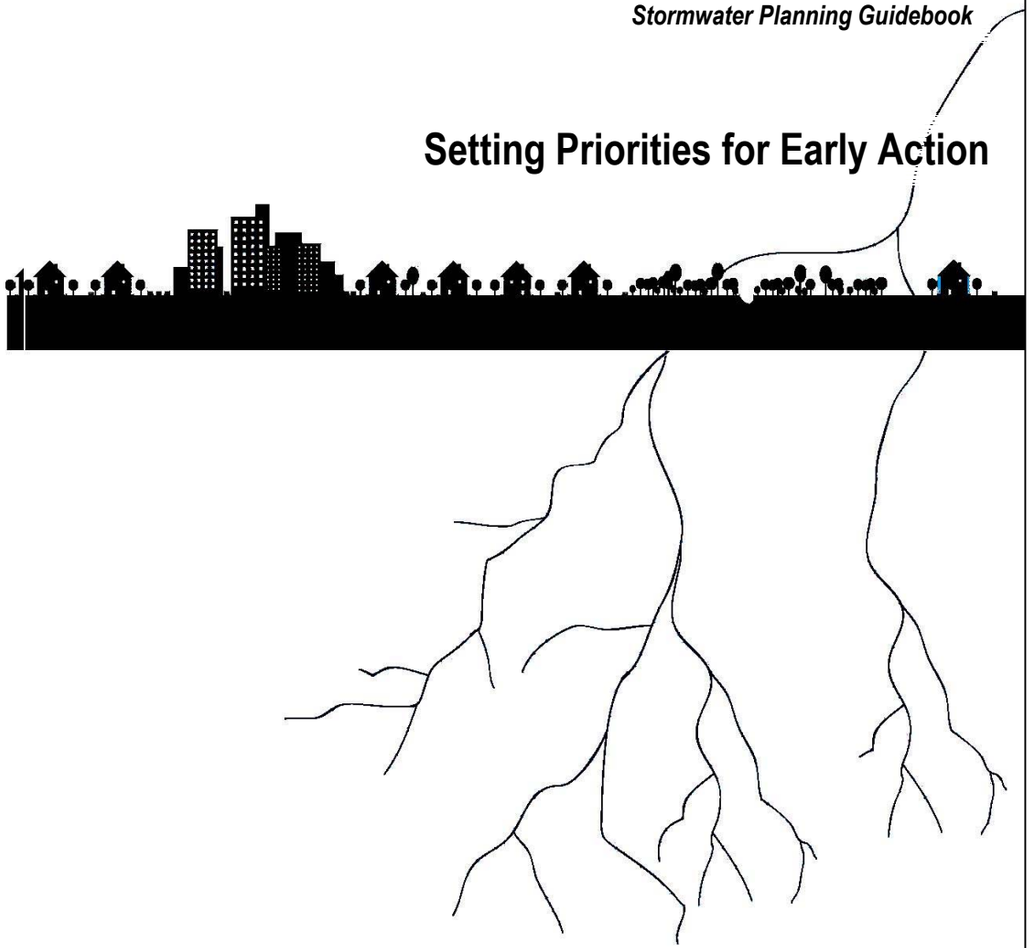
Setting Priorities for Early Action



Chapter Five

5.1 Knowledge-Based Approach

Stormwater management may be driven by expressed goals, objectives and policies as outlined in Chapter 4, or it may be driven by evolving crises on the ground, or both. In either case, a key step for any municipality or regional district undertaking a stormwater planning process is to set priorities for action.

Setting priorities for action should be at two scales:

- **At the regional scale** – deciding which watersheds are priorities
- **At the watershed scale** – deciding which tributary drainage catchments to focus on within priority watersheds

Overview

This chapter presents a methodology for prioritizing action that focuses on low-cost results by getting the right people together in working sessions. This 'knowledge-based' approach contrasts with one that starts with extensive raw data collection and sophisticated mapping.

