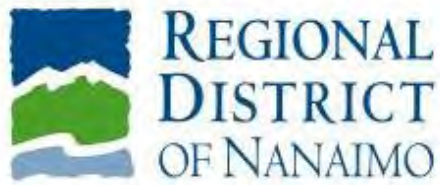


Regional District of Nanaimo
Drinking Water & Watershed Protection Program:
10 Year Action Plan Implementation Review

September 2018

Prepared for



Prepared by



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Executive Summary

The Regional District of Nanaimo (RDN) began implementing of the Drinking Water and Watershed Protection Program in 2009. Since then, the organization and its partners have made tremendous strides towards fulfilling the initiatives' objectives.

The purpose of this report is to inventory these many successes, as well as some of the challenges the program has faced over the past decade. It considers actions laid out in the 2007 *Drinking Water and Watershed Protection Action Plan* and takes stock of what has been completed, initiated or advanced, and what has not. Along the way, it identifies what partnerships and resources have made implementation possible. Where appropriate, the report also identifies opportunities that could be addressed in a planned update to the *Action Plan*, scheduled for 2019.

The review commenced in the last week of June 2018. We gathered data through: a number of meetings and discussions with program staff, a literature review, in-depth interviews with key staff and stakeholders and two workshops.

Overview of the Drinking Water and Watershed Protection Program

In 2007, the Drinking Water-Watershed Protection Stewardship Committee, a stakeholder advisory group, oversaw preparation of the *Drinking Water and Watershed Protection Action Plan*. This seminal document laid out the parameters of implementation that continue through to today. This *Action Plan* was adopted by the RDN Board in 2008. Implementation commenced in 2009 following a referendum of electoral area residents that approved creation of a new service and cost recovery through a parcel tax.

Drinking Water and Watershed Protection is functionally administered by RDN's Regional and Community Utilities Division, although several other departments are also involved. The RDN Board is ultimately responsible for program governance. However, the Board is supported by a Technical Advisory Committee that advises on implementation. By 2012, local municipalities across the region had successively signed on to participate. This included financial support. The City of Nanaimo, District of Lantzville, City of Parksville, and Town of Qualicum Beach are now active partners. Their residents enjoy the same access to program benefits as residents in electoral areas.

Success of the Drinking Water and Watershed Protection Program is due in great part to the contributions of partners in government, industry and not-for-profit sectors. The criticality of these partnerships was emphasized again and again by the people we interviewed. Other agencies and stakeholder groups contribute in many ways, including direct funding, in-kind staff effort, providing pools of volunteers for watershed monitoring, and offering low or no-cost specialized expertise.

In broad terms, implementation has been characterized by numerous major accomplishments. RDN has generally proceeded from an initial focus on education and outreach, moving on to increasing effort in water science and data collection. More recently, attention has shifted more towards policy and planning and to refining science processes and data management.

Program Review

Our program review is categorized under the following three themes:

1. water science: data collection & monitoring;
2. water education & outreach; and,
3. water policy advocacy & planning support.

Water Science: Data Collection & Monitoring

The starting goal for the water science theme was to improve information about the region's water resources in support of better land use decisions and public understanding (Lanarc, 2007). Key objectives include compiling and mapping existing information, improving stream monitoring systems, improving groundwater monitoring, and making information readily available and understandable to decision-makers.

Major accomplishments over the past decade include the following:

- ✓ many data gaps have been filled;
- ✓ vulnerable water sources and systems have been prioritized; and,
- ✓ data has been acquired and interpreted robustly and resourcefully.

Key challenges going forward include the following:

- there are opportunities to improve data management; and,
- in the future, further attention will need to be devoted to operationalizing data for purposes of informing land use planning and policy decisions.

Our investigation left us with **little doubt that, directly as a result of the program's work**, there is already a much better understanding of aquifers and streams in the region than elsewhere on Vancouver Island or much of the province. There are also indicators that this is already leading **to more informed decision making in areas of RDN's jurisdiction and the decisions of other authorities**. Going forward, with the more refined data collection that is already underway and greater attention to operationalizing it, work under this theme has a very promising future.

Water Education & Outreach

The central goals for the education and outreach theme are: 1) to promote awareness and stewardship of the watersheds and drinking water resources in the Region; and, 2) to promote efficient water use in all sectors (Lanarc, 2007). Related objectives include improving public awareness of where water comes from and why it is important to protect watersheds, changing water consumption patterns, and improving coordination among other stakeholders who also provide information.

Major accomplishments over the past decade include the following:

- ✓ the program has created and disseminated an impressive array of water conservation and sustainability resources;

- ✓ there has been innovation in developing unique and regionally relevant education programs; and,
- ✓ partnerships for regional service delivery have been highly successful.

Cumulatively, these accomplishments and other program efforts have contributed to a 31% reduction in per capita water consumption in RDN between 2004 and 2017.

Key challenges going forward include the following:

- outreach campaigns are often highly information intensive;
- it may be time for a review of program branding and collateral;
- new effort in market research with residents and further program evaluation is recommended; and,
- by learning from programs in leading jurisdictions in North America, there are opportunities for further innovation in how demand management programs are delivered.

RDN's water education and outreach efforts are highly valued by stakeholders. In comparison with many similar British Columbian and Canadian communities we have assisted, this body of work is exemplary. Since the inception of the program, momentum has continued to build. With continuing effort, the Regional District has an opportunity to entrench a position as a provincial and even national leader in this space.

Water Policy Advocacy & Planning Support

Key goals under the policy advocacy and planning support theme are: 1) to use the information gathered through the water science program to protect watersheds and water resources in land use planning and development decisions; and, 2) to prioritize and protect watersheds according to their ecological and drinking water values (Lanarc, 2007).

Major accomplishments over the past decade include the following:

- ✓ a foundation has been laid for future success; and,
- ✓ there have been a number of specific successes in land use planning and informing policy.

Key challenges going forward include the following:

- land use and watershed planning objectives set out in the 2007 *Action Plan* have not yet been fully realized.

Attention to policy advocacy and planning support will no doubt remain a key focus in the future. The science-based approach of the program, the fact that it brings together multiple agencies, and the foundation built on data and information and public support lead us to believe that the true potential of the program in this area is yet to be seen.

Other Observations

Our research uncovered several other observations about the impact of the Drinking Water and Watershed Protection Program that merit brief attention.

First, we see opportunities to more actively engage with First Nations on a government-to-government basis to identify how they would like to participate in implementation in the future.

Second, it is important to recognize that there are key intersections with other RDN programs, most notably Liquid Waste Management Plan implementation and Emergency Services. As such, the program supports not just enhanced drinking water and watershed protection, but also other environmental and community sustainability goals.

Third, we noted some opportunities to improve organizational coordination on watershed protection. For example, this might include more use of interdepartmental working groups and temporary staff cross-appointments. This may be a concept for further consideration in the next operational period.

Finally, a number of informants told us that they believe more effort needs to be invested in communicating the value of the program more broadly, to stakeholders, elected officials and the public. **The program does a very good job of explaining the “what” (what kind of toilet should I buy? what is the water quality situation in the stream? what should I do about my well?). Going forward, we suggest much more effort should go into explaining the “why” (why should I care about watershed protection? why do particular development patterns need to change? why does the parcel tax represent outstanding value?).**

Conclusion

While we have identified a number of opportunities for the next operational period, it must be restated in summation that the work of the program to date has been nothing less than remarkable and highly successful. We see at least three key contributing factors.

- First, the vital importance of partnerships with other agencies, industry and the not-for-profit sector needs to be reemphasized. The program offers a necessary point of connection for different groups and agencies around the region and the collaboration it facilitates was cited by many as absolutely key to success.
- Second, the importance of the sustainable funding model for watershed protection, in the form of **RDN’s** annual parcel tax, also needs to be stressed. While the budget demand is actually relatively modest, RDN staff do very well with what they have. In fact, they are able to leverage this to attain significant additional funding and volunteer efforts to support watershed protection.
- Finally, the unique nature of this initiative compared to similar ones elsewhere in the Province must be underscored. To the best of our knowledge, no other regional district has a watershed protection function with taxation authority comparable in scope or longevity, putting RDN very far ahead of other communities. Other jurisdictions look to RDN as a model and remark on the success.

In closing, despite the challenges we have outlined, like every one of the informants we spoke to during the review, we see great prospects for the Drinking Water and Watershed Protection Program. There is clear and strong support for this initiative both inside and outside the organization, support that has been well maintained for a decade. The foundation is laid for very bright future in the next operational period.

1.0 Introduction

The Regional District of Nanaimo (RDN) began implementing the Drinking Water and Watershed Protection Program in 2009. Since then, the organization and its partners have made tremendous strides towards fulfilling **the initiatives'** objectives, which include water resource awareness and public education, monitoring and science, and policy and planning support.

The purpose of this report is to inventory these many successes, as well as some of the challenges the program has faced over the past decade. It considers actions laid out in the 2007 *Drinking Water and Watershed Protection Action Plan* and takes stock of what has been completed, initiated or advanced, and what has not. Along the way, it identifies what partnerships and resources have made implementation possible. Where appropriate, the report also identifies opportunities that could be addressed in a planned update to the *Action Plan*, scheduled for 2019.

Econics is a Victoria-based firm that specializes in supporting governments' **work to sustain** water systems and the communities that depend on them. We were selected to complete this review through a competitive procurement process based on our experience with similar programs across Canada and previous water protection and conservation program evaluation projects.

Following this introduction, the report has four main sections, as follows:

- Section 2 sets out the research methodology used to complete this work;
- Section 3 provides a broad overview of the Drinking Water and Watershed Protection Program including history, budget and governance;
- Section 4 provides our review of the program, organized around four general themes: water education & outreach; water science: data collection & monitoring; water policy advocacy & planning support; and, other observations;
- Section 5 provides a summary and recommendations.

1.1 Limitations

The reader should be aware of several limitations. First, due to scope constraints our work is not intended to be a formal audit of the Drinking Water and Watershed Protection Program. Rather, it is a general review informed by interactions with a group of key stakeholders and examination of resources largely directed to us by RDN staff. Despite this, we are confident the report provides an objective and well-informed assessment of implementation to date.

Second, the summary in the body of the report focuses on program highlights - major achievements and identified challenges. It should be noted that a great deal of work has been completed over the past ten years by RDN staff and partners, far more than what can be detailed here.

Finally, while the report does identify key gaps and opportunities that could be addressed in the next operational period, this is not the primary goal. Rather, the focus of this project is primarily retrospective rather than forward looking. That is, it is concerned with assessing implementation to date. It is intended to support the pending 2019 *Action Plan* update, rather than prejudging or dictating its direction.

