

Introduction



The Created Need

Clean, clear water is the primary demand of people. We depend on water coming from wells deep beneath our homes, or pumping facilities on lakes with elaborate pipelines spread throughout our communities. On average, a person living in Ontario consumes about 360 litres of water per day. Each litre follows a cycle that starts from a surface or underground source and ends up returning to the ground, river, lake or stream. In addition, when you consider that 40 per cent of the base flow of southern Ontario waterways comes from valuable groundwater resources, it is not surprising to think of rivers and streams as a barometer of our environmental well being.

In this decade, economic growth and sustainable development bring to mind the contradictions of how we, as a society, think of the Ontario landscape and its natural resources. We know that uncontrolled consumption of natural resources for economic development leads to their eventual exhaustion and collapse. In contrast, the sustainable use of natural resources nurtures the needs of future generations, while providing for the people of today. Commerce and the natural environment should be considered mutually dependent since it is impossible to have a high quality of life with economic development, in the midst of a degrading natural environment.

Without knowledge and understanding of past human impacts, the future is difficult to predict. We have a collective understanding of our past influences on our natural environment and diverse opinions on how we should continue to live within it. This difference in perspectives is what forms the need for comprehensive land use planning and developing solutions that consider all users of natural resources. This is commonly referred to as an *ecosystem approach* where economic, social, physical, natural and cultural interests are considered connected and integrated into a comprehensive land use plan.

Rivers and streams have been a vital part of our cultural heritage since settlement in the 1740s and even prior to that for the First Nations. They were the highways of the landscape, moving trade, people food and lumber. With European settlement came the construction of towns, cities, mill dams, the clearing of forests, intensive agriculture, livestock production, and new modes of transportation. By 1840, much of the southern Ontario landscape had been cleared for urban areas and agriculture. Early settlement practices typically ignored the natural features and their dynamic processes. These same rivers and streams soon became the dumping ground for sawdust, garbage, chemicals, and sewage as settlement turned to industry, municipal growth, and prosperity. Flooding became an ever-growing fear of people living close to the river.

Primarily in rural southern Ontario, forested land and valleys turned to row crops and pasture over

mere decades, with rivers and streams responding with varying degrees of instability. Shrinking forests, which normally stored water and slowly released it as base flow to the river, had less capacity to contain snowmelt. Wetlands, which act as massive storage facilities for our waterways, were drained and filled in order to make way for row crops or shopping malls. Some streams that traditionally supported fish all year became dry and lifeless. Livestock, still to this day, has unrestricted access to many of our streams and rivers. This causes onsite and downstream problems for drinking water supplies, aquatic life, and beaches, as increased bank erosion, phosphates, nitrates and fecal bacteria impair the quality of the waterways. Clean water, as an essential element to our existence, needs to be protected from poor rural land use practices.



Figure 1.1: Many of our urban streams have been straightened and lined with concrete.

Municipal growth continues around us as we watch rural lands being consumed by the vastness of urbanization. Over the last 40 years, many urban streams and rivers have become hardened storm drains that are devoid of life. In the last century, many smaller streams have been straightened, enclosed or re-directed in order to make way for urban form. Stormwater, flowing over hard surfaces such as asphalt, builds to tremendous volumes during a storm, collecting pollutants along its path as it eventually unleashes itself on a river valley through a connected series of underground concrete pipes. Rivers and streams respond with aggravated flooding and erosion, channel widening, sediment contamination, and loss of aquatic life. Decades of damaging actions associated with urban land use practices prompted the need to prevent continued misuse of our waterways.

Disheartening as these images of human intervention might seem, it is this environmental carelessness that has prompted the need to protect remaining natural features and to rehabilitate those that are degraded. In light of our streams, this call has been out for at least three decades.