If the right people with the right knowledge are involved at the start, a knowledge-based approach will be both time-efficient and cost-effective. This combination should translate into cost savings that can be applied to stormwater solutions in the field.

There are many approaches to setting priorities, ranging from data-collection-intensive to knowledge-based. In regions where some watershed areas are at high risk, and others may not yet be priorities, the use of a knowledge-based approach to distinguish those catchments requiring early intervention can be an efficient way to initiate action where it is needed the most to avoid or mitigate stormwater threats.

As stormwater management actions are implemented, more rigorous long-term data collection through a monitoring program is appropriate to allow adaptive management of stormwater solutions.

5.2 At-Risk Methodology

The *At-Risk Methodology* (ARM) creates an early focus on areas that may need priority attention to avoid pending stormwater impacts.

Priority action should be focused in at-risk drainage catchments where there is both high pressure for land use change and a driver for action. The latter can be either:

- a high-value ecological resource that is threatened, or
- an unacceptable drainage problem

It is important to focus on areas of land use change because this is where problems can be turned into opportunities. Land use change is the root cause of stormwater's ecological and property impacts, and this root cause can be eliminated through land development practices that reduce the volume and rate of runoff at the source. Local governments also usually have jurisdiction over, and focus their attention on, areas experiencing land use change.

Integration of Knowledge

In order to identify at-risk drainage catchments it is important to integrate knowledge from each of the planning, ecology and engineering disciplines:

- **Planning** – to identify where the areas are with high pressure for land use change
- **Ecology** – to identify where there are significant aquatic resources.
- **Engineering** – to identify where there are chronic drainage problems

The integration of this information through discussion and brainstorming in an interdisciplinary roundtable process will enable the identification of at-risk drainage catchments – those where future land use change threatens to degrade high-value resources or exacerbate drainage problems.

Identification of Priorities

The result of the foregoing process will be identification of priority drainage catchment areas for stormwater planning and action. The top priority drainage catchment is particularly significant because of its potential to act as a demonstration project for remaining watersheds to demonstrate how:

- profitable land use can proceed while preventing stormwater-related problems
- land development practices that reduce runoff at the source can protect aquatic habitat and property from stormwater related impacts

By monitoring the performance of demonstration projects, land development and stormwater management practices can be improved over time for remaining watersheds.

Introduction to the Interdisciplinary Roundtable Process

The most effective and affordable way to identify at-risk watersheds for priority action is to tap the knowledge of people within any regional district or municipality who have the necessary planning, ecology and engineering knowledge. This can be accomplished through an interdisciplinary roundtable process that integrates planning, engineering, and ecological perspectives from the very beginning of a stormwater planning process.

The inputs and outcomes that define the interdisciplinary roundtable process are conceptualized in Figure 5-1. The knowledge-based mapping products from three focused working sessions (land use, ecology and engineering) feed into an interdisciplinary roundtable. This roundtable is where representatives from the three focused working sessions overlay key information on future land use, aquatic resources and drainage problems to identify at-risk drainage catchments and prioritize action.

The interdisciplinary roundtable is especially appropriate for a jurisdiction that has multiple watersheds. It need not be, and should not be, a lengthy process, especially if the goal is to achieve early action. The objective is to make initial decisions based on informed judgement.

