

Integrating the Site with the Watershed and the Stream

Primer for Integrated Rainwater and Groundwater Management

2. Connect Water, Land and People

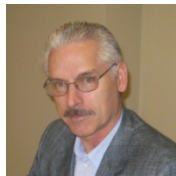
BC local government is among the most autonomous in Canada, and BC is perhaps the least prescriptive province. Historically, the Province has enabled local government by providing policy and legal tools in response to requests from local government. Local government can choose to act, or not.

In general, the enabling approach means the onus is on local government to take the initiative. The Province recognizes that communities are in the best position to develop solutions which meet their own unique needs and local conditions.

Regional Team Approach

“BC’s enabling philosophy has become a driver for a regional team approach (see Figure 3) to implementing a new culture for urban watershed protection and restoration in BC,” reports Tim Pringle, President of the *Partnership for Water Sustainability in BC*.

“We are observing that the term ‘regional team approach’ is resonating. Insertion of the word **team** in ‘regional approach’ has had a profound impact on how practitioners view their world. Team implies there is personal commitment; it also suggests there is a game plan and a coachable context. The regional team approach is proving to be a powerful motivator.”



“We are also observing that major breakthroughs happen when decision makers in government work with grass-roots visionaries in the community to create the future desired by all. Collaboration grows from a shared vision about the future and the commitment to action. The regional team brings the players together to implement a top-down and bottom-up approach,” adds Eric Bonham, a founding member of the *CAVI-Convening for Action on Vancouver Island* initiative, and a former Director in the Ministries of Environment and Municipal Affairs.



Living Water Smart, BC’s Water Plan

Released in June 2008, Living Water Smart presents government’s vision for sustainable land and water stewardship. The Green Communities Initiative complements Living Water Smart and comprises plans, strategies and enabling tools to achieve the land and water stewardship vision. Together, the two initiatives represent a call to action. Together, they provide the provincial context for a regional team approach.

The 45 actions and targets in Living Water Smart establish expectations vis-à-vis how land will be developed (or redeveloped) and water will be used.

Share a Vision, Create a Legacy: “The ultimate goal of the Living Water Smart and Green Communities initiatives is to establish expectations that, in turn, will influence the form and function of the built environment. If land and water practitioners are then successful in bringing a ‘water for life and livelihoods’ vision to fruition by embracing *shared responsibility*, this will create a legacy for those who follow in our footsteps,” states Lynn Kriwoken, a Director in the Ministry of Environment and the Province’s lead person for development and delivery of Living Water Smart.



Collaborate and Make Green Choices: “At the end of the day, planners and engineers and other disciplines must come together to determine the issues and solutions. While legislative reform is a foundation piece, collaboration takes place outside the legislative framework.”

“This is why we constantly emphasize that 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.”

“Our immediate objective is to encourage ‘green choices’ that will flow through time, and will be cumulative in creating liveable communities, reducing wasteful water use, and protecting stream health,” concludes Lynn Kriwoken.

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Source: Water Sustainability Action Plan for British Columbia

Figure 3

Regional Team Approach

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Living Water Smart Actions & Targets

Three actions / targets in particular serve to establish expectations vis-à-vis how land will be developed and water will be used. A desired outcome is to reduce the **'water footprint'** of BC communities. The three actions / targets are listed below; they are also cross-referenced to the three subject areas and page numbers in the Living Water Smart vision document:

- **Doing Business Differently:** *"By 2012, 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"* (page 43)
- **Preparing Communities for Change:** *"By 2012, new approaches to water management will address the impacts from a changing water cycle, increased drought and risk, and other impacts on water caused by climate change"* (page 61)
- **Choosing To Be Water Smart:** *"By 2020, 50% of new municipal water needs will be acquired through conservation"* (page 75)

The stream health target on p 43 is the lynch-pin for a collaborative and consistent approach that aligns local government policies and actions with provincial and regional goals.

Web-Accessible Tools: "To make it possible to achieve Living Water Smart targets and actions, the Province has developed a suite of tools in partnership with local government," reports Ted van der Gulik, the Senior Engineer in the Ministry of Agriculture, and Chair of the inter-governmental Water Balance Model Partnership.



"These tools are all web-based and are intended to support new approaches to water management. They can be applied on-the-ground by land and water practitioners. Our vision is that they will collectively facilitate informed decision-making with respect to climate change adaptation and stream health."

Why Protect Stream Health

In BC, headwater tributary streams are a predominant feature; and watershed health is very much about protection of aquatic habitat. The critical issue is the damage to and loss of habitat caused by land use change and resulting erosion of the headwater streams.