Restoration, Rehabilitation or Reclamation

Many hours were spent deciding on the best name for this manual, partly because our observations of similar documents from around the World Wide Web led to some confusion regarding standard terminology. The definitions within the *Dictionary of Natural Resource Management*, written by Julian and Katherine Dunster, were found to be very helpful. Similar definitions within the *Stream Corridor*

Restoration Handbook, a recent product of the U.S. Department of Agriculture, also assisted our effort to reduce word confusion. Moving forward, we believe that we have used the best-suited definitions based on an amalgamation of what these recognized publications had to offer.

Restoration, rehabilitation, and reclamation appear to have common meanings, but in the field of ecology they have unique definitions that are driven by expectation. Mending the impacts of the past is the common theme, with each definition describing the degree of degradation and spirit of renewal. *Restoration* encompasses a complex understanding of the physical, chemical, and biological processes within the watershed, while recognizing land uses that have caused anatomic as well as functional damage to the ecosystem. This damage has impaired the recovery of the naturally dynamic ecosystem. The goal is to return it to its original state by removing the cause of degradation. *Rehabilitation* embraces the same understanding of ecosystem functions and processes but does not focus on the recovery of the pre disturbance condition. Instead, rehabilitation targets the recovery of natural functions and processes within the context of the disturbance. *Reclamation*, taking one-step further, aims at recreating the functions and processes of a naturally stable ecosystem with the understanding that it will be quite different from the condition prior to disturbance.

We chose to rely on rehabilitation as the most appropriate descriptor since it defines the situation of the majority of river and stream projects in Ontario. Most projects fall into the category of recovering natural functions and processes within the context of the disturbance. Total restoration is impossible to attain when you consider the thousands of years of natural processes that have

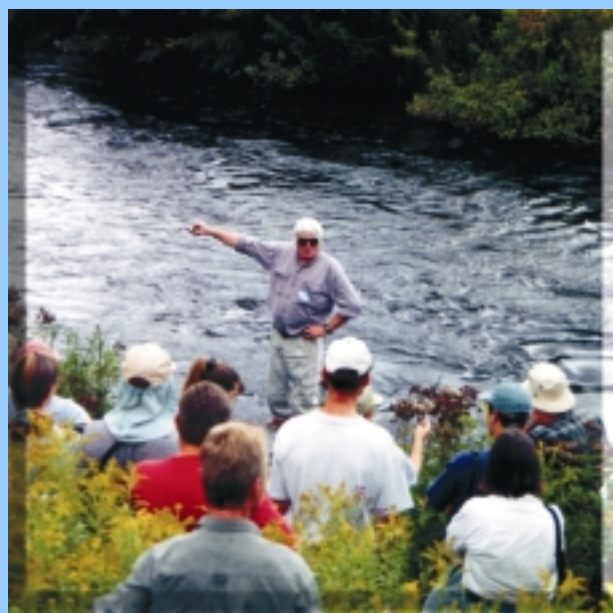


Figure 1.2: Chris Marshall providing some history about his experiences with healing streams.

sculpted the landscape, combined with the ever-growing degree of human influence. Yet the term restoration can be generally applied to situations where local impacts are being removed. Likewise, reclamation can be applied in cases where a stream or river and its natural processes are being recreated within the confines of existing disturbance.

Building on Experience

In an effort to uncover the history and growth of stream rehabilitation in Ontario over the last two decades, several key people were interviewed through the course of developing this manual. We are fortunate to have kept in contact with these seasoned veterans. Likewise, we are fortunate that their early demonstration projects are still noticeable today.

In some cases, these people brought their skills and knowledge when they moved here from abroad. Chris Marshall, of the Cold Creek Flyfishers, fondly recalls his younger years in England, planting waterweeds and building pools to improve a local river. Since moving to Canada, Chris has conveyed his passion for rivers in the rehabilitation of Cold Creek, near Belleville. Early projects included cattle fencing and tree planting. Even as recent as the fall of 1997, Chris coordinated a successful workshop called Healing Streams. Ron Holloway, a respected river-keeper from the River Itchen in England, brought his guidance and wealth of knowledge as the key speaker for the event.