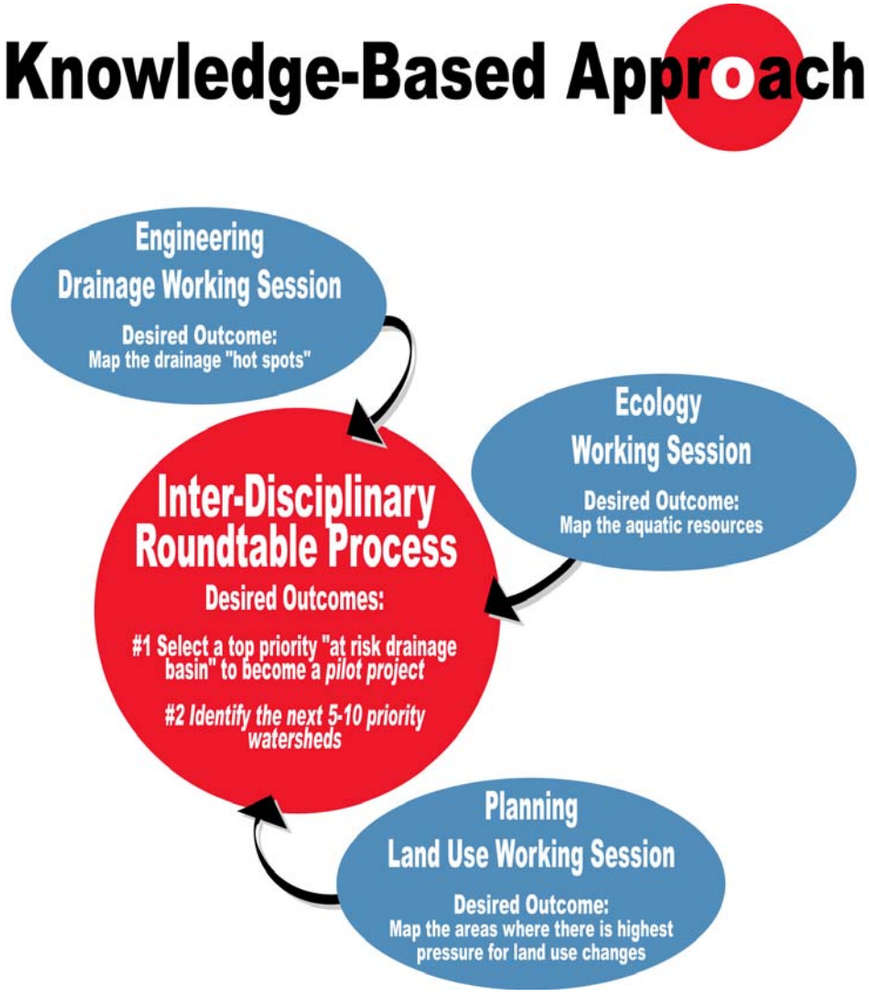


Figure 5-1

Timely Decision Making

Key decisions can be made in a relatively short period of time if:

- **The working session is focused on achieving a specific desired outcome –**

  For example, the desired outcome could be the selection of a top priority at-risk drainage catchment to focus early action. Once action is implemented, this catchment will become a demonstration project for remaining watersheds. A secondary desired outcome would be to identify the next 5 to 10 (say) priority watersheds to provide guidance for the longer-term stormwater management program.

- **The information that is key to achieving the desired outcome is presented -**

  The focused working sessions should produce overall maps of the stormwater planning region, highlighting the areas where:

  - there is the greatest pressure for land use change
  - ecological resources are concentrated or threatened
  - chronic drainage problems (i.e. 'hot spots') occur

  The overlay of this information allows an assessment of drainage catchment risk, which provides a focal point for action.

The focused working sessions should follow these same principles in order to ensure the entire process is effective and affordable.

Focused Working Sessions

The working sessions on land use, ecology and engineering are the foundation of the whole process for identifying at-risk drainage catchments and prioritizing action. For each of the focused working sessions it is important to identify the key participants, desired outcomes and technical information that could be presented at the working sessions to help achieve the desired outcomes. Table 5-1 summarizes this information.

It is recognized that many jurisdictions may not have access to all of the technical information suggested in Table 5-1. Not all of the listed technical information is necessarily required to make informed decisions. The success of the process depends mainly on the local knowledge and experience of working session participants. In the absence of hard data, it is acceptable to substitute value judgements that are knowledge-based.