Figure 4 illustrates typical land development; and can represent either a problem or an opportunity.

Impact of the Salmon Crisis: Looking back, the salmon crisis of the 1990s was the catalyst for action. The salmon is an icon. It is also the early warning system that there is a problem. Coastal salmon runs such as Coho, chum and pink spawn and rear in the headwater streams which are typically small. A generation ago, the ecosystem value of headwater streams was not fully appreciated. The result: streams were being lost as a consequence of rapid population growth and land development.

The lack of understanding and respect contributed to the decline of many wild salmon populations. And so the goal of protecting stream health became a driver for action in BC.

Science-Based Understanding Informs Policy and Practice: By 2002, as an implementation action resulting from enactment of the Fish Protection Act (1997), the Province released *Stormwater Planning: A Guidebook for British Columbia*. The Guidebook was a joint effort of Environment Canada and two Ministries – Environment and Municipal Affairs. The process produced a science-based framework to guide development of the rainwater (stormwater) component of Liquid Waste Management Plans.

The core premise of the Guidebook is that land development and watershed protection can be compatible. This also suggests that urban watershed restoration is achievable over time. The Guidebook signified a paradigm-shift. This resulted from recognition of HOW a science-based understanding could bridge the gap between high-level policy objectives and site design practices.

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Stream health depends on
ALL properties in a watershed



If we reduce our 'water footprint', and if we ensure the integrity of groundwater flow, we can then protect stream health

Source: Water Sustainability Action Plan for British Columbia

Figure 4

Why Protect Stream Health

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Designing with Nature in BC

The *Partnership for Water Sustainability in BC* is helping the Province implement the Living Water Smart and Green Communities initiatives. This is being accomplished through shared responsibility in delivering the *Water Sustainability Action Plan*.

Released in 2004, the Action Plan provides a partnership umbrella for on-the-ground initiatives that advance a *design with nature* way-of-thinking and acting. The phrase is borrowed from the title of a seminal book by the late Ian McHarg, internationally renowned landscape architect and writer on regional planning using natural systems.

Figure 5 identifies the objectives and desired outcomes that brand 'designing with nature'.

Legislative Authority for Integrated Approach: "The Living Water Smart and Green Communities initiatives are catalysts for 'designing with nature':



Start with effective green infrastructure and protect environmental values. Get the watershed vision right. Then create a blueprint to implement green infrastructure," states Glen Brown, the Executive Director of the Province's Local Government Infrastructure and Finance Division and the Deputy Inspector of Municipalities.

"The legislative authority for integration of land use planning and asset management, including financial management, already exists. Local governments can develop a truly integrated Asset Management Strategy that views the watershed through an environmental lens."

Climate Change Adaptation: "Designing with nature captures the essence of climate change adaptation. Adaptation is about responding to the changes that will inevitably occur. Adaptation is at the community level and is therefore about collaboration," adds Raymond Fung, Director of Engineering and Transportation with the District of West Vancouver, and Chair of the Green Infrastructure Partnership.



Get the Watershed Vision Right

The *Inter-Regional Education Initiative* is linking activities in and between four regions so that everyone can benefit from lessons learned. Collaboration between local governments and the stewardship sector has emerged as a critical success factor in "getting the watershed vision right".

Four Regions are Leading by Example: These 'top-down and bottom-up' initiatives demonstrate what can be accomplished by embracing the 'regional team approach':

- **In the Comox Valley:** The *Comox Valley Land Trust* created the vision for *Nature Without Borders*; and this vision is influencing the actions of local government.
- **In the Nanaimo Region:** The champion for undertaking a precedent-setting approach to groundwater research and application in the Englishman River is the *Mid Vancouver Island Habitat Enhancement Society*.
- **In the Cowichan Valley:** The *Cowichan Watershed Board* is the vehicle for bringing together people in order to advance stewardship action.
- **In the Capital Region:** The *Bowker Creek Blueprint* is a 100-Year Action Plan to guide watershed and creek corridor restoration as neighbourhoods redevelop in the urban core of three municipalities.

Looking ahead, Section 5 elaborates on the significance and value of the Englishman River groundwater research, within the City of Parksville and beyond.



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Collaboration, a 'Design with Nature' approach, and re-use of resources are keys to mitigation of unfunded infrastructure liability and adaptation to climate change

To achieve higher levels of stream, wetland and marine environment protection:

- Protect and restore urban 'green' space
- Strive for a lighter 'water footprint'
- Re-use and recycle water, energy & nutrients from liquid wastes
- Develop compact, complete communities



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Source: Water Sustainability Action Plan for British Columbia

Figure 5

'Design with Nature' - Objectives and Outcomes

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Living Rivers Initiatives in the Englishman River Watershed

The Englishman River Watershed is a case study demonstration application of what it means to connect water, land and people.

