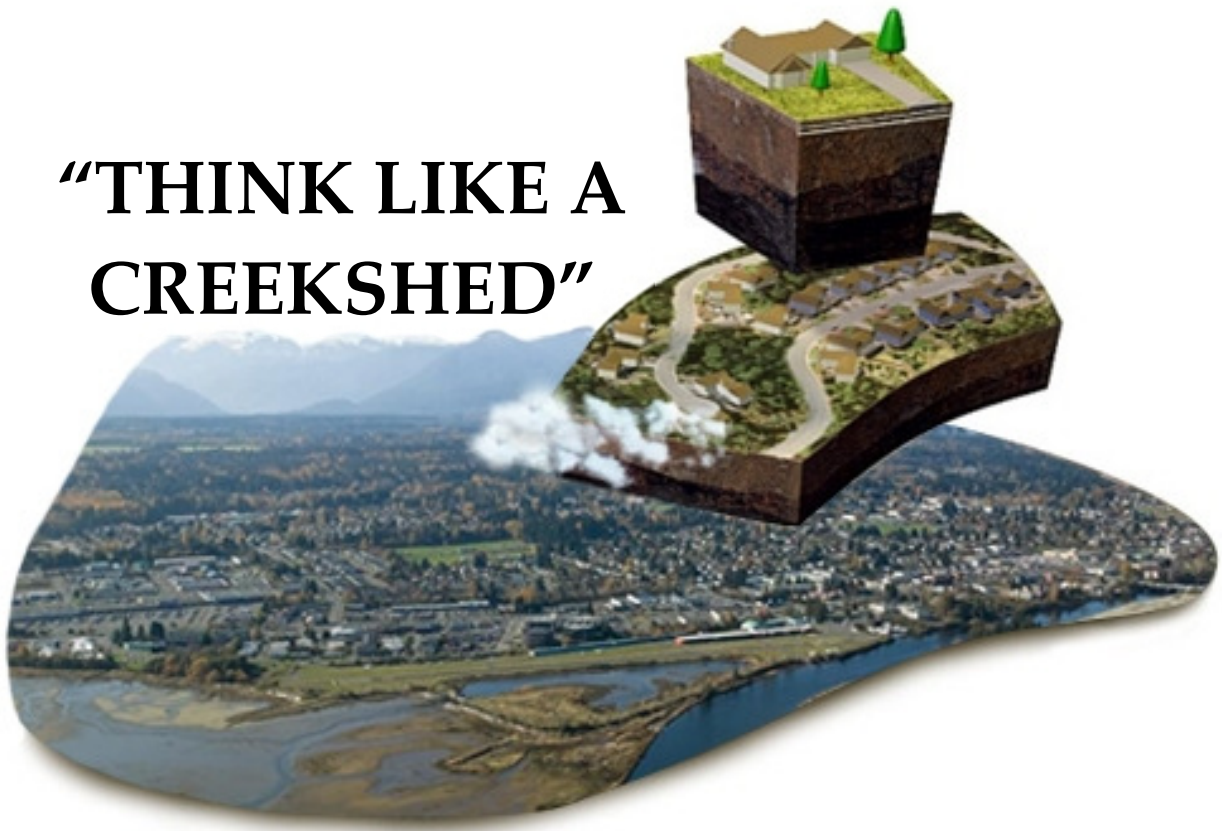
Adapting land use, infrastructure servicing and asset management practices to sustain and enhance ecological (water balance) services requires perseverance by a committed local government staff.

Community Benefits: Implementation of a whole-system, water balance approach, founded on the twin pillars of the Water Balance Methodology and EAP, would result in these desired outcomes:

- **ENHANCE** the natural commons to create high value public assets;
- **AVOID** an unfunded liability (by limiting stream erosion, preventing flooding, improving water quality);
- **ADAPT** to a changing climate; and
- **REDUCE** life-cycle costs for drainage infrastructure.

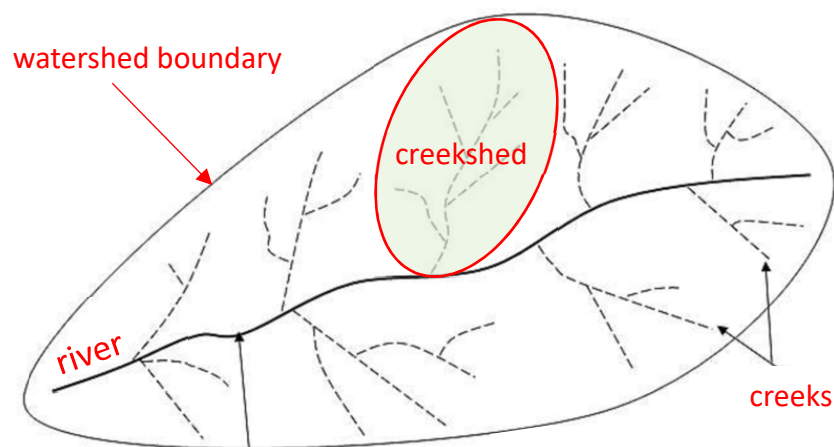
Reconnecting hydrology and ecology, and adapting to the province's 'new reality' (*warmer, wetter winters and longer, drier summers*) depends upon 'top-down & bottom-up' processes that align and accelerate implementation of reinforcing provincial, regional and local actions to improve where we live.

“THINK LIKE A CREEKSHED”



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**.





the partnership
for water sustainability in bc