2.0 Project Methodology

The review kicked-off in the last week of June 2018. In July and August, we gathered data through: a number of meetings and discussions with program staff, a literature review, in-depth interviews with key staff and stakeholders and two workshops. Descriptions of these steps are provided in this section.

2.1 Literature Review

We reviewed several dozen documents directed to us by RDN program staff. These included: Board reports and budget memos spanning the past decade; business plans; presentations; educational collateral prepared under the Team WaterSmart brand; several key technical reports completed by consultants; and, various other miscellaneous documents. A bibliography of literature reviewed is included in Appendix 1. This literature review provided context for the program review and served as a source of information referenced throughout this report.

2.2 Stakeholder Interviews

The methodology for the interview portion of the research started with RDN staff identifying and contacting candidates. These people included both RDN staff and external stakeholders from the Provincial Government, industry, academia, member municipalities, and water stewardship groups, all of whom are heavily involved in program implementation or oversight. Interview appointments were booked ahead of time, generally a week in advance. The interviewee was sent a copy of a project overview and discussion guide (found in Appendix 2) in advance via email. In total, ten interviews were conducted involving 13 informants (one session included three people). Six were conducted by phone and four were conducted in person in Nanaimo. Interviews were semi-structured in nature, typically lasting about an hour. They generally followed the questions set out in the discussion guide, but the interviewer was free to follow new topics in the context of the discussion. Afterwards, a copy of our notes was sent to each informant for validation. Some individuals provided additional feedback, which was incorporated into revisions. A list of interviewees can be found in Appendix 3.

2.3 Workshops

Two workshops were held to engage with individuals involved in program implementation. The first was held on 16 July 2018 and included nine RDN staff members employed in Long Range Planning, Geographic Information System Support, Regional and Community Utilities, and Drinking Water and Watershed Protection. The second was held on 26 July and included 16 people including select members of the stakeholder Technical Advisory Committee and some additional RDN staff. Formats for the events were similar. **Both were held at RDN's** offices in Nanaimo over a single afternoon. They started with an overview presentation by **RDN's** Program Coordinator and then moved into plenary and breakout group discussions. Both were actively facilitated by Econics staff. Sessions were designed to elicit feedback on successes and challenges. Information was collected in several formats including notetaking, template worksheets, and flipcharts. This information was subsequently digitized, compiled, and analyzed to inform the evaluation in this report. Workshop agendas and attendee lists can be found in Appendix 4.

3.0 Overview of the Drinking Water and Watershed Protection Program

This section provides a broad overview of the program, including historical milestones, governance, funding and partners. The intent is to provide background for the reader less informed about program administration and implementation.

3.1 Program Inception

The genesis of the program dates back to the early 2000s when a series of reports and discussions led to the creation of the Drinking Water-Watershed Protection Stewardship Committee, a stakeholder group with broad representation of organizations and sectors with an interest in water sustainability in the RDN. This committee oversaw preparation of the *Drinking Water and Watershed Protection Action Plan* by Lanarc consultants, completed in October 2007. This seminal document laid out the parameters of implementation that continue through to today. The *Action Plan* was adopted by the RDN Board in 2008 with direction to hold a referendum for service area establishment across all electoral areas. Following many public meetings by staff with community groups and other efforts to build support, in 2008, regional district residents approved creation of a new service and cost recovery through a parcel tax. Drinking Water and Watershed Protection was established as a regional service by RDN Bylaw 1556-0 in 2008,¹ and implementation commenced in 2009 with these objectives:

- increase water efficiency in our communities to avoid the costs of expanding water supply infrastructure;
- track local water resources to ensure adequate water supply now and in the future;
- enable better water management and land use decisions, to protect property values and ecological values in the region.

3.2 Program Geographic Scope

The geographic scope of the program encompasses the entire RDN municipal boundary including all electoral areas and, since 2012, all four local municipalities. For example, benefits such as rebates are offered to all region residents. Implementation of science and data-related initiatives generally aligns with watershed and aquifer boundaries (see Figure 1). In some cases these boundaries overlap with surrounding regional districts.



Figure 1: RDN Water Regions
Source: RDN website

¹ Copies of this bylaw and subsequent amendments can be found at <https://www.rdn.bc.ca/action-plan>.

3.3 Program Administration and Governance

Drinking Water and Watershed Protection **is functionally administered by RDN's Regional and Community Utilities Division**, although several other departments are also involved. The RDN Board is ultimately responsible for program governance. However, the Board is supported by a Technical Advisory Committee that advises on implementation (RDN, 2012a). The Technical Advisory Committee includes 21 members representing a broad range of interests and geographic locations.² Members are selected by the Board either through an application process or by appointment through the member's organization.

By 2012, local municipalities across the region had successively signed on to participate. This included financial support. City of Nanaimo, District of Lantzville, City of Parksville, and Town of Qualicum Beach are now active partners. Their residents enjoy the same access to program benefits as residents in electoral areas. Notably, Team WaterSmart outreach resources and incentives such as rebates are offered to municipal residents and streams in urban areas are monitored through the regional Community Watershed Monitoring Network. Municipalities are involved in governance through staff seats on the Technical Advisory Committee and indirectly through their elected official representation on the RDN Board.

3.4 Program Budget

The 2008 referendum authorized levying up to \$25 per parcel annually. A parcel tax instrument was selected rather than an assessment as this was seen as fairer given that water sustainability impacts residents equally (Donnelly, 2015). However, the actual tax has never exceeded \$10 per parcel. Affordability has been supported by phased in contributions from local municipalities so that, at present, all parcels in the region are taxed equally.

For at least the past five years, the budget has consistently been about \$500,000 annually (\$513,488 was requisitioned in 2018; (RDN, 2017a)). Staffing costs account for a large portion of this, presently including one coordinator and two or three project assistants as well as some management overhead.

It is important to note that this investment enables leveraging significant additional resources that greatly magnify the program impact. This has included cash investments from the Federal Government (through the Geological Survey of Canada), the Provincial Government, private forestry companies and others. As well, the RDN benefits from regular in-kind contributions from these same organizations as well as local not-for-profit organizations, academia and other local interest groups.

² Current TAC membership can be found at <https://www.rdn.bc.ca/action-plan>.

3.5 Program Partners

Success of the Drinking Water and Watershed Protection Program is due in great part to the contributions of partners in government, industry and not-for-profit sectors. The criticality of these partnerships was emphasized again and again by the people we interviewed. Other agencies and stakeholder groups contribute in many ways, including direct funding, in-kind staff effort, providing pools of volunteers for watershed monitoring, and offering low or no-cost specialized expertise. Table 1, below, lists just some of these key partners:

Table 1: Key Partners in Drinking Water and Watershed Protection Implementation

<p>Federal Government</p> <ul style="list-style-type: none"> • Department of Fisheries and Oceans • Geological Survey of Canada <p>Provincial Government</p> <ul style="list-style-type: none"> • Ministry of Environment • Ministry of Forest, Lands, Natural Resource Operations and Rural Development • Ministry of Transportation and Infrastructure <p>First Nations</p> <ul style="list-style-type: none"> • Qualicum First Nation • Snaw-naw-as First Nation • Snuneymuxw Nation • Other First Nations with overlapping traditional territories <p>Local Government</p> <ul style="list-style-type: none"> • City of Nanaimo • District of Lantzville • City of Parksville • Town of Qualicum Beach <p>Academia</p> <ul style="list-style-type: none"> • Vancouver Island University • University of Victoria (POLIS Project) • Simon Fraser University 	<p>Other Agencies</p> <ul style="list-style-type: none"> • Cowichan Valley Regional District • Comox Valley Regional District • Islands Trust • Island Health • Regional Water Purveyors and Improvement Districts • Okanagan Basin Water Board • School Districts 68 and 69 <p>Industry</p> <ul style="list-style-type: none"> • Island Timberlands • TimberWest • Vancouver Island Real Estate Board • Hydrogeologist and hydrologist sector • Water well drilling sector • Irrigation and landscaping sector <p>Not-for-Profit Sector</p> <ul style="list-style-type: none"> • Coastal Water Suppliers Association • Mid Vancouver Island Habitat Enhancement Society • Partnership for Water Sustainability in BC • Nanaimo and Area Land Trust • Over 12 local stewardship and stream keeper groups
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The role of partners in the program will be a recurring theme throughout the remainder of the report. As well, some of the challenges that RDN has had with effective engagement with First Nations remains an issue, which is dealt with specifically in section 4.4 below.

3.6 Program History and Timeline

A more extensive account of events of the past ten years is provided below in section 4.0, where we look at specific achievements and challenges. In broad terms, however, implementation has been characterized by numerous major accomplishments. RDN has generally proceeded from an initial focus on education and outreach, moving on to increasing effort in water science and data collection. More recently, attention has shifted more towards policy and planning and to refining science processes and data management. Table 2 on the following page is a timeline of major occasions, though this is not a comprehensive list of all activities.

Table 2: Drinking Water and Watershed Protection Timeline

2003	- RDN Board identified watershed protection as a priority in <i>2003-2005 Strategic Plan</i>
2006	- Drinking Water-Watershed Protection Stewardship Committee established
2007	- <i>Drinking Water and Watershed Protection Action Plan</i> released (in October)
2008	- Board approves <i>Drinking Water and Watershed Protection Action Plan</i> - Electoral area referendum approved by a narrow margin; elector assent to establish a service and funding mechanism through parcel tax established - RDN Bylaw 1556-0 passed by RDN Board - <i>Innovative Options and Opportunities for Sustainable Water Use</i> report completed
2009	- Drinking Water and Watershed Protection Program implementation commences - Full time coordinator position staffed - Inaugural Technical Advisory Committee held (December) - Toilet rebate program commences
2010	- Team WaterSMART program continues under the new program - First WellSMART workshop - Irrigation Check-up Service first offered - Water Purveyor Working Group established - First submission to the Province's Water Act Modernization consultation process
2011	- Expansion of the BC Observation Well Network commences - <i>South Wellington-Cassidy Groundwater Quality Study</i> completed - Community Watershed Monitoring Network (CWMN) surface water quality sampling program established
2012	- Local municipalities become implementation partners - Phase 1 Water Budget Project commences (in February) - Yellow Point Development Permit Area requirements passed, requiring rainwater harvesting in new development - Rainwater harvesting rebate program commences, offered to all region residents
2013	- Toilet rebate program wraps up after issuing 1532 rebates to residents - Expansion of BC Observation Well Network concludes - Water conservation plans completed in City of Nanaimo and RDN's water service areas - Legislative proposal response to <i>Water Sustainability Act</i> provided to the Province - Phase 1 Water Budget completed; presented to public via series of open houses
2014	- School field trip program commences - Volunteer observation well network first implemented - Wellhead upgrade and well water quality testing rebate programs commence - Agricultural Water Demand Model completed - New Liquid Waste Management Plan adopted, including commitments linking to DWWP rainwater management program
2015	- <i>Climate and Hydrometric Monitoring Network Scoping Study</i> completed (April) - <i>State of our Streams 2015</i> report sent to all electoral area residents - Nanaimo lowlands aquifer characterization completed through GSC funding
2016	- Stewardship group seed funding program commences - Harmonized Watering Restrictions Framework established - <i>Water Monitoring Plan for Nanoose</i> (Electoral Area E) completed
2017	- <i>State of our Aquifers 2017</i> report issued - Irrigation upgrades & soil improvements rebate programs commence - Hydrogeological Assessment for Area H Official Community Plan update completed - Water monitoring network equipment (tool lending) library launched - New GIS Water Map interface launched - RDN becomes referral agency for provincial groundwater licence applications - Major expansion of monitoring in priority locations under Water Budget - Phase 2
2018	- Irrigation Check-up Service impact evaluation completed - Analysis of trends and trajectories from 2013 Water Conservation Plan completed - Surface water quality trend analysis of 2011 to 2017 CWMN data completed