Geographic Context: The Englishman River is located on the mid-east coast of Vancouver Island at Parksville and drains an area of approximately 324 km² (Figure 6). The river's headwaters arise on the eastern slope of Mt. Arrowsmith and Mount Moriarty Ridge and flow easterly for 40km, entering the Strait of Georgia just north of Rath Trevor Beach Provincial Park. The Englishman is a community watershed, with a headwater storage dam on Arrowsmith Lake and water intake and treatment facilities in the City of Parksville, licenced by the Arrowsmith Water Service (AWS).

Land Use: The majority of the Englishman watershed is privately-owned forest lands held by Island Timberlands Limited Partnership and TimberWest Forest Corp. The lower half of the watershed (i.e., downstream of Englishman River Falls Provincial Park) is a mix of protected areas, forestry, agriculture and rural/urban residential areas, with the greatest population (12,000) within the City of Parksville's urban containment boundary.

Fish and Water Sustainability Projects: In 2006, the BC Conservation Foundation (BCCF) received approval from the Living Rivers Trust Fund Advisory Group for a multi-year *Living Rivers – Georgia Basin/Vancouver Island* business plan that focuses on fish and water sustainability projects in high priority Georgia Basin and Vancouver Island watersheds.

Investments from this program in the Englishman Watershed have been substantial to date, including construction of log jam fish rearing structures; side-channel improvements; fish abundance and stream flow monitoring; headwater lake storage feasibility; estuary biophysical inventory and restoration planning; public education about the value of water conservation; and, applied groundwater research.

BC Regional Adaptation Collaborative: In 2009, Natural Resources Canada provided BCCF with multi-year funding for the *Englishman River RAC Case Study* so that BCCF could complete:

1. a water balance study for the watershed;
2. engineering feasibility studies for a proposed Shelton Lake (South Englishman River sub-basin) storage dam; and,
3. a watershed management plan (incorporating climate change adaptation).

"In place of a formal Englishman Watershed Management Plan, however, the *2012 Official Community Plan Review* being undertaken by the City of Parksville opened the door to develop a Primer that will advance *water-centric thinking* in the mid-Island region," reports Craig Wightman, BCCF Senior Fisheries Biologist.



"In addition to informing the Parksville OCP, the Primer will inform the Nanaimo Regional District's *Drinking Water & Watershed Protection Plan*. Our objectives are to assist City and regional staff with incorporation of new scientific knowledge extending surface water hydrology and the health of aquatic ecosystems to inter-connected groundwater resources, a breakthrough recently documented by Dr. Gilles Wendling in his pioneering study of the lower Englishman's aquifer formations.

"By adopting a more holistic urban planning model, one which recognizes that healthy streams and groundwater are inextricably linked and valuable, the City of Parksville can assume a leadership role as it strives for a sustainable future. In practical terms, this means that strong principles of water stewardship will influence the community's growth and development, with enhanced protection of all water sources an overarching goal."

"In so doing, Parksville can ensure improved drought security and natural flood control in the face of climate change, as well as enhanced water quality in support of the native salmon, wildlife and recreational assets valued by so many of its citizens," concludes Craig Wightman.

