

WATERSHED MANAGEMENT AND PLANNING IN ONTARIO
WITH SPECIAL REFERENCE TO CONSERVATION AND PROTECTED AREAS:
A RESPONSE

Steve Hounsell
Ontario Power Generation

Introduction

Watershed planning and protected areas planning have experienced major advances over the last decade. Both approaches aspire to achieve ecological sustainability, both for inter-generational human benefits and for the conservation of biodiversity. Nevertheless, there has been a history of “working in silos”, which has been reinforced by academic streaming and institutionalization. It is suggested that there is a need to break down the institutional silos and to promote even greater integration of watershed planning with natural areas and protected areas planning. Sustainability is suggested as the overriding and unifying goal that should bring these two approaches closer together into more effective interdisciplinary studies.

Watershed management, as a best management practice, can be described as an interdisciplinary, integrative, participative and advisory process to planning authorities, largely the municipalities. Although watershed planning goals can vary, at its highest level, it tends to promote notions of sustainability-meeting the needs of people for safe and sustainable supplies of water, while also sustaining the ecological processes, features and renewable resources within the watershed, both in the present and in the future. Dr. Shrubsole, in his keynote address, made this clear in his statements on balancing the needs of environment, society and economy, as espoused by *Agenda 21*. Notions of sustainability resonate very much with goals of conservation and protected areas planning.

Historical Overview of Watershed Planning and Protected Areas Planning

Watershed planning evolved considerably throughout the 1990s. It has become more integrative and more participatory. The state of the science has improved, particularly in the areas of quantitative modeling for ground water quantity and quality and surface water quantity and quality. Other areas may be lagging in terms of quantitative modeling, but are advancing in more qualitative terms, notably the areas of terrestrial natural heritage planning and social dimensions. The effective integration of all of these themes, is still problematic, but it is advancing nevertheless. Systems thinking and effective integration is still elusive.

Protected Areas and Natural Areas Planning

Parallel trends in the advancement of natural heritage and protected areas planning has occurred over the past decade. The 1990s witnessed some great advances in this field, largely through the greater availability and power of geographical information systems (GIS) and the enhanced availability of digital databases on natural heritage, and satellite imagery. These technological advancements paralleled the growth of conservation biology and landscape ecology as new integrative disciplines. These collective advancements in technology and the state of science have enabled a degree of analysis and sophistication that was previously unattainable.

In the Ontario context, advances in protected areas planning is perhaps best represented through the *Lands for Life* effort, throughout the area of the undertaking for the *Timber Class Environmental Assessment*. The result of that effort was most impressive: the establishment of 378 new protected areas, with the promise of more to come, representing the ecological diversity of that expansive region. In southern Ontario, we have *Carolinian Canada's Big Picture*, the *Big Picture 2002*, the *Oak Ridges Moraine Plan*, the *Niagara Escarpment Plan* and some excellent regional and local scale initiatives such as the Toronto and Region Conservation Authority's natural heritage system, among others. These are all notable advances that have occurred in a relatively short period. The involvement of various environmental non-governmental organizations (ENGOs) has been critical to these achievements.

Watershed Management and Protected Areas Planning — Finding Common Ground

The higher order vision of state-of-the-art watershed planning is consistent and complementary with the goals of protected areas conservation and protection. That is also where we will find common ground between watershed planning and protected areas planning. The following vision statement, taken from the *Provincial Final Report of the Science and Technology Task Group of the Watershed Planning Initiative* (Ontario Interministry Task Group, 1995), makes this relationship clear:

"The Task group members developed a vision for the future which is the achievement of a sustainable environment for Ontario through planning on a watershed basis. In this vision, ecosystem function, structure and composition sustain human activities and inherently set limits to development and consumption processes. As a result, river systems have adequate base flows, groundwater is conserved, surface waters host stable self-sustaining aquatic communities, a variety of linked terrestrial systems support self-sustaining indigenous plant and animal life, clean water is available for municipal, industrial and agricultural use, and humans have access to a variety of recreational and resource use opportunities."

Notions of sustainability are central to watershed management and protected areas management. The vision is to work towards ecologically revitalized and sustainable water-

sheds and landscapes. That vision is based on the need to achieve functional, ecologically sustainable ecosystems that conserve biological diversity (ecosystem, species and genetic diversity), provide clean air and water, and productive soils, and the resources that we need to sustain ourselves both now, and for future generations. It places people in context as being a part of nature and dependent upon its services for our survival and prosperity.

Protected areas need to be embedded within functionally sustainable watersheds and landscapes if they are to be successful in achieving their goals of conserving biodiversity. The notion of directionally moving towards ecological sustainability is key and the overriding goal. We need to understand what that means and we need to ask ourselves whether our decisions and actions are moving us closer, or further away, from that goal.

Suggested Future Development Needs: Integration is Essential. We need to do Better.

There is a legacy of reductionism, even within the ecological sciences. We work in silos and we need to break these barriers down. This is evident in academic streaming and even continues through the organizational structures of government ministries and agencies. It is readily apparent when you examine the aquatic sciences versus the terrestrial sciences, or watershed planning versus protected areas planning. The two groups seldom converge and when they do, it is often "late in the game and a forced-fit".

The same dichotomy exists in how we spatially define "ecosystems" (the "silos" continue). Watershed and aquatic scientists define ecosystem boundaries within a spatial hierarchy of watershed (drainage basin) mapping, while terrestrial scientists, and protected areas planners, define ecosystem units using hierarchical ecological land classification mapping, driven by landform, moisture and climatic variables. Groundwater aquifers typically have even different boundary systems, as do the airsheds, which affect both terrestrial and aquatic ecosystems. All are human constructs, designed to facilitate our understanding and analysis of ecosystems. What is needed is the integration of all of these layers and systems. That integration is possible with geographical information systems (GIS).