3.7 Program Organization and Categorization

The 2007 *Drinking Water and Watershed Protection Action Plan* was organized around seven program themes with 26 discrete actions. The seven themes are:

1. public awareness and involvement;
2. water resources inventory and monitoring;
3. management of land use and development;
4. watershed management planning;
5. management of water use;
6. management of water quality; and
7. adapting to climate change.

Over the past decade, implementation has remained true to these seven themes, for example by tracking performance against them and reporting to the RDN Board in this structure. Operationally, however, work tends to be organized under a simpler format with three broad categories, as follows:

1. water science: data collection & monitoring;
2. water education & outreach; and,
3. water policy advocacy & planning support.

For convenience, we follow this simpler organization in this remainder of this report. However, Table 3 enables easy mapping back to the original *Action Plan* so the reader can see how progress has been made against the foundational program design.

Table 3: Drinking Water and Watershed Protection Program Organization

RDN Theme	2007 Action Plan Program	2007 Action Plan Actions
Water Education & Outreach	Program 1: Public Awareness and Involvement	1A: The “WaterSmart” Program
		1B: Coordinated Information and Education Resources
		1C: Demonstration Projects
		1D: Support for Volunteers and Non-profit Organizations
	Program 5: Water Use Management	5A: Water Conservation Plans
		5B: Cooperation among Community Water Supply Systems
		5C: Rainwater and Graywater Use
		5D: Incentive Programs
	Program 6: Water Quality Management	6B: Agriculture and Forestry
		6C: Private Water Well Safety
6D: On Site Sewage Disposal		
Water Science: Data Collection & Monitoring	Program 1: Public Awareness and Involvement	1D: Support for Volunteers and Non-profit Organizations
	Program 2: Water Resources Inventory and Monitoring	2A: Compilation and Mapping of Existing Data
		2B: Additional or New Data Collection
		2C: Water Quality Monitoring
		2D: Data Response Systems
	Program 6: Water Quality Management	6A: Contaminant Management
		6C: Private Water Well Safety
	Program 7: Climate Change	7A: Follow the Science
7C: Assessing Local Hydro-climatic Balance		
Water Policy Advocacy & Planning Support	Program 3: Land Planning and Development	3A: Land Development (Engineering) Standards
		3B: Development Application Review
		3C: Development Charges
		3D: Planning Tools
	Program 4: Watershed Management Planning	4A: Watershed Prioritization
		4B: Watershed Management Planning
		4C: Support Local Food Production
	Program 5: Water Use Management	5E: Water Use Regulation
	Program 6: Water Quality Management	6B: Agriculture and Forestry
	Program 7: Climate Change	7B: Land and Water Use Adaptation

4.0 Program Review

This section outlines our findings from the program review based on the methodology set out in section 2.0.

4.1 Water Science: Data Collection & Monitoring

The starting goal for the water science theme was to improve information about the region's water resources in support of better land use decisions and public understanding (Lanarc, 2007). Key objectives included compiling and mapping existing information, improving stream monitoring systems, improving groundwater monitoring, and making information readily available and understandable to decision-makers.

This emphasis on operationalizing information – that is, making it useful for decision making – was prominent in the original *Action Plan* and clearly in the minds of its architects. At the same time, the informants we spoke with for this project repeatedly reminded us that long time frames are required to compile and analyze water quality and quantity data in a robust and scientifically defensible way. This creates a pressure point within the program. On the one hand, the end game for data collection and monitoring is to influence policy and land use. On the other hand, doing so effectively takes many years and is resource intensive. This tension is discussed later in this section.

4.1.1 Relevant Programs and Actions in the 2007 *Action Plan*

Most of the initiatives for this theme sit under Program 2 of the 2007 *Action Plan* (Water Resources Inventory and Monitoring), which recommended the following actions:

- 2A: Compilation and Mapping of Existing Data
- 2B: Additional or New Data Collection
- 2C: Water Quality Monitoring
- 2D: Data Response Systems

Also under this theme are elements of Program 6 (Water Quality Management) and Program 7 (Climate Change), as follows:

- 6A: Contaminant Management
- 6C: Private Water Well Safety
- 7A: Follow the Science
- 7C: Assessing Local Hydro-climatic Balance

As well, as discussed more below, RDN's approach to monitoring leans heavily on contributions from volunteers and non-profit organizations, so an aspect of Program 1 (Public Awareness and Involvement) is also pertinent:

- 1D: Support for Volunteers and Non-profit Organizations

4.1.2 Highlights from the Past Decade

Water data collection and monitoring has been an area of intense effort during the period under review, particularly in the second five years as public education and outreach programs matured, allowing attention and resources to shift. Some key outcomes include the following:

- In 2013, completion of Phase 1 of the Regional Water Budget project provided a preliminary indication of the level of stress on seven water regions and mapped aquifers.³ Phase 2 of this project is now underway, and is resulting in enhanced monitoring and water budget development for priority watersheds (see Piteau Associates, 2016 and Golder Associates, 2016).
- In partnership with local stewardship groups, the Community Watershed Monitoring Network was established in 2011 to sample water quality **across the region's creeks** and streams at over 60 sites.
- A *State of our Streams* publication was distributed to all electoral area residents in 2015, providing a snapshot of streams in the region. This was followed by a *State of our Aquifers* report for residents in 2017, which focused on groundwater resources.
- A *Climate and Hydrometric Monitoring Network Scoping Study* was completed, which identified and prioritized locations and potential partnerships to support additional climate and hydrometric (streamflow) stations around the region (Kerr Wood Leidal, 2015).
- Aquifer and stream monitoring were expanded, including:
 - support for addition of 16 new wells to the BC Observation Well network (managed by the Provincial Government and partly funded by RDN);
 - additional data collection from 34 volunteer observation wells; and,
 - the addition of four new streamflow and two new climate monitoring sites.

4.1.3 Major Accomplishments

This section sets out some of the major accomplishments under the water science theme since 2009.

✓ Many Data Gaps Have Been Filled

Our literature review and consultation activities all point to significant strides towards better monitoring and understanding of local water resources, particularly among decision making agencies, that are directly attributable to the program. This improved understanding encompasses water quality and quantity, and to some extent aquatic ecosystem management.

This is evident with both surface water and groundwater. In the case of surface water, the Province has traditionally focused on monitoring larger systems, such as Englishman River. The addition of new monitoring stations on smaller systems through the program is providing different insights, broader reach, and greater granularity than would otherwise be possible given Provincial Government resource limitations.

Similar is the case of groundwater. The expansion of the Provincial observation well network, supplemented by volunteer monitoring and efforts to map aquifers through the Geological

³ See <http://rdnwaterbudget.ca/>

Survey of Canada (2016) has provided site specific graduations of vulnerability beyond what was previously obtainable.

The impact of this information is experienced in various ways. For example, there is evidence that it is already affecting Provincial water allocation decision making. As an informant from the Province told us, **“at end of the day, we have a much better understanding of the aquifers in the area than we do elsewhere. This is because of the monitoring and work that is taking place sponsored by RDN.”** (Lapcevic, 2018).

RDN is beginning to have enough information at its disposal to see trends, which in turn informs where additional monitoring is required in the future. Results can be used to communicate with senior managers, decision makers and let the Province know what is happening on a regional scale, bringing sharper focus to water issues in the mid-island.

Attendees at the Technical Advisory Committee workshop also stressed that there are still large areas where understanding of water quantity and quality remain very limited and much remains to be done to define aquifer characteristics. However, testimony of numerous interviewees confirms that the region is much further along now than it was before the Drinking Water and Water Protection Program commenced.

- ✓ Vulnerable Water Sources and Systems Have Been Prioritized

Key technical projects carried out over the last ten years have clarified which watersheds and aquifers in the region are most stressed. Enhanced monitoring in these areas has commenced.

This is perhaps most evident in the water budget work that began in 2012. In Phase 1 of this project, the region as a whole was canvassed and a preliminary indication of the level of stress on seven water regions and mapped aquifers was completed. Phase 2, starting after 2013, focuses on introducing enhanced monitoring and refining water budgets for priority watersheds (specifically French Creek, Cedar-Yellowpoint (see Piteau Associates, 2016) and Nanoose (see Golder Associates, 2016). Additional instrumentation went into these areas in 2017, and additional data collection is now underway.

There is also evidence that enhanced monitoring has led to more effective drought response compared to elsewhere on Vancouver Island, particularly in 2015 and 2017 (and, we would expect, 2018). Provincial staff report that supplementary monitoring on smaller systems has provided better information to support water shortage responses under the *BC Drought Response Plan* (Lapcevic, 2018).

Finally, enhanced groundwater monitoring, supported in part by voluntary observation wells and data submission through the well testing rebate program has enabled more detailed aquifer characterization. This in turn is already uncovering areas of vulnerability. Presence of increased nitrates in aquifers in Electoral Area F was cited as one example, which is enabling provincial health authorities to better understand the water quality protection issues they face (Magee, 2018).

- ✓ Data Has Been Acquired and Interpreted Robustly and Resourcefully

Several **aspects of RDN’s approach to** collect data were lauded by observers, particularly the use of **“citizen science” to support** low cost acquisition, combined with reliance on third party experts to aid with analysis.

For example, the use of volunteers to collect surface water quality data through the Community Watershed Monitoring Network has proven cost effective, boosted the capacity of community groups, and fostered positive relationships between members of civil society.

Since 2011, some 13 stewardship groups **have undertaken “boots on the creek” monitoring** efforts in 24 different watersheds (RDN, 2018b). RDN supports this work by providing an equipment library, coordination, relationship brokering between stream keeper groups and the Ministry of Environment and by facilitating transfer of water quality data to appropriate Provincial repositories (i.e., the EMS database). Quality control is maintained by using a general suite of indicators following provincial methods and protocols for water quality sampling. Put succinctly, simple data collection methods are used, making it hard to get it wrong (Law, 2018).

Similarly, enabling private well owners to share water quality testing results through the incentive of rebates has significantly expanded the number of data points to characterize aquifers, again at very low cost.

While data is often collected by volunteers, interpretation is typically left to the experts. RDN has elected to rely on either consultants or senior government staff. For example, water budget work has been carried out by reputable, third party hydrogeologists. Other prominent examples are referenced in section 4.1.2, above (see, for example, Golder Associates, 2016; Piteau Associates, 2016; Kerr Wood Leidal, 2015). This avoids the need to hire highly specialized staff internally and largely eliminates any potential perception of bias in the analysis.

Finally, the way that RDN has leveraged additional funding for monitoring work is worth noting. For example, the forest industry helps fund laboratory validation of data collected by volunteers (Epps, 2018). This novel arrangement and the other examples provided above demonstrate a creative and parsimonious, yet robust approach to data collection and analysis.

4.1.4 Challenges

- Improving Data Management

While it is clear that data collection has been quite successful, it is also apparent that there are opportunities to better manage data once it has been acquired.

RDN staff have attempted to address data capture and storage over time through various solutions, but in general, have employed three different strategies.

First, in some cases it has partnered with the Provincial Government to host data in maintained and centralized databases. For example, surface water quality information collected through the Community Watershed Monitoring Network is uploaded to the Ministry of Environment’s **Environmental Monitoring System (EMS), where it is readily accessible to all.**⁴ This approach seems to be a good, logical, long term solution that provides open access to information, but obviously hinges on the capabilities of the senior government partner.

⁴ See <https://a100.gov.bc.ca/pub/ems/indexAction.do>

Second, in at least one case, RDN has invested in implementing a stand-alone, local third party application. WaterTrax houses well water quality data sourced from voluntary submissions through the water testing rebate program. It also has the capability to **accommodate data from RDN’s water supply wells and from the voluntary observation well network**. WaterTrax consolidates information from various sources, and can produce map outputs by area and aquifer. However, it requires ongoing management and support from RDN. As well, it is isolated from the centralized information systems run by the Province and information is not open and accessible.

Third, in the case of some groundwater and lake level data, information is still housed on **RDN’s internal servers in Microsoft Excel**. Staff acknowledge that, while still a valid way to manage data, this is a less than ideal solution. It creates various vulnerabilities including risk of loss of knowledge in the event of staff turnover and the fact that information is not **publically accessible**. **As well, there are all of the various limitations of Excel’s user interface**, data processing speed and ease of use. As a result, participants in the staff workshop, for example, expressed a desire for one platform to manage all groundwater data. In the short term, plans are underway to move some of this data (e.g., lake levels, some groundwater data) to the **Province’s** Aquarius database through a third-party data sharing agreement.

The various information systems, data sources and their owners are summarized in Table 4, below.

Table 4: Water Data Sources, Platforms and Ownership

Data Type	Source	Platform	Database Owner	Access
Surface Water Flow and Level; Groundwater Quantity	Provincial monitoring network	Aquarius	Province	Open
Lake Levels	Holden and Quennell	Excel ⁵	RDN	Internal only
Surface Water Quality	Community Watershed Monitoring Network	EMS	Province	Open
Well Quality	Voluntary submission through rebate scheme RDN water supply wells	WaterTrax	RDN	Internal only
Climate	1 station at upper Nanoose Creek	GOES	RDN	Open
Groundwater Elevation	Voluntary observation wells	- Excel - Aquarius (pending for 11/16 wells)	RDN (Excel) Province (Aquarius)	Internal only (RDN systems) Open (Provincial system)

In general, the approach to data management to date is perhaps best characterized as *ad hoc*. RDN staff lacked tools and personnel to manage data at the start of the collection process, and we heard several times that they are now in a “catch up” mode in this area.

⁵ The intent is to move this data to the Province’s Aquarius database in the near future.

Moving forward, more attention to data management is recommended. RDN already started down this path by engaging Golder Associates (2017) to develop a Water Monitoring Data Management Framework. This high-level framework provides recommendations for developing a robust data management system for the program. In addition, staff have some tactical plans for improved data management that they were able to share with us. In general, these entail continued migration to open provincial systems (ideally) or developing more robust internal systems where necessary.

We suggest that this should be an area of continued attention, and that these plans should be incorporated into the update of the *Action Plan* for the next operational period.

It should be noted that the fact that this challenge exists for RDN is in many ways a direct **result of the Provincial Government's incapacity to provide necessary centralized** infrastructure for all water datasets. However, the Province is currently in the process of reviewing its own approach under the *Water Information Stewardship Project*. The goal of this multi-year business transformation initiative is to develop integrated and coordinated water information systems to support timely and durable resource decisions for British Columbia.⁶ This project and the existing partnerships with Provincial staff indicates that there are opportunities to collaborate on more robust solutions to these challenges in the next operational period of the Drinking Water and Watershed Protection Plan.

Finally, it is worth mentioning that this issue is by no means unique to RDN. We have witnessed similar situations in many water management agencies across Canada at both the local and senior levels of government, so it may be a consolation that the Region is not alone.

- Further Attention to Operationalizing Data

As the volume of data collected for both surface and groundwater grows, the program continues to enjoy growing success in aquifer and surface water characterization. However, it also seems that greater attention (and budget resources) will need to be devoted to analysis in the future and to turning data into useful knowledge that can inform decision making.

Some of this work requires highly technical, specialized skill sets. To date, much of this has been either outsourced to expert consulting firms, or undertaken through partnerships with appropriate organizations such as Vancouver Island University or the Province. However, relying on partners to complete such analysis will always be challenging due to their own resource constraints.

RDN is already addressing the issue on specific fronts. For example, there are the various major consultant reports cited in section 4.1.2 above. Similarly, seven years of streamflow data from the Community Watershed Monitoring Network and other sources is currently being assessed through a new consultant contract. This important initiative, led by Ecoscape Environmental Consultants, is scheduled for completion in 2018 and will provide important insights into trends, incidences of data exceeding standards, and potentially causation. The intent is that this will help direct future outreach and policy efforts.

⁶ In the interest of disclosure, please note that Econics has been involved in the *Water Information Stewardship Project* in a project management capacity since 2017.

As well, the program is currently budgeting to analyze expanded data collection from key watersheds identified in Phase 1 of the water budget study. Under Phase 2, additional monitoring was deployed in 2017 and the first year of results are now coming in, mostly focused on groundwater data. This will set the context for developing numerical water budget models in a pending third phase. As one interviewee noted, however, the real challenge will be how the results are used to set objectives for managing watershed risk that can be adhered to in the face of changing and use activities.

As the analytical workload continues to grow, it is not clear whether the somewhat *ad hoc* approach used to date will continue to be sufficient, or whether a more comprehensive, long term research plan developed with partners in academia and the Province would be preferable.

Attendees at both workshops expressed concern that there is a growing risk that at least some of the data collected across the program will lose currency if not analyzed in a timely manner (though it will maintain value as baseline or historic data). We recommend that attention to how to leverage data collected through the program should be a key focus of an updated *Action Plan*, and budgeted for accordingly. This planning can likely be done in conjunction with planning for improved data management discussed above.

4.1.5 Summary

Our investigation left us with little doubt that, directly as a result of the program's work, there is already a much better understanding of aquifers and streams in the region than elsewhere on Vancouver Island or much of the province. As we will discuss further in section 4.3, there are indicators that this is already leading to more informed decision making in **areas of RDN's jurisdiction and** the decisions of other authorities. Going forward, with the more refined data collection that is already underway and greater attention to operationalizing it, work under this theme has a very promising future.

Opportunities for the next operational period of the program include the following:

- Continue to implement the water monitoring data management framework and associated internal staff work plans and ensure this is incorporated into the *Action Plan* update.
- Continue efforts to move water monitoring data to open, centralized Provincial databases.
- Where Provincial Government capacity and infrastructure gaps around water data management exist, work with and encourage the Province to fill them.
- Ensure that operationalizing data attained in the past decade is a key focus of the update to the *Action Plan*; that is, ensure the new plan gives explicit attention not just to data collection but to identifying, in practical terms, what information products are required, what skill sets are needed to produce them, and how they will be used to set objectives for and monitor watershed management.

4.2 Water Education & Outreach

The central goals for the education and outreach theme are: 1) to promote awareness and stewardship of the watersheds and drinking water resources in the Region; and, 2) to promote efficient water use in all sectors (Lanarc, 2007). Related objectives include improving public awareness of where their water comes from and why it is important to protect watersheds, changing public water consumption patterns to reduce wastage, and improving coordination among other stakeholders who also provide information.

Creation of Team WaterSmart as a unifying brand and banner for water conservation across the region pre-dates the Drinking Water and Watershed Protection Program. Continued implementation of the outreach and education under the Drinking Water and Watershed Program resulted in early success. In fact, this area continues to account for a disproportionate amount of staff time and budget resources compared to the other two program themes.

The end result is that a broad range of impressive projects and initiatives have been made available to residents. Indeed, based on our experience working on similar initiatives with many other similar Canadian communities, the work can only be characterized as exemplary.

At the same time, as information resources and branded publications continue to proliferate, **we see some evidence of the program beginning to become a “victim of its own success”**. We see opportunities to rationalize and refocus education and outreach efforts in the next operational period. These are discussed later in this section.

4.2.1 Relevant Programs and Actions in the 2007 *Action Plan*

Water education and outreach initiatives link back to the original *Action Plan* mainly through three programs with corresponding actions, as follows:

Program 1: Public Awareness and Involvement

- **1A: The “WaterSmart” Program**
- 1B: Coordinated Information and Education Resources
- 1C: Demonstration Projects
- 1D: Support for Volunteers and Non-profit Organizations

Program 5: Water Use Management

- 5A: Water Conservation Plans
- 5B. Cooperation among Community Water Supply Systems
- 5C: Rainwater and Graywater Use
- 5D: Incentive Programs

Program 6: Water Quality Management

- 6B: Agriculture and Forestry
- 6C: Private Water Well Safety
- 6D: On Site Sewage Disposal

As well, some elements of Program 7 (Climate Change) are also relevant, in particular the need to educate officials, planners, engineers, developers, and forestry and agricultural professionals about the changing local hydro-climatic balance.

4.2.2 Major Accomplishments

This section sets out some of the major accomplishments under the water education and outreach theme since 2009.

- ✓ Impressive Water Conservation and Sustainability Resources

RDN's efforts to create and disseminate resources to help people reduce their water use and be good stewards are both extensive and impressive. Many end-uses (indoor and outdoor) are targeted and many communication channels are employed. This is most prominent with Team WaterSmart initiatives, and include print material, web resources, community events, rebates, workshops, school education and much more. As stated above, in comparison with many similar British Columbian and Canadian communities we have assisted, this body of work is exemplary. This view was widely shared by participants in both the interviews and workshops. **As one person put it, "Team WaterSmart has been a very effective model in bringing water education to the general public"** (Law, 2018).

Key examples include the following, but this list is by no means comprehensive:

- numerous information brochures and publications, with notable illustrations including the [Landscape Guide to Water Efficiency](#) and a suite of consistently branded brochures covering various end uses of water inside and outside the home (a list of the collateral we looked at can be found in Appendix 1);
- a deep program website that captures literally dozens of different water conservation and sustainability resources, some features having sophisticated user interfaces (for example the [regional watering restrictions map](#) and the [Our Watershed](#) map tool);⁷
- student [watershed field trips](#) and teacher curriculum resources for grade 4 and 5 classes in School Districts 68 and 69;
- the [Residential Irrigation System Check-Up](#) program, which incorporates elements of water conservation best practice because it is highly targeted at both specific users (high volume residential customers) and at specific end uses (outdoor irrigation via in-ground automatic systems);
- [Team WaterSmart summer events](#) involving interactive, staffed booths at community gatherings across the region (see Table 5, below); and,
- a range of [water stewardship rebates](#) available to all region residents including those in member municipalities (uptake over time is summarized in Table 6, below).

⁷ In fact, the program website has become so information heavy that we see some risk of it becoming inaccessible from the point of view of the layperson user. This is discussed further in section 4.2.4.

Table 5: RDN Water Sustainability Outreach Occurrences (2011 to 2018)

	2011	2012	2013	2014	2015	2016	2017	2018	Total	Average
School Field Trips				7	14	11	6	6	44	9
Youth Education	0	0	0	1	11	3	4	2	21	3
Workshops	8	6	9	9	10	15	10	7	74	9
Other Events	20	19	21	21	25	29	38	38	211	26
Irrigation Check-ups	79	35	49	28	30	17	18	12	268	34
wellSMART	5	3	4	4	3	2	2	2	25	3
	112	63	83	70	93	77	78	67	599	80

Table 6: RDN Water Sustainability Rebates (2013 to Present)

	2013	2014	2015	2016	2017	2018*	Total Rebates	Average /Year ♦	Average Rebate	Average \$/year	Total \$
Rainwater Harvesting (2013-present)	52	37	42	46	39	11	227	43	\$732	\$27,936	\$167,618
Wellhead Upgrades (2014-present)		10	10	9	11	5	45	10	\$250	\$2,137	\$10,685
Well Quality Testing (2014-present)		175	103	112	119	80	589	127	\$95	\$54,642	\$10,928
Irrigation Upgrade/ Soil Improvement					11	26	37	11	\$214	\$3,278	\$6,556
ENERGY STAR Clothes Washer (2016)*				50			50	50	\$50	\$2,500	\$2,500
TOTAL	52	222	155	217	180	122	948	165			\$198,289

Notes:

- * 2018 data is for partial year to August.
- ♦ Excludes 2018 data.
- Rebate program pilot years were not included due to incomplete data.
- The ENERGY STAR Clothes Washer rebate was only available in 2015 and 2016. In 2015 it was administered by the RDN Sustainability Department and only available to RDN Electoral Area and Lantzville residents; data for that year is not readily available. This program was delivered jointly with BC Hydro as a rebate "top up".
- RDN also offered a Toilet Replacement Rebate program between Oct 2009 and Nov 2013. Under this program 1532 toilets were replaced and \$95,700 in rebate dollars were granted.

With respect to the impact of these and other initiatives, a study was completed in 2018, which found that average water demand per connection in RDN operated Water Service Areas decreased by 31% between 2004 and 2017, putting the region on track to achieve targets set in 2008 and 2013. This study also found that maximum month water production (again in in RDN Water Service Areas) remained below a 2004 reference level from 2011 to 2017 (McSorley, 2018b).⁸

✓ Innovation in Regionally Relevant Education Programs

RDN has developed several “niche” water sustainability programs that merit specific recognition. In part this is because they are quite relevant uniquely to the region because of its distinctive hydrological and social situation. These examples are also consistent with water

⁸ It is important to qualify that RDN cannot take full credit for these savings, as most communities across North America have sustained dramatic water use reductions over the same period due to natural uptake of more efficient appliances and fixtures and changing outdoor water use trends.

sustainability program best practice because they are highly targeted and use a variety of policy instruments to incentivize participation.

Three examples serve to illustrate. First, the [wellSMART initiative](#) couples workshops, wellhead upgrade rebates, and water testing incentives with educational resources and auditing offered by trained Provincial Government staff. Through wellSMART, people now have ready access to information on well construction, maintenance, water testing, and groundwater protection. While large volume users may receive more targeted support from the Province, in the past small well owners were more likely to be overlooked. **RDN's program** acknowledges that they are important and supports their unique needs (Lapcevic, 2018). We are unaware of a comparable program in other groundwater dependent communities in BC.

Second, work to promote rainwater harvesting has included the [Rainwater Harvesting Best Practices Guidebook](#) (RDN, 2012b) a robust design and installation resource, as well as workshops, rebates and online advice.⁹

Third, the [Water Purveyor Working Group](#) was launched through RDN's **leadership in 2010** and has met at least annually ever since, bringing together improvement districts and other small suppliers for education symposiums and to discuss issues of mutual interest. In light of the limited capacity of many small purveyors despite their significant responsibilities, this **initiative underscores RDN's emergence as a water management** leader locally and provincially.

✓ Successful Partnerships for Regional Service Delivery

While the breadth of water conservation and sustainability outreach efforts is impressive on its own, the way that they have been implemented compounds their impact. RDN staff have done an extraordinary job of developing strong partnerships with other agencies to promote stewardship. These partners include the Province, member municipalities, small water purveyors, industry, community groups and others (see section 3.4, above, for a fuller list).

An example is delivery of Team WaterSmart on behalf of Nanaimo, Parksville, Lantzville, and Qualicum Beach. Under this banner, RDN provides water conservation education on behalf of these partners, speaking to all residents with a unified voice. **As one interviewee put it, "we are all one big happy family" (Sims, 2018).** For instance, coordination of rebates for water sustainable goods and services means that incentives are provided seamlessly across municipal boundaries. A noteworthy success here was negotiation of a regionally-consistent outdoor watering restriction framework in 2016, which now simplifies communications during the summer period.

Another example is delivery of watershed field trips to elementary school classes, delivered through a partnership between RDN, member municipalities and forestry companies (specifically, Island Timberlands and TimberWest). Industry provides safe and controlled access to the watershed, and RDN provides tour guidance and resources for teachers.

Yet another excellent example of successful collaboration is delivery of the wellSMART workshops through a partnership between RDN, the Ministry of Forest, Lands, Natural

⁹ To give a sense of the uniqueness of this publication, we were well aware of this guidebook before we started working with RDN on the current project and have referred other communities, including some outside British Columbia, to it a number of times.

Resource Operations and Rural Development, Island Health and the well drilling industry. RDN provides the venue and promotion, whereas the other organizations provide technical expertise to train residents in well maintenance, operation, testing and protecting their water source. Supporters see this work as highly successful (cf. Magee, 2018).

An example that provides value specifically for municipalities has been the Community Watershed Monitoring Network. The stream monitoring and engagement with stewardship groups on urban creeks provides data of interest from a municipal stormwater management perspective.

Partnerships such as these dramatically leverage the resources RDN brings to bear and contribute to a shared community stewardship ethic.

4.2.3 Challenges

- Outreach Campaigns are Often Highly Information Intensive

As noted above, RDN’s educational resources are inarguably both far-reaching and impressive. However, they are often also very information intensive. Communications products and messaging often contain considerable, tightly packed technical content.

In some cases, detailed technical content is wholly appropriate. For example, the rainwater best practices manual (RDN, 2012) and the landscape guidebook (RDN, nd) would be sought by audiences seeking highly prescriptive advice in order to complete specific projects.

However, in other cases we see distinct symptoms of what one interviewee called “information overload”. A number of examples can be cited. The program website, taken as a whole, though quite well organized and rich in content, may be overwhelming from the perspective of the casual visitor. Similarly, the 2015 *State of our Streams* and 2017 *State of our Aquifers* newsletter are both highly detailed and technical, to a level that we suspect would be beyond even well-educated readers, despite the fact that we understand that both of these documents were distributed by mail to most households in the region (see Figure 2).

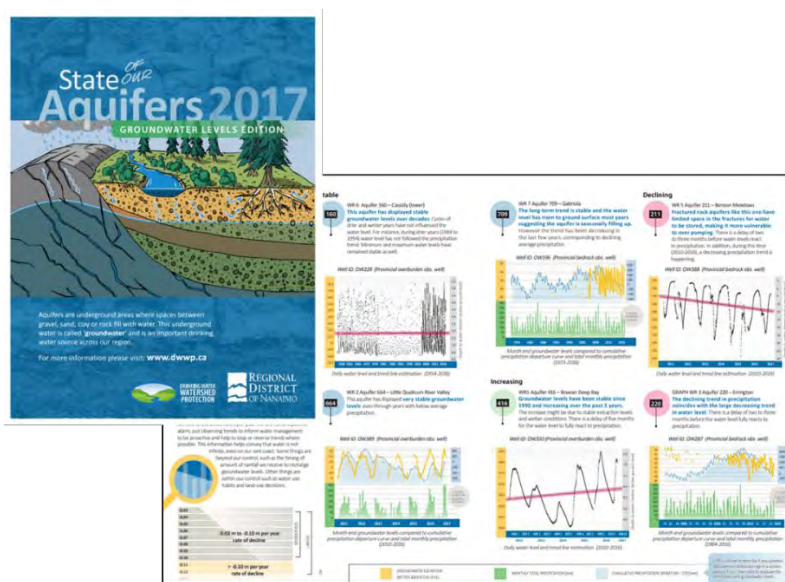


Figure 2: Excerpt from State of our Aquifers 2017 Newsletter

Research from fields such as environmental psychology and marketing tell us that information alone rarely leads to sustainable behaviour change (cf McKenzie-Mohr, 2011). RDN has an **opportunity in the future to transition to more “best-in-class” outreach** methods. For example, it could make more use of well-established community-based social marketing techniques such as social norms, commitments and more vivid marketing communications. As we discuss further in section 4.4, below, we also see the opportunity to shift more from factual information to more messaging about why watershed protection matters.