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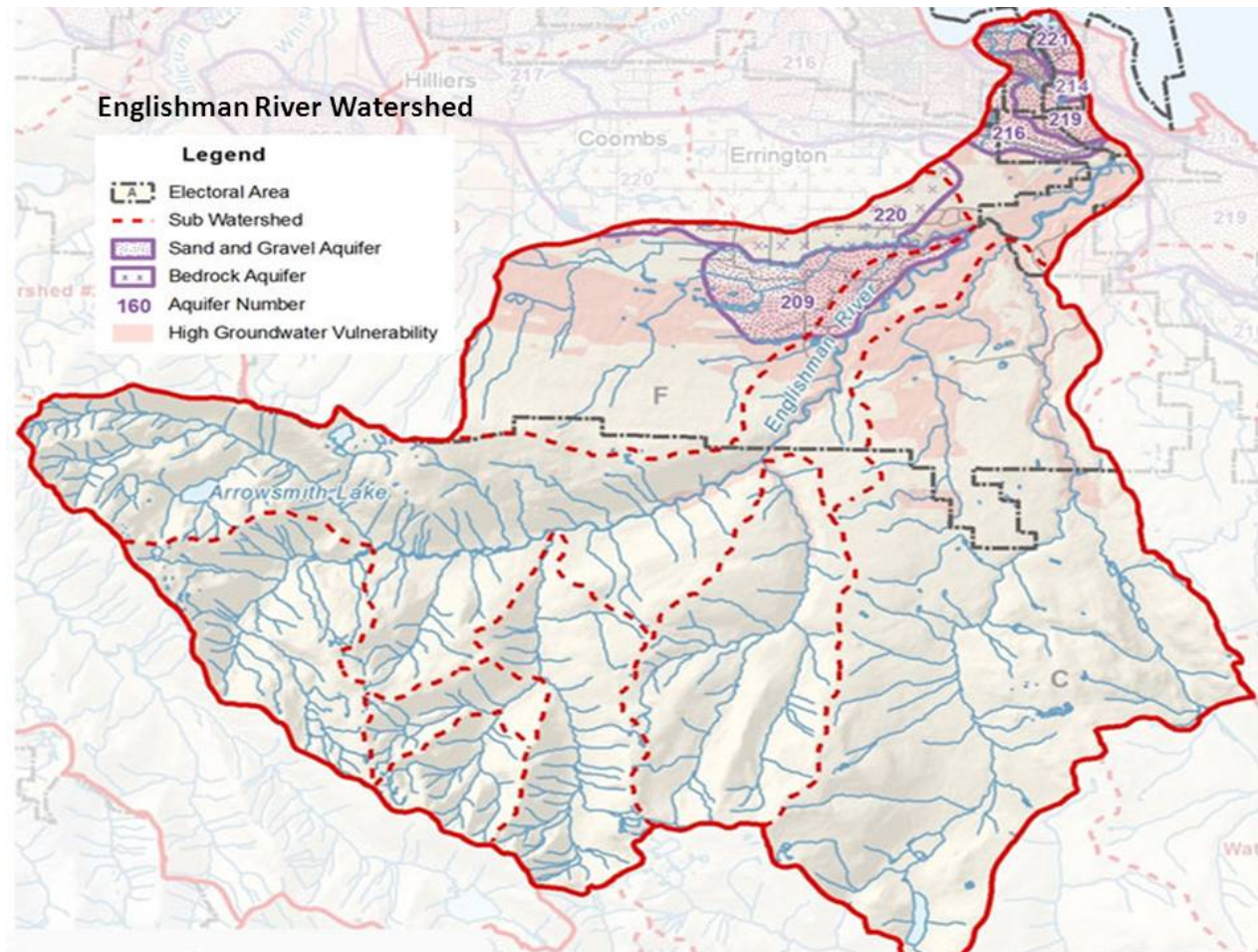


Figure 6

Englishman River Watershed

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Guiding Principles

The core concepts introduced in preceding pages provide the philosophical foundation for an integrated approach to use and conservation of land and water. Next, these core concepts are synthesized into a set of guiding principles.

Connecting Water, Land and People: Lessons learned by those who are leading change can help those who want to move to a design with nature strategy. Guiding principles are:

1. Choose to be enabled.
2. Establish high expectations.
3. Embrace a shared vision.
4. Collaborate as a 'regional team'.
5. Align and integrate efforts.
6. Celebrate innovation.
7. Connect with community advocates.
8. Develop local government talent (i.e. *Inter-Regional Education Initiative*)
9. Promote shared responsibility.
10. Change the land ethic for the better.

Systemic change is possible, even in the complicated sphere of planning for use and conservation of land. It requires understanding and pursuit of holistic outcomes.

Connecting Natural and Built Environments:

An integrated approach recognizes that land use changes outside a stream corridor result in changes within the corridor. The impact of land development in changing both rainwater runoff quantity and quality can trigger progressive loss of biodiversity and abundance of aquatic species within the corridor.

Integrated, or watershed-based, rainwater management recognizes the relationships between the natural environment and the built environment, and manages them as integrated components of the same watershed. These relationships are illustrated in Figure 7.

Creating Change on the Ground: Practical research and new tools are now enabling engineers, planners and other disciplines to do business differently. Case study experience demonstrates that creating change on the ground revolves around four basic ingredients:

1. Start with a unifying concept that makes sense (e.g. 'design with nature' goal);
2. Develop a science-based and pragmatic methodology for undertaking technical analyses (e.g. mimic water balance);
3. Create a web-based calculation tool that has a user-friendly interface and is accessible to anyone (e.g. *Water Balance Model*); and
4. Implement a multi-audience outreach and professional development program that is defined by consistent messaging.

The practitioner and community culture in BC is changing as an outcome of collaboration, partnerships and alignment. Changing the culture requires a process. This takes time to complete. There is no short-cut.