The draft *Watershed Management Plan for the Duffins Creek Watershed* in Pickering (Toronto and Region Conservation Authority, 2003) is an excellent example of the benefits of integrating terrestrial natural heritage planning with aquatic ecosystem planning. Natural heritage planning was formally integrated into this plan and became a key driver for enhancing watershed function. Interestingly, of the various future scenarios that it modelled, the most positive outcome was the one which modelled the effects of an enhanced terrestrial natural heritage system. That outcome not only had positive gains from a biodiversity conservation perspective, but it also contributed to the management of hydrological, hydrogeological, water quality, aquatic resource, recreation and human heritage concerns. The report went on to say: "*At a watershed scale, the protection of a viable natural heritage system will provide the foundation for a sustainable watershed. By protecting the ability of natural systems to carry out watershed functions there will be*

less need for costly maintenance of infrastructure, less risk with unproven technological solutions to watershed management and cost savings in taking a preventative approach rather than a reliance on remedial or 'end-of-pipe' solutions." (Toronto and Region Conservation Authority, 2003)

Future Opportunities

Several opportunities exist to advance the effective integration of protected areas planning with watershed planning.

- *Smart Growth* — *The Central Ontario Smart Growth Panel (2003)* has recognized and recommended the development of a comprehensive natural heritage system for the entire region, as well as effective watershed-based source protection. This is further supported by the Federation of Ontario Naturalists's *Smart Future for Ontario* (Pim and Ornoy, 2002). Integration, driven by sustainability goals, is key.
- *Policy Reform* — We need the Policy "enablers" to make sustainable ecosystems and sustainable communities not only a possibility, but also a reality.
- *Species at Risk Act (SARA) and Ontario's Endangered Species Act* — The promulgation of SARA should provide enhanced regulatory tension to improve our conservation, protection and recovery efforts for species at risk. Restoring critical habitat is key and it must be done within the context of a sustainable landscape/watershed matrix;
- *Watershed-based Source Protection (MOE, 2003)* — Healthy watersheds provide a wide variety of social benefits. The recommendations of the Walkerton enquiry and the report by the Advisory Committee on Watershed-based Source Protection Planning provide notable opportunities for enhanced watershed management and protection. These recommendations will enhance the likelihood to integrate sound watershed planning with sound natural heritage planning, coming even closer to achieving functional ecosystem management. Government support for many of these recommendations is needed.
- *Climate Change and Kyoto* — This could be an important driver and opportunity for serious habitat restoration work. Climate change has the potential to cause significant adverse impacts to our ecosystems (Malcolm *et al.*, 2000a; 2000b). There is an urgent need to buffer against those changes and to start working with nature to sequester CO₂. The need to sequester carbon could act as a catalyst for progressive land use change, biodiversity conservation and enhanced ecosystem services, through strategic afforestation and ecological restoration efforts.
- *Sustainability* — It is suggested that ecological sustainability needs to be an overarching goal to watershed planning and protected areas planning. It means that we must work to live within the waste assimilation and regenerative capacities of our ecosystems. That implies living within the carrying capacity of our regional ecosystems and watersheds. In that regard, ecological footprints (Wackernagel and Rees, 1995) provides both self-awareness in terms of our demands on nature and provides the direction for what needs to be done to

become sustainable (see: <http://www.rprogress.org/>). This is further complemented by The Natural Step Framework (see: www.naturalstep.ca/index2.html) which articulates a systematic framework for understanding and addressing sustainability (Robert, 2002). It spells out the basic system conditions, or rules of the sustainability game, which must be satisfied should we wish to become a sustainable human enterprise. We need a common vision for a more sustainable and healthy future and we need the public support and political will to achieve it. A true ecosystem approach, integrating watershed science with conservation biology and protected areas planning, can help us to achieve that vision.

References

- Central Ontario Smart Growth Panel. 2003. *Ontario Smart Growth — Shape the Future, Final Report*. Ministry of Public Infrastructure Renewal: Toronto. 97 pp.
- Malcolm, J. R. and A. Markham. 2000a. *Global Warming and Terrestrial Biodiversity Decline*. World Wildlife Fund: Gland, Switzerland.
- Malcolm, J.R. and L.F. Pitelka. 2000b. *Ecosystems and Global Climate Change. A Review of Potential Impacts on U.S. Terrestrial Ecosystems and Biodiversity*. Pew Centre on Global Climate Change: Arlington, VA. 41 pp.
- MOE (Ministry of the Environment). 2003. *Protecting Ontario's Drinking Water — Toward a Watershed-based Source Protection Planning Framework — Final Report*. Advisory Committee on Watershed-based Source Protection: Toronto, ON. 77 pp.
- Ontario Interministry Task Group. 1995. *Final Report of the Watershed Planning Initiative — Science and Technology Task Group*. Toronto, ON. 76 pp.
- Pim L. and J. Ornoy. 2002. *A Smart Future For Ontario. How to Protect Nature and Curb Urban Sprawl in Your Community*. Federation of Ontario Naturalists: Toronto, ON. 71 pp.
- Robert, K.H. 2002. *The Natural Step Story — Seeding a Quiet Revolution*. New Society Publishers: Gabriola Island, BC. 274 pp.
- Toronto and Region Conservation Authority (TRCA). 2003. *A Watershed Plan For Duffins Creek and Carruthers Creek*. A Report of the Duffins Creek and Carruthers Creek Watershed Task Forces: Downsview, ON.
- Wackernagel, M. and W. Rees. 1995. *Our Ecological Footprint: Reducing Human Impact on Earth*. The New Catalyst Bioregional Series. New Society Publishers: Gabriola Island, BC. 160 pp.