- Branding Review

In our review of Drinking Water and Watershed Protection print and web-based communications collateral, we discovered an issue that we have seen before with other well developed outreach programs - **the phenomena of “brand creep”**. This occurs when branding is done inconsistently or when the messages you are trying to communicate do not come across vividly and clearly. If this issue is left unattended, the risk is that the brand will no longer have clarity and residents become confused about who you are, what you offer, and why you exist. This problem can also dilute attention away from the entity that should usually be at the centre of communications – the Regional District of Nanaimo (and in some cases partner local governments).

To illustrate, so far we have observed use of at least ten different logos and wordmarks in program communications (see Figure 3). In one instance, eight different logos were used on a single page. In a couple of cases (e.g., the wellSMART program) it is not immediately clear why a separate brand identify is required at all. This challenge is compounded by the fact that the logos of five different local governments including RDN must sometimes be incorporated into design.



Figure 3: Logos Used in Drinking Water and Watershed Protection Communications

Beyond logo proliferation, we also see other opportunities to improve brand consistency more generally (e.g., consistent use of colour, style elements, fonts, etc.). From the staff **workshop, we also understand that this observation is consistent with the direction that RDN’s**

Corporate Services department is taking in their efforts to curb the proliferation of program sub-brands across the organization. As a result, to address this emerging concern, we recommend that RDN undertake a review of program branding and perhaps consider developing corporate style guidance specifically for the program.

- Market Research and Program Evaluation

Within the past year, RDN staff have completed several internal quantitative studies to begin to assess the impact that education and outreach to date have had on water use behaviour. For example, analysis of metered consumption data for participants in the Irrigation Check-up program found that the majority (65%) of participants reduced their summer water-use in the years following participation (McSorely, 2018b).

The fact that this analysis is beginning to happen is encouraging, but we see more opportunities. In particular, to the best of our knowledge RDN has not yet undertaken any formal market research studies. These kinds of studies provide key insights into resident attitudes towards water sustainability and conservation and answer applied questions about penetration rates of water efficient fixtures and appliances and outdoor water use behaviour (e.g., lawn watering habits).

Leading jurisdictions typically complete such studies with a reputable market research firm regularly, every three to five years as a good rule-of-thumb. An ideal research design combines a large telephone survey (500 to 800 people) with focus groups (two to four groups), with scope driven by budget availability. A standardized survey questionnaire is used to allow comparison of results across time (i.e., you ask some of the same questions every time you do the research to see if results change).

This kind of market research as well as other quantitative projects like the one completed for the Irrigation Check-up help target efforts and provide metrics of success that inform program evaluation and budget allocation.

We note that, while this contention is made based on our experience working with other jurisdictions, it was mirrored by staff and partners several times in the workshops. For example, participants noted that no work has been done to date to monitor how well print publications are received, and that little work has been done to quantify how effective programs are from a cost/benefit perspective.

Finally, a side-benefit of this kind of research is that it often uncovers high-levels of support from the community for water and watershed protection (cf, RBC Blue Water Project, 2017). It may be useful to have localized results to assist with ongoing justification of the program.

- Opportunities for Innovative Demand Management Program Delivery

To reiterate the message stated above several times, by the standards of other comparable BC and Canadian communities of similar size, the demand management work being done by RDN is exemplary. However, if we apply the much higher standards of the most prominent and successful water conservation programs, for example from the Southern US or Ontario, there are many opportunities to innovate and improve performance.

Much of RDN's work to date focuses narrowly on education and incentive (i.e., rebates) policy instruments.¹⁰ As well, most attention goes to the single-family residential sector. Going forward, we see opportunities to employ techniques that are more targeted at specific user groups, specific end uses of water, and other sectors (such as non-residential customers). Some specific examples may include:

- greater attention to non-revenue water and control of system loss, which is often the lowest per unit cost source of water savings;
- use of local regulatory measures such as once-through cooling system bans or water efficient landscape standards in new development;
- greater use of community based social marketing techniques (cf McKenzie-Mohr, 2011);
- targeted incentives **for developers who implement “above code” water sustainability practices**;
- targeting specific end users;¹¹ and,
- greater attention to the commercial, industrial and institutional sectors.¹²

In some cases, new measures such as these will be more difficult to implement because they will require working through partners. For example, **in RDN's case**, system loss control and outreach to non-residential customers are typically within the purview of member municipalities. It may take some convincing to show partners that these kinds of measures offer lower cost water savings than traditional, broad market, information-intensive education campaigns.

At the same time, we do not recommend abandoning measures that are already in place and working well. For example, Team WaterSmart participation in community events brings many benefits, not the least of which is maintaining the profile of the program among key stakeholders and partners. Here, however, there may be opportunities to do the same things in more effective ways. The approach that leading jurisdictions take to community events is to use active rather than passive methods, such as systematically collecting information from residents while on-site, or using events to promote specific initiatives in a very targeted and persuasive way. This includes having specific, quantitative goals for events that are measured and evaluated after.

The list above is really only the tip of the iceberg. We recommend that further attention to opportunities for innovation in demand management program delivery be an explicit focus of **the planned update to RDN's Water Conservation Plan** (Aquavic, 2013) in the next operational period.

¹⁰ This is very much a general observation, as there are certainly good examples of use of other techniques to be found.

¹¹ For example, in the US there is emerging interest in water conservation programs for low income households. Evidence is beginning to show that, on average, this group tends to lag behind in adoption of water efficient fixtures and appliances in the home and so may have above average per capita water use. Programs targeted to them provide the additional benefit that they may help these households better control their water costs.

¹² For example, many leading jurisdictions target the hospitality sector (hotels and restaurants) with measures to retrofit niche technologies such as once-through cooling systems and pre-rinse spray valves in food preparation facilities.

4.2.4 Summary

RDN's water education and outreach efforts are highly valued by stakeholders and seem to be universally seen as successful. Since the inception of the program, momentum has continued to build. With continuing effort and by borrowing from best practice experience in other jurisdictions, the Regional District has an opportunity to claim a position as a provincial and even national leader in this space.

Opportunities for the next operational period include the following:

- Reduce the information intensity of communications, focusing more on simpler messages that emphasize why watershed protection and conservation are important.
- Complete a review of branding and consider developing corporate style guidance specifically for the program.
- Conduct market research with residents to understand their attitudes towards water sustainability and conservation and to seek answers to applied questions about matters such as penetration of water efficient fixtures and appliances and outdoor water use behaviour.
- Continue to conduct analysis to quantify the impact of the program and its specific initiatives on per capita water demand.
- Update the RDN water conservation plan with attention to best practices from leading North American jurisdictions; plan to employ demand management techniques that are more targeted at specific user groups, specific end uses of water, and less frequently engaged sectors (such as non-residential customers).
- Support member municipalities with adoption and implementation of innovative best practice water conservation practices in areas of their domain.
- Review implementation of initiatives that cross *Drinking Water and Watershed Protection Action Plan* and the *Liquid Waste Management Plan* (specifically rainwater management) to ensure that any potential administrative overlaps are addressed and that organizational responsibilities are clear.

4.3 Water Policy Advocacy & Planning Support

Key goals under the policy advocacy and planning support theme are: 1) to use the information gathered through the water science program to protect watersheds and water resources in land use planning and development decisions; and, 2) to prioritize and protect watersheds according to their ecological and drinking water values (Lanarc, 2007).

A myriad of specific objectives fall under these goals including: protecting drinking water through the Regional Growth Strategy, Official Community Plan policies and designations, and zoning bylaws; ensuring that new development provides proof of adequate drinking water; and undertaking watershed management planning on a priority basis.

While the original *Action Plan* charted a decidedly ambitious course for reformed land use planning and watershed management, thus far this area has proved to be the most challenging and controversial amongst stakeholders. This is detailed in this section.

4.3.1 Relevant Programs and Actions in the 2007 *Action Plan*

Mapping back to the *Action Plan*, key policy and planning initiatives link to Program 3 (Land Planning and Development), which recommended the following actions:

- 3A: Land Development (Engineering) Standards
- 3B: Development Application Review
- 3C: Development Charges
- 3D: Planning Tools

There are also linkages with Program 4 (Watershed Management Planning), which recommended the following actions:

- 4A: Watershed Prioritization
- 4B: Watershed Management Planning
- 4C: Support Local Food Production

Other relevant areas in the *Action Plan* include influencing decision making in provincial water allocation decision making (Program 5, Action 5E), in the agriculture and forestry sectors (Program 6, Action 6B), and adapting land and water use in the face of climate change (Program 7, Action 7B).

4.3.2 Major Accomplishments

This section sets out some of the major accomplishments under the policy advocacy and planning support theme since 2009.

- ✓ Foundation Laid for Future Success

Almost all the informants we spoke to reminded us of the very long time frames needed to build a sufficient information base to adequately characterize watersheds and aquifers, and the challenges of building lasting public support for these endeavors. Over the past ten years, RDN has sought to create a strong foundation with data, partnerships, education, and

program identity. While it is important to understand that the situation remains in the data building stage and that much analysis remains to be done, there are good indicators that this foundation is falling into place.

Much of the work described in section 4.1, above, is highly relevant here. For example, a group of participants in the Technical Advisory Committee workshop characterized the efforts **to prioritize watersheds under the water budget project as the “greatest success” of the program to date.** Since it identifies varying stress levels in different water regions, emerging sentiment is that it now has the real potential to influence land use decision making. Similarly, enhanced monitoring of aquifer stress levels is now providing guidance on where additional planning work or studies should be done.

As detailed in section 4.2.3, little work has been done to date to quantify resident attitudes towards watershed protection. However, based on anecdotal reports from interviewees and the considerable investment in education and outreach, we would also expect that progress has also been made to build necessary public support for water sustainable land use planning and policy.

✓ Specific Successes in Land Use Planning and Informing Policy

Particularly from the last several years, we found specific examples of the program influencing land use decision making and allocation policy. These include the following:

- The program supported a technical review that examined aquifer characteristics in Area H, including investigating aquifer recharge areas. This work directly influenced the Area H Official Community Plan update, which sets clear objectives and policies to protect freshwater resources.
- Program **staff also supported RDN’s Planning Department** with creation of the Yellowpoint Aquifer Protection Development Permit Area in amendments to the Area A Official Community Plan (RDN, 2011a). This requires that new development in that permit area must have additional rainwater storage to protect the sensitive aquifer.
- The *Agricultural Area Plan* (Upland Consulting, 2012) was adopted by the RDN Board in 2012 and includes aspirational goals and objectives to improve opportunities for on-farm water resource management.
- More strategically, through the program, the RDN also offered the Province comments and feedback on *Water Sustainability Act* development (see RDN, 2015a; RDN, 2013; RDN, 2010). We understand from contacts in the Province that this type of stakeholder feedback had a meaningful impact on shaping public policy and legislation in the new Act and its regulations.

4.3.3 Challenges

- Land Use and Watershed Planning Objectives Have Not Yet Been Fully Realized

While we can look with optimism at these several accomplishments in supporting land use planning, it is also clear that there is a general consensus among staff and stakeholders alike that ambitions of the 2007 *Action Plan* in this realm have not yet been fully met. Our reading of the plan was that it intended to see comprehensive reforms toward water-based land use planning. Partially as a result of this vision, some stakeholders have heightened expectations of what watershed protection should mean, for example, when a development is approved near a stream. However, despite the obvious effort to assemble necessary information and public support, setting progressive, water-driven objectives for land use management and policy remains a challenge, and the original vision remains elusive.

We have observed that the reasons for this are complex, involving an array of organizational and regulatory considerations. First, there are multiple actors and agencies involved including provincial approving authorities in several ministries, local municipalities, industry, developers and others.

Second, planners and decision makers face historical constraints including jurisdictional and regulatory limitations. For example, the current Regional Growth Strategy (RDN, 2011b) was largely developed before Drinking Water and Watershed Protection implementation fully commenced, as were most Electoral Area Official Community Plans. As well, RDN can only intervene in land use where it has legislative authority to do so. For example, it has limited authority over existing water rights, private forest land matters, rural road drainage, or existing zoning provisions.

Third, as noted above, it takes a great deal of time to gather data and create robust knowledge on aquifers and streams, in some cases decades. It also takes time to develop community support for watershed protection. Several informants stated that they did not believe that RDN had the foundation of sufficient information to support substantially different decision making in this area until very recently. Even where data and information has been attained, this typically provides indicators only. This nuance and the limitations of applying information to specific uses, such as land use planning, is not well understood by the public.

Finally, there is the plain reality that land use decision making is simply very difficult and influenced by many factors. The process is intensely political because there can be winners and losers and certain kinds of development may be hindered. Simply put, educational efforts and scientific data collection are much easier, so it is not at all surprising that more progress has been made in those areas to date.

There are undeniable benefits to being aspirational in strategic planning because it engenders sustained interest and excitement. However, more than one informant suggested that the 2007 *Action Plan* may have over-reached to some extent in its ambitions around planning and policy. It is not immediately clear that RDN could achieve the full breadth of what was called for in a span as short as ten years. This is particularly so with respect to the watershed management planning recommendations under Program 4, where involvement and buy-in from a broad range of stakeholders would be demanded, including the Provincial Government.

At the same time, there is also much evidence that the stage is now set for different results in the next operational period. As noted above, operationalization of data is underway, and there are specific, recent instances where we see this influencing decisions. Analysis is now available that shows water quality or quantity constraints. This has been provided for consideration in development referrals and to external agencies (for example, to subdivision approving officers at the Ministry of Transportation and Infrastructure and to regional water managers in the Ministry of Forests, Lands, Natural Resource Operations and Rural Development).

Within RDN, work is currently underway on a policy that will identify and standardize the technical information required for rezoning applications to confirm that the potable water needs of proposed parcels or use can be met where community water service is not available. This will provide consistency in the review of development proposals and ensure greater assessment of impacts of rezoning on aquifers and streams.

We also heard from staff in both the Drinking Water and Watershed Protection and in Strategic and Community Development that they are already turning their minds to the importance of water sustainability in planned updates to the Official Community Plans for Electoral Areas A, C, F and G.

As a critical mass of data and information becomes available to influence decision making, we suggest that a key task for the update to the *Action Plan* is to set clear and attainable goals for land use planning in the next operational period. This would include clarifying how technical expertise (e.g., in hydrology) will be procured and what new and different regulatory authorities will be needed. A collaborative, inter-departmental effort will be required to ensure that this updated plan reflects attainable and universally supportable goals that strike the right balance between protecting water resources and enabling community growth and development.

4.3.4 Summary

Attention to policy advocacy and planning support will no doubt remain a key focus in the future. The science-based approach of the program, the fact that it brings together multiple agencies, and the foundation built on data and information and public support lead us to believe that the full potential of the program in this area is yet to be realized.

Opportunities for the next operational period include the following:

- Set clear and attainable goals for land use planning support and water policy advocacy in the next operational period, including clarification of what technical expertise and information products will be required. Specifically, identify what will be required to set water-driven objectives for land use management in scheduled updates to official community plans and the Regional Growth Strategy.

4.4 Other Observations

Our research uncovered several other opportunities to improve the impact of the Drinking Water and Watershed Protection Program that merit brief attention here.

4.4.1 Stronger First Nations Engagement

RDN staff concede that more work needs to be done to engage with the Qualicum, Snaw-naw-as, Snuneymuxw and other area First Nations on program implementation and there appear to be many promising opportunities to do so. For example, while we understand invitations have been extended in the past, there are no First Nations representatives on the Technical Advisory Committee. First Nations could be key partners in watershed monitoring activities (the Qualicum First Nation has assisted with site selection in the past). Traditional ecological knowledge can enhance science-based knowledge created through the program. First Nations communities could be more frequent recipients of outreach support from Team WaterSmart (similar to support already received by municipal governments).

However, individual First Nations will certainly have their own perspectives on how (or whether) they want to participate in the program and regional governance generally.¹³ We recommend that RDN make it a priority to more actively engage with First Nations on a government-to-government basis to identify the ways in which they would like to participate in program implementation in the future.

4.4.3 Recognize Key Integrations with Other RDN Programs Including *Liquid Waste Management Plan* Implementation and Emergency Services

The relationship between the Action Plan and 2014 amendments to RDN's Liquid Waste Management Plan (LWMP) requires brief attention because of several areas of integration. This is because the Drinking Water and Watershed Protection Program now delivers on regulatory requirements under the LWMP related to rainwater management and watershed management/protection.

The LWMP is a component of RDN's legal authorization to discharge wastewater under the Environmental Management Act. The BC Ministry of Environment and Climate Change requires RDN, as a discharger, to meet these specific commitments and implement the rainwater management and watershed protection programs. As such, implementation now addresses not just drinking water and watershed protection goals, but is also a progressive and effective part of meeting wastewater discharge requirements. We understand from staff that, without this, extensive and costly additional regulatory requirements would have likely been imposed under the LWMP.

The LWMP commits to implement all seven Action Plan programs including integrated watershed management planning. More specifically, it calls for continued implementation of the RDN Water Conservation Plan and refinement of the water budget program to assist in land use decisions. As well, it requires continuation and evolution of water education and incentive programs and watershed monitoring partnerships (RDN, 2014). It also calls for action

¹³ In other regions on Vancouver Island, First Nations have articulated a preference to be represented at the decision-making level, and in fact have successfully secured seats at the Board level in the Alberni-Clayoquot Regional District.

on rainwater management, in particular developing a specific strategy with targets and standards to mitigate impacts of land development.

In a similar vein, as the program has matured, it is increasingly making important **contributions to RDN's Emergency Services Program**. For example, **monitoring stations** established through the program (in addition to pre-existing stations) provide real time climate and stream water level data. DWWP staff compile and report this to the Emergency Operations Centre and/or Emergency Program staff in support of flood or fire response.

We recommend that these important inter-relations be recognized and incorporated in the upcoming Action Plan update.

4.4.3 Enhanced Inter-Departmental Coordination

Organizationally, there are many benefits and synergies to situating the program within the Regional and Community Utilities Department. However, going forward, if the program is to continue to evolve into a more strategic role and become more focused on land use and planning, we see benefits to enhancing coordination with other departments, particularly Strategic and Community Development. We would not immediately recommend reorganization, and in any case, such considerations are beyond the scope of our work. However, we suggest considering other means to improve coordination including mechanisms such as inter-departmental working groups and temporary staff cross-appointments. This may result in stronger collaboration and broader organizational focus for the program.

4.4.4 Increase Effort to Communicate the Value of the Program

A number of informants told us that they believe more effort needs to be invested in communicating the value of the program more broadly. The program does a very good job of **explaining the "what" (what kind of toilet should I buy? what is the water quality situation in the stream? what should I do about my well?)**. Going forward, we suggest much more effort **should go into explaining the "why" (why should I care about watershed protection? why do particular development patterns need to change? why does the parcel tax represent outstanding value?)**. Integral to this is explaining clearly and concisely why watershed protection matters, not just in terms of ecosystem values, but also community, financial, and infrastructure values. As discussed above, this is another reason to refine communications through all channels, make it less information intensive, and become more focused on pre-meditated key messages. We also anticipate a need to create more opportunities to communicate with RDN Board members and elected officials in member municipalities about the many benefits that the Drinking Water and Watershed Protection Program creates. This in turn will enable them to more actively champion it and ensure community support is maintained.

4.5 Reconciliation against the 2007 *Action Plan*

At this point in the report, it will be clear to the reader that significant progress has been made against the 2007 *Action Plan*. Staff, partners and the RDN Board have remained faithful to this original source document and tangible advancement is demonstrable against all programs and goals, though unevenly. As documented above, more evolution can be observed in outreach, education, science and monitoring, and notably less in planning and policy goals.

For the reader wanting a more direct comparison of progress against the *Action Plan*, see Table 7, below. This table is based on one provided to us by RDN staff, which they use for internal tracking purposes. It is largely unedited except for some simplification for ease of readability and to provide consistent terminology. Based on our evaluation, we cannot see much reason to challenge RDN's internal evaluations. In other words, their self-assessment of progress is, on the whole, accurate. However, four clarifying notes may be useful.

First, progress against Actions 3A (Land Development Standards) and 3C (Development Charges) are both labelled **“Not Initiated”, in red. We understand that this is symptomatic of** the more general delays in progress against key planning initiatives that are fully documented in section 4.3, above. However, more tactically, we also understand that these actions were deferred fairly early in the implementation history as a result of internal discussions by staff in Regional and Community Utilities and Strategic and Community Development Services. This resulted in a conclusion that effort would be better directed at influencing other planning processes and activities, such as OCP revisions.

Second, progress against Action 6B (Agriculture and Forestry) has been limited. In the Action Plan, it was envisioned that the program would find ways to influence farming and forestry operations to protect water sources from contamination and to steward watersheds. We see several reasons for hindered progress here. One is simple resource constraints. With limited budgets, it is hard to see that all actions could be fully implemented in as few as ten years. Another is that, unlike the very concrete goals elsewhere in the Action Plan, the prescribed actions in this area are comparatively vague, so it is hard to know by what standard to measure advancement. Finally, it must be pointed **out that RDN's authority in this area is** quite limited. Both sectors are regulated by the Provincial Government, and both largely take place on private lands in the region.

However, it is also important to point out that some measurable progress has taken place under this action. For example, the forestry sector actively participates on the Technical **Advisory Committee and enthusiastically and measurably supports RDN's monitoring and outreach efforts. As well, RDN's Agricultural Area Plan** (Upland Consulting, 2012) includes aspirational goals and objectives for on-farm water resource management.

Third, in at least one area, on-site sewage disposal (Action 6D), the commitments in the Action Plan are now largely implemented by Wastewater Services through their SepticSmart outreach program.¹⁴ This initiative provides workshops and toolkits to residents to ensure that on-site systems are functioning properly. It also provides rebates for septic system maintenance, contact information for certified professionals, and we understand that Wastewater Services coordinates with Island Health on regulatory functions. This, however, is largely a matter of administrivia rather than a statement about implementation status.

Finally, how the area of climate change (Program 7) in the Action Plan has been treated and tracked is interesting. The context here has changed remarkably since the plan was originally penned. Climate change was still a relatively new concept a decade ago, whereas it is evolved to now be accepted as simply an operational context, in much the same way as other issues such as land use pressures or population growth. As such, staff no longer consider this a separate issue, but instead view it as something that must simply be integrated into implementation generally. We see this as an entirely appropriate approach.

¹⁴ See <https://www.rdn.bc.ca/septicmart>

Table 7: Reconciliation of Progress against the 2007 Action Plan

Action Plan Program	Action Plan Action	Status	Key Initiatives
1 - Public Awareness and Involvement	1A: The WaterSmart Program	Ongoing	DWWP and Team WaterSmart website
			Water Saver Contest & Watershed Friendly Lawn Campaign
			Publications and Media Coverage
			"State of" reports
			Irrigation Check Ups
	1B: Coordinated Information and Education Resources	Ongoing	DWWP TAC
			School field trips and presentations
			Educational outreach display booth
			wellSMART workshops
	1C: Demonstration Projects	Partial	Innovative water conservation technologies tour
			Team WaterSmart workshops and events
	1D: Support for Volunteers and Non-profit Organizations	Ongoing	Surface Water Quality Monitoring
			CWMN annual training
CWMN monitoring equipment sign-out			
Stewardship seed funding			
2- Water Resources Inventory and Monitoring	2A: Compilation and Mapping of Existing Data	Ongoing	Annual CWMN results session meeting
			GIS Water Map
	2B: Additional or New Data Collection	Ongoing	Phase 1 Water Budget Study
			BC Obs Well Network expansion
			Volunteer Observation Well Network
			Community Watershed Monitoring Network (CWMN)
			Hydrometric and climate monitoring
			Well water quality - voluntary results submission
			Phases 2 & 3 of Water Budget Analysis
			Physical Stream Assessments - USHP
	2C: Water Quality Monitoring	Ongoing	Nanaimo lowlands aquifer characterization
			Wetland mapping and inventory
			Community Watershed Monitoring Network (CWMN)
2D: Data Response Systems	Underway	Well water quality - voluntary results submission	
		South Wellington- Cassidy Groundwater Quality Study	
	Ongoing	Phase 1 --> Phase 2 Water Budget	
		Water Quality Objectives	
3- Land Planning and Development	3A: Land Development (Engineering) Standards	Not Initiated	Support for Emergency Operations Centre (EOC)
	3B: Development Application Review	Ongoing	Policy B1.21 Revision Policy (groundwater requirements for rezoning unserved lands)
			Yellow Point Aquifer DPA - requires rainwater harvesting
			DPA Review - updating language and best practices
	3C: Development Charges	Not Initiated	N/A
3D: Planning Tools	Ongoing	Hydrogeological Assessment for Area H OCP update	

Action Plan Program	Action Plan Action	Status	Key Initiatives
4 - Watershed Management Planning	4A: Watershed Prioritization	Partial	Phase 1 Water Budget
	4B: Watershed Management Planning	Not as Described	Working through OCP process; new Water Sustainability Plans will be investigated for priority areas.
	4C: Support Local Food Production	Partial	Agricultural Water Demand Model
5- Water Use Management	5A: Water Conservation Plans	Ongoing	RDN WSA Water Conservation Plan - completed alongside City of Nanaimo's Plan
			Evaluation of RDN WSA Water Conservation Targets, Trends, Trajectory
	5B: Cooperation among Community Water Supply Systems	Ongoing	Water Purveyor Working Group
			Harmonized Watering Restrictions Framework & comms coordination
			Region-wide incentive programs
	5C: Rainwater and Greywater Use	Ongoing	Collaboration with Ops dept; some items to come out of upcoming Water System Risk Plan
			Rainwater Harvesting Best Practices Guidebook
			Rainwater harvesting, Greywater workshops
			Info session for building inspectors
	5D: Incentive Programs	Ongoing	Lobbying senior government via UBCM - rainwater for potable use
Build off MoH Greywater Manual - best practices for residents (upcoming)			
5E: Water Use Regulation	Ongoing	Toilet, rainwater, wellhead upgrade, well water testing, irrigation upgrades, soil improvements	
		Provided comments to Province during consultation period for new <i>Water Sustainability Act</i>	
		Organized info sessions on new groundwater regulations	
6- Water Quality Management	6A: Contaminant Management	Partial	Review license applications as agency on Water Licenses
			Info not distributed directly, but requirements exist at rezoning stage
	6B: Agriculture and Forestry	Partial	Done at a provincial level with Well Protection Tool Kit; not mapped beyond zoning maps.
	6C: Private Water Well Safety	Ongoing	Forestry reps participate on TAC; DWWP has interacted with Agricultural Advisory Committee on occasion
6D: On Site Sewage Disposal	Ongoing	Well water quality testing - rebate and data submission	
		This is implemented via Septic Smart - administered by the WWS department as part of the LWMP commitments	
7- Climate Change	7A: Follow the Science	Partial	Actions are integrated into ongoing initiatives
	7B: Land and Water Use Adaptation		
	7C: Assessing Local Hydro-climatic Balance		

Source: based on RDN (2018a)

5.0 Conclusion and Consolidated List of Opportunities

This report has attempted to inventory these many successes, as well as some of the challenges the Drinking Water and Watershed Protection Program has faced over the past decade in comparison to the goals and actions set in the 2007 *Action Plan*.

While we have identified a number of opportunities for improvement in the next operational period, it must be restated in summation that the work of the program to date has been nothing less than remarkable and highly successful.

More specifically, the vital importance of partnerships with other agencies, industry and the not-for-profit sector needs to be reemphasized. **As one staff member put it, “it is an effort of everyone in the community working together and this is a key benefit of the program. You need that to implement change” (Fegan, 2018).** The program offers a necessary point of connection for different groups and agencies around the region and the collaboration it facilitates was cited by many as absolutely key to success.

The importance of the sustainable funding model in RDN for watershed protection, in the form of the annual parcel tax, also needs to be stressed. While the budget demand is actually relatively modest, the program does very well with what they have. In fact, they are able to leverage this to attain significant additional funding and volunteer efforts to support watershed protection. Based on our experience working with other jurisdictions around the country, we see this stable funding as key and a major differentiator from similar programs. Because there is a stable revenue source, RDN is not in a cycle of always looking for operating dollars and so can focus on implementation. **As one observer put it, “I think the community has had really good value for their money” (Lapcevic, 2018).**

Finally, the unique nature of this initiative compared to similar ones elsewhere in the Province must be underscored. To the best of our knowledge, no other regional district has a watershed protection function with taxation authority comparable in scope or longevity, putting RDN very far ahead of other communities. Other jurisdictions look to RDN as a model and remark on the success. This can be a source of pride for the organization.

In closing, despite the challenges we have outlined, like every one of the informants we spoke to during the review, we see great prospects for the Drinking Water and Watershed Protection Program. There is clear and strong support for this initiative both inside and outside the organization, support that has been well maintained for a decade. The result has been a long list of accomplishments in science and data attainment, education and outreach, and improved land use planning and policy. People recognize that RDN has a tremendous asset in the program staff and that there are very productive partnerships enabling ongoing implementation. The foundation is laid for very bright future in the next operational period.

5.1 Consolidated List of Opportunities

1. Continue to implement the water monitoring data management framework and associated internal staff work plans and ensure this is incorporated into the *Action Plan* update.
2. Continue efforts to move water monitoring data to open, centralized Provincial databases.

3. Where Provincial Government capacity and infrastructure gaps around water data management exist, work with and encourage the Province to fill them.
4. Ensure that operationalizing data attained in the past decade is a key focus of the update to the *Action Plan*; that is, ensure the new plan gives explicit attention not just to data collection but to identifying, in practical terms, what information products are required, what skill sets are needed to produce them, and how they will be used to set objectives for and monitor watershed management.
5. Reduce the information intensity of communications, focusing more on simpler messages that emphasize why watershed protection and conservation are important.
6. Complete a review of branding and consider developing corporate style guidance specifically for the program.
7. Conduct market research with residents to understand their attitudes towards water sustainability and conservation and to seek answers to applied questions about matters such as penetration of water efficient fixtures and appliances and outdoor water use behaviour.
8. Continue to conduct analysis to quantify the impact of the program and its specific initiatives on per capita water demand.
9. Update the RDN water conservation plan with attention to best practices from leading North American jurisdictions; plan to employ demand management techniques that are more targeted at specific user groups, specific end uses of water, and less frequently engaged sectors (such as non-residential customers).
10. Support member municipalities with adoption and implementation of innovative best practice water conservation practices in areas of their domain.
11. Set clear and attainable goals for land use planning support and water policy advocacy in the next operational period, including clarification of what technical expertise and information products will be required. Specifically, identify what will be required to set water-driven objectives for land use management in scheduled updates to official community plans and the Regional Growth Strategy.
12. As a priority, actively engage with First Nations on a government-to-government basis to identify how they would like to participate in implementation in the future.
13. Recognize and incorporate key integrations with other RDN programs including Liquid Waste Management Plan implementation and support for Emergency Services in the pending Action Plan update.
14. Investigate options to improve interdepartmental coordination on watershed protection in the next operational period.
15. Increase efforts to communicate the value of the program and watershed protection to residents, elected officials, and **stakeholders, focusing on the “why”**.

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