Integrated Rainwater Management: In the past, drainage practices concentrated on peak flow rates and overlooked the importance of volume management. Integrated solutions manage both volume and flow rates.

Next, the spotlight shifts to the science behind an integrated and holistic approach to rainwater and groundwater management:

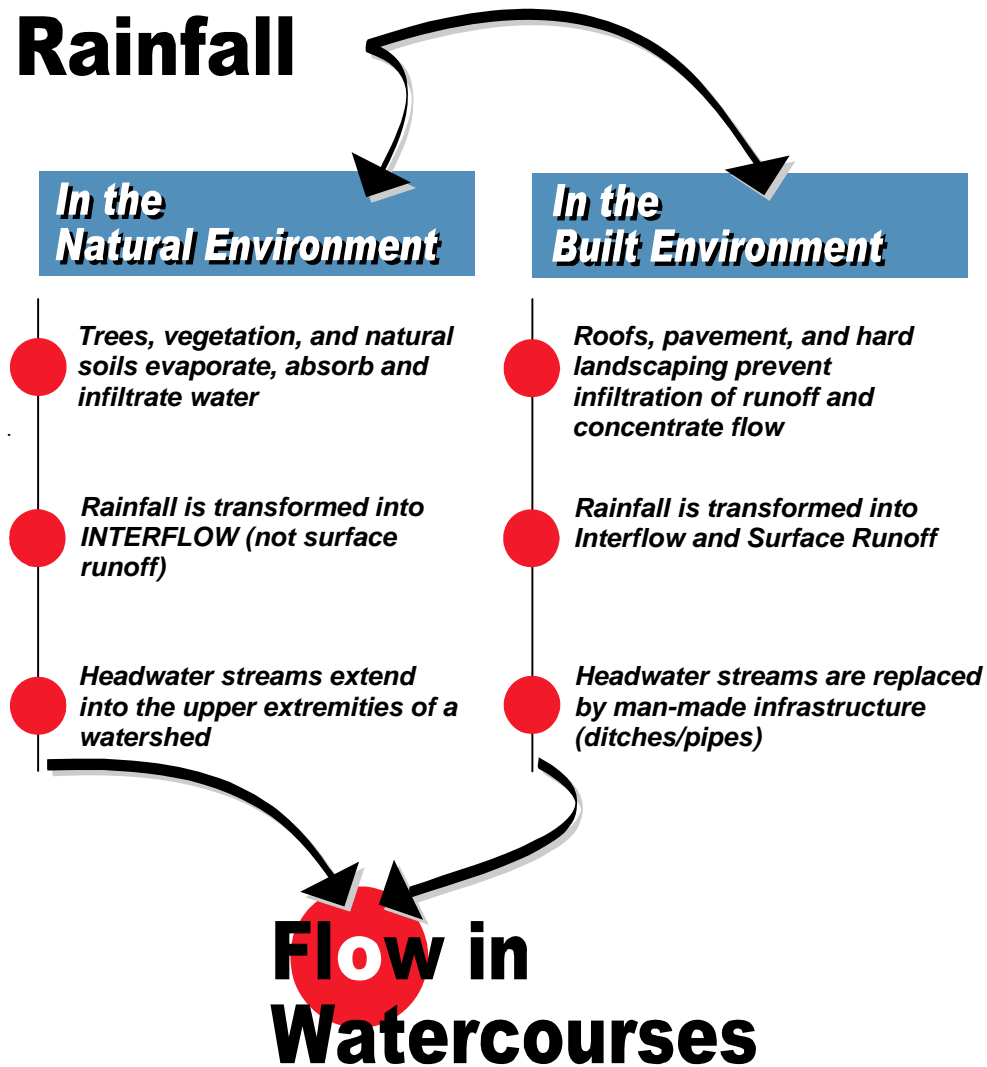
- First, Section 3 introduces the Water Balance Methodology that underpins an understanding of how to protect stream health.
- Then, Section 4 explains how 'changes in hydrology' impact on diversity and abundance of the fisheries resource.
- After that, Section 5 synthesizes what is important to know about the Englishman River groundwater demonstration project.
- Finally, Section 6 provides guidance so that local government can move from awareness to implementation.

Looking ahead, the next four sections provide the foundation for an approach keyed to establishing watershed-specific performance targets.

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Rainfall



Source: Chapter 3, *Stormwater Planning: A Guidebook for British Columbia*, 2002

Figure 7

Desired Outcome: Manage Natural Environment and Built Environment as Integrated Components of a Healthy Watershed