Similarly, Richard Hoffman, one of the founders of Trout Unlimited in Ontario, remembers rehabilitation work as a boy in a Wisconsin meadow stream back in the late 1950's. He was happy to work alongside his father, a biology teacher, at the time. By 1975, Richard was active in the Credit River with boulder placements and helping form the beginnings of a local Trout Unlimited chapter.

Steve Copeland, past project coordinator for Trout Unlimited - Greg Clark Chapter, had his first experience in stream rehabilitation while living near the Pine River in northern British Columbia. According to Steve, a large pipeline project had caused a great deal of damage to the river during the construction season of 1975. Sediment was entering the watercourse as a result of the pipeline construction and continuous vehicle crossing. Area residents took to lobbying the town council and eventually succeeded in having bridges constructed and riverbanks stabilized with rock. Three years later, Steve met up with Bob Marshall of Trout Unlimited's Southern Ontario Chapter on the Credit River. Shortly after becoming involved with that group, he went on to become the project director working with Jack Imhof, from the Ministry of Natural Resources (MNR), and Geza Gespardy from the Credit Valley Conservation Authority. Today, Steve promotes stream conservation through partnerships as the President of

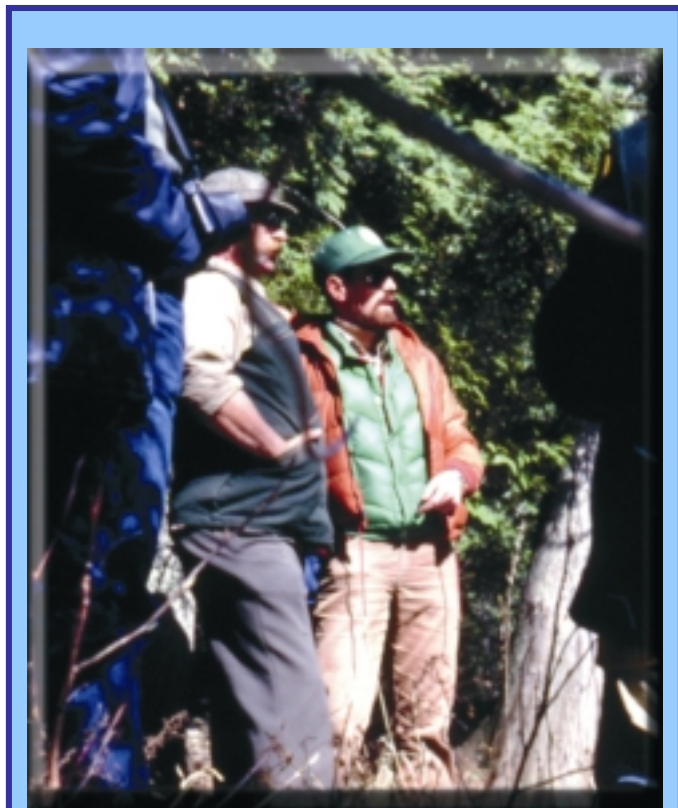


Figure 1.3: Jack Imhof with renowned English riverkeeper Ron Holloway in the early days of stream rehabilitation (CVC photo)




Ontario Streams. Nothing makes him happier than seeing people actively committed to their rivers.

Our home grown ecologists, biologists and technicians, including Jack Imhof, Delbert Miller and Tim Rance, received exposure to stream improvement during the 1970's in a variety of situations. Jack immersed himself into the early writings of Wisconsin's Dr. Ray White, and by 1973, Imhof was active in a brown trout project with the Izaak Walton Fly Fishers Club (IWFFC) on Bronte Creek. Personal interest, a love for fishing and a quest for knowledge as a developing stream ecologist, inspired Jack to become involved with clubs like IWFFC. Delbert, working as an MNR fish and wildlife technician under the guidance of biologist Harold Manson, was involved with the construction of channel constrictors and log deflectors in Norfolk Sand Plain streams in the early 1970's. Tim Rance, while stationed in Owen Sound as the MNