

Rouge River Watershed

Scenario Modelling and Analysis Report

Chapter 1.0

Introduction

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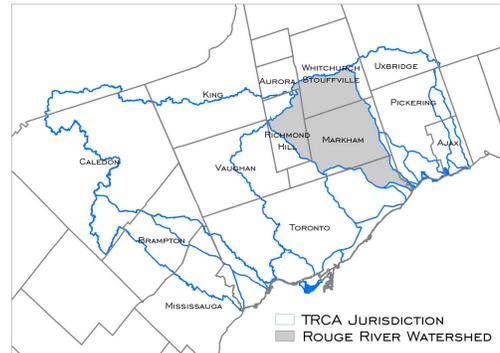
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INTRODUCTION

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The Toronto and Region Conservation Authority (TRCA) and the Rouge Park Alliance, in cooperation with the multi-stakeholder Rouge Watershed Task Force, have applied an innovative study approach to the development of a watershed plan for the Rouge River watershed. The Rouge River watershed lies in the south-central portion of the Greater Toronto Area, draining an area of 336 km² from its headwaters in the Oak Ridges Moraine to its mouth at Lake Ontario (Figure 1-1). The watershed supports a mix of agricultural, urban and rapidly urbanizing land uses and their associated management challenges. Many stakeholders believe that decisions over the next five to ten years will be critical in determining the long term health of the Rouge River watershed. Therefore, in order to provide effective guidance for the protection and enhancement of the watershed, the study adopted a forward thinking, science-based and integrated approach.

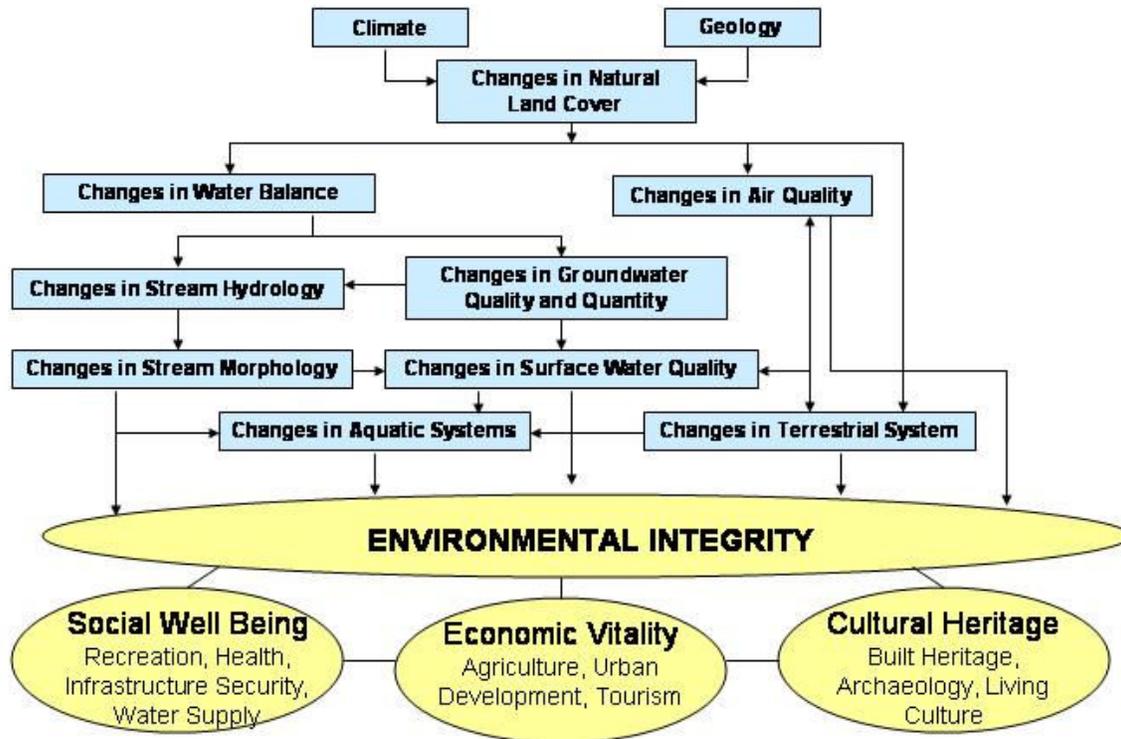
Figure 1-1: Rouge River Watershed



Central to all aspects of the study was the recognition that the Rouge River watershed is complex, consisting of many systems that interrelate. Effective evaluation of these systems involves an examination of not only the features and functions but their integrated nature. From the 1980s to the present, watershed management practices in Ontario and internationally have evolved significantly toward an integrated approach. Increasingly, watershed management addresses a broader range of resource and environmental protection issues than previous initiatives, and considers the interrelationships among these issues (CVC, GRCA, and TRCA, 2002). The Rouge Study therefore set out to develop an improved basis for decision-making that is based on a better understanding of the interactions between human and natural systems and thresholds of watershed health.

The watershed response model (Figure 1-2) illustrates the significance of geology, climate and land cover in shaping a watershed's hydrological, biological and cultural systems. The diagram also illustrates the pathways and order in which changes in individual watershed systems occur in response to changes in land cover, climate or management practices. Ultimately these system changes can affect valued watershed services, such as recreation or resource based industry, which rely on overall health and integrity of the watershed.

Figure 1-2: Watershed Response Model



The Rouge River watershed exhibits reaches along a continuum between its pristine natural condition that existed before human settlement and a degraded, unhealthy condition that could result from extensive human impacts. The watershed plan aims to guide land use and management activities, such that a desirable level of watershed health can be protected or restored.

The watershed planning study was carried out in three phases. The first phase involved characterization of watershed systems and evaluation of current conditions according to a set of watershed goals and objectives. This work was documented in the *Rouge River State of the Watershed Report* (TRCA, 2007). In the second phase, current and anticipated future stresses on the watershed and possible management approaches identified in Phase 1 were further analysed through modelling studies, which are the focus of this report. Additional analysis of these issues and approaches occurred during expert workshops, called “management summits”, and with reference to literature from other jurisdictions. Information and strategic recommendations arising from the first two phases of study contributed to the development of the watershed management plan, which constituted Phase 3.

The purpose of the modelling study component of the watershed plan was to assist the technical team and Task Force in:

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- improving knowledge of watershed systems, their interdependencies and relative sensitivity to change;
- understanding how watershed conditions would respond to future land use and climate changes; and
- understanding the relative effectiveness of various management actions in achieving watershed goals and objectives.

This information provided a sound basis for setting strategic management recommendations for inclusion in the watershed plan.

The TRCA developed an integrated approach to the modelling and analysis work that recognized the complex interactions among natural systems and human activities. An innovative aspect of this work was a set of commonly defined scenarios of potential future watershed land use, climate and management strategies that was prepared for subsequent modelling and integrated analysis by individual disciplines. Predictive modelling tools or approaches were established that enabled examination of the effects of each scenario on concerns associated with water balance, hydrology, hydrogeology, water quality, aquatic and terrestrial systems, cultural heritage and nature-based recreation. Effects were evaluated in terms of acceptability with respect to established watershed goals and objectives and working targets. The overall watershed response model illustrated the pathways and linkages among the individual systems and was used to guide the integrated analysis. The individual models were linked in that often output from one model was required as input to another. Care was taken throughout the study to ensure the compatibility and comparability of study results.

This report summarizes the technical study design, findings and recommendations associated with the scenario modelling component of the watershed planning process. While the analysis accounted for interaction between various watershed systems, the study findings are presented in this report according to conventional themes with appropriate cross-referencing between sections. The themes include: surface water quantity, surface water quality, groundwater, aquatic systems, terrestrial natural heritage systems, cultural heritage and nature-based recreation. The report provides concluding observations about the effectiveness of applying an integrated, watershed based approach to the development of the watershed plan.

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1.1 REFERENCES

CVC, GRCA, and TRCA. 2002. *Lessons Learned: Best Practices in Watershed Management*.
Report prepared for Conservation Ontario and the Government of Ontario

TRCA. 2007. *Rouge River State of the Watershed Report*.