Table 5-1 Structure for Focused Working Sessions

	Land Use Working Session	Drainage Working Session	Ecology Working Session
Desired Outcome	An overall map of the stormwater planning area (regional district or municipality) showing the areas where there is greatest pressure for future land use change	An overall map of the stormwater planning area (regional district or municipality) showing drainage 'hot spots'	An overall map of the stormwater planning area (regional district or municipality) showing aquatic habitat and species distribution
Key Participants	People who have knowledge about future land use change, including: ▪ planning staff representing all jurisdictions within the regional district or municipality ▪ First Nations ▪ representatives from the development community	People who have knowledge about drainage problems, including: ▪ engineering staff representing all jurisdictions within the regional district or municipality ▪ operations and maintenance staff from all jurisdictions ▪ community ratepayer associations	People who have knowledge about aquatic habitat and species, including: ▪ parks and environment staff representing all jurisdictions within the regional district or municipality ▪ representatives from senior government agencies (WLAP, Fisheries and Oceans Canada, Environment Canada), including habitat biologists and water quality specialists ▪ representatives from local stream stewardship groups and First Nations
Technical Information	Base maps or GIS layers showing key information that affects future land use change, including: ▪ OCP land use designations ▪ zoning polygons ▪ cadastral (lot) boundaries ▪ growth management strategies ▪ existing land cover characteristics, particularly impervious areas (air photos can provide this information) ▪ current development proposals ▪ limits of utility servicing or 'septic suitable' soils This information should be combined with maps showing watershed and sub-catchment boundaries. It would also be useful to assemble air photos showing existing and historic land use patterns in order to provide a perspective on past development patterns.	Base maps or GIS layers showing key factors that influence drainage problems, including: ▪ layout of existing drainage system (storm sewers and creeks) ▪ location of stream crossings, culverts and storm sewer outfalls ▪ location of known flooding incidents or other drainage-related problems ▪ floodplain mapping This information should be combined with maps showing watershed and sub-catchment boundaries. It would also be useful to provide air photos that show existing land uses.	Base maps or GIS layers showing key information that affects aquatic habitat and species, including: ▪ vegetation mapping, particularly for riparian areas ▪ watercourse classification and data, including fish presence ▪ relevant water quality data ▪ sensitive ecosystem polygons ▪ soils mapping ▪ floodplain mapping This information should be combined with maps showing watershed and sub-catchment boundaries. For certain regions, considerable biophysical mapping has already been done by senior government agencies.

5.3 Case Study: Stormwater Priorities in the Regional District of Nanaimo

The Regional District of Nanaimo (RDN) is typical of many rural/suburban regional districts in British Columbia. The majority of the regional district is in forestry uses, with growing pockets of agriculture and urban land uses at lower elevations.

Stormwater management activities to date have been concentrated in the member municipalities of Nanaimo, Parksville and Qualicum Beach. These activities have been primarily drainage-focused, and the RDN has not played a significant role in their delivery. Furthermore, there has been little planning for stormwater management in the electoral areas, other than that associated with road drainage.

Since there are development areas in the regional electoral areas that include urban densities of residential, commercial and industrial land uses, there are already stormwater impacts that likely require attention within the RDN. Stormwater issues will be exacerbated by projected urban growth increases in parts of the electoral areas.

Watersheds in the RDN

There are an estimated 50 watersheds within the developed areas of the RDN.

If a stormwater program were to commit to developing Integrated Stormwater Management Plans (ISMPs) for each of these watersheds, the program costs would be high, and political acceptance in this largely rural area would be problematic. Further, the benefits of such a comprehensive program would be limited for the RDN, because many of these watersheds are not at risk of urban stormwater impacts. In addition, the RDN does not have jurisdiction over forestry or agriculture land uses.

Clearly, rural regional districts like the RDN need to set priorities for stormwater planning that focus their efforts. The At-Risk Methodology was applied in the RDN as a means of determining these priorities.

Workshop Structure and Methodology

In general, the RDN followed the workshop structure and methodology outlined in this chapter, with one exception. Whereas the Land Use Workshop was held as a separate event, the Drainage and Aquatic Habitat Workshops were combined into a single event, for sake of time and cost efficiency and to allow for effective communication among the various disciplines involved in the process.

Land Use Workshop

Invited guests to the Land Use Workshop, in addition to members of a steering committee, included:

- Planners from the RDN
- Planners, Engineers and Approving Officers from member municipalities
- Approving Officers from the Ministry of Transportation and Highways
- Representatives of the Real Estate Board and local development associations
- Representatives of local agriculture associations

The agenda for the workshop included a review of stormwater management concepts, and the general context and objectives of the stormwater planning process.

General mapping provided at the workshop included watershed boundaries overlaying recent airphoto information, as well as cadastral and land use designations.

Identification of Land Use Change

Within this general context, participants were asked by a facilitator to identify areas in the RDN where rapid land use change was expected over the next 10 years. Specifically, participants identified areas where:

- urban development is anticipated
- zoning for 1 hectare (2.5 acre) parcels or smaller is in place but not yet built out
- utility servicing for such zoning is in place or imminent

- such land use change overlays a large portion of a drainage basin (two-thirds or more)
- time permitting, the group was also asked to identify areas of substantial expected re-development, as well as areas where lower density developments might be expected to have stormwater impacts

To record the information put forward by the group, the facilitators applied 'post-it' notes to the maps with notations. The group identified approximately twenty-one areas of rapid land use change in a half-day workshop.

Of these twenty-one areas, ten were eliminated from further consideration by the RDN since they were located entirely within the boundaries of member municipalities. The remaining eleven areas were summarized and forwarded to the Drainage and Aquatic Habitat Workshop.

There was considerable information exchange among the group, with many participants learning of pending land use changes for the first time.

Drainage and Aquatic Habitat Workshop

In the interest of time, the Drainage and Aquatic Habitat Workshops were combined into a single event.

In addition to the steering committee, invited guests for the Drainage Workshop component included:

- Engineers from the RDN
- Engineers from member municipalities
- Approving Officers and Operations Managers from the Ministry of Transportation and Highways
- Engineers from the Ministry of Water, Land and Air Protection
- Representatives of local agriculture associations
- Representatives of local consulting engineering firms

Invited guests for the Aquatic Habitat Workshop component included:

- Habitat Biologists and Water Quality Biologists from WLAP
- Habitat Biologists and Researchers from Fisheries and Oceans Canada
- Biologists from Environment Canada and the Canadian Wildlife Service
- Environmental Planners from member municipalities
- First Nations
- Representatives of local environmental consulting firms
- Representatives of local stewardship organizations, including land trusts, field naturalists and streamkeepers

The agenda for the Drainage and Aquatic Habitat Workshop included a review of stormwater management concepts for new participants, the general context and objectives of the stormwater planning process in the RDN, and the results of the Land Use Workshop.

Mapping was presented that showed the eleven candidate study areas that resulted from the Land Use Workshop in more detail. The mapping illustrated the extent of proposed land use change overlaid on watershed drainage boundaries and airphotos. In particular, mapping was used to identify land use changes that would cover a large proportion of a small drainage basin. Percentages of this expected cover were estimated. Maps also showed available information on drainage sub-catchment boundaries and watercourses.

Identification of Areas at Risk

Within this general context, participants were asked by a facilitator to review and comment on drainage or habitat risks related to the eleven candidate areas. Specifically, for each of the candidate areas, participants identified:

- areas of high risk for drainage-related problems like flooding or instream erosion and sedimentation
- risks to existing or potential fisheries and aquatic resources

After the identification of risks, participants were asked, as individuals, to rank the candidate areas by priority for integrated stormwater management (from 1 as highest to 11 as lowest). Tabulation of the results has provided the RDN with a sense of priority areas on which to focus. The next step for the RDN will be to develop an ISMP on some of these priority catchments. For a detailed discussion on developing an ISMP, refer to Chapter 10.

Reporting Results and Follow-Up Questionnaire

A third workshop was held to report the results of the process back to the participants.

This important step allowed for a presentation of the results in context along with the draft RDN five-year Stormwater Action Plan. The workshop allowed for discussion among the participants about the process and the results, and was especially important for discussion of minority opinions.

The RDN also distributed a follow-up questionnaire to confirm acceptance of the process and the results.

Strengths and Limitations of the At-Risk Methodology

The At-Risk Methodology was useful and successful for the RDN. The great majority of participants felt that it was appropriate and effective for making decisions about priorities. Strengths of the process include:

- low cost
- relative speed of decision making
- effectiveness of the process for selecting priorities and moving towards action without undue delay

Limitations of the process are:

- accuracy of the process relies on the level of knowledge of individuals participating
- subjective nature of the process can leave it open to challenge by competing interests

Building Support Through the Interdisciplinary Roundtable Process

A key byproduct of the At-Risk Methodology is the transfer of information among the participants.

It is a rare occasion that brings together into one room the key planning, engineering and environmental professionals and non-government organizations from across a region.

The RDN Interdisciplinary Roundtable provided a key opportunity for presentation of current stormwater management concepts to this interdisciplinary group. See Section 5.3 of this chapter for related information. The participants were able to understand and discuss how integrated stormwater management would involve co-operative effort.

Communication with the Interdisciplinary Roundtable should not end with the conclusion of the At-Risk Methodology. The communication and access to expertise that was established will be very important throughout the stormwater management process, including at both the neighbourhood and site planning scales when more detailed decisions become necessary.

A Look Ahead

As the RDN moves toward approval and implementation of its Stormwater Action Plan, the understanding created among professionals in the region through the At-Risk Methodology process will provide an important foundation for future success**.**

5.4 The Role of Mapping

Mapping the right information can provide a valuable tool to support decision making. However, mapping itself does not make the decisions; people make decisions. This is a distinction that often seems to be overlooked.

Keeping it Simple

Information presented must be directly relevant to the desired outcome of the working session. Maps should help participants achieve the desired outcome rather than divert attention away from it. This is particularly important for the Interdisciplinary Roundtable, where different types of information are integrated.

The maps of land use change, aquatic resources and drainage 'hot spots' produced as a result of the focused working sessions should only present the information needed to identify at-risk drainage basins. Ideally, there should only be three maps presented at the Interdisciplinary Roundtable, each one a distillation of the more detailed mapping presented at each of the three focused working sessions.

Graphic Overlay versus Geographic Information System (GIS)

The focused working sessions and the Interdisciplinary Roundtable rely on the overlay of maps with key information. This can be accomplished using:

- graphic overlay maps, or
- GIS ArcView layers

Both options will achieve the same basic objective, which is to illustrate the relationship between different types of information. While the data linkage and query options available with GIS provide greater opportunity for analysis, they also require greater time investment.

Use of Graphic Overlays

Relevant relationships may be obvious from a review of map overlays, and this may provide a more affordable analysis that is of equal effectiveness to the GIS data query. This is particularly true for the Interdisciplinary Roundtable, where the emphasis should be on simple maps that present only the relevant information. It will likely be obvious where areas with high pressure for land use change overlap areas with high habitat value or drainage 'hot spots'.

For smaller regional governments in particular, there is a likelihood that lack of GIS resources and training will lead to stormwater inertia if too much reliance is placed on technical sophistication in GIS.

Application of GIS

For jurisdictions that do have access to GIS, it provides a good tool for keeping accurate records of effective impervious area (EIA), which is a key determinant of watershed health. Using GIS, the EIA of each new development or retrofit area could be recorded at the subdivision or building permit stage. In this way an accurate record of EIA can be established over time. Airphoto or map interpretation methods cannot record EIA because they cannot differentiate impervious area that is hydraulically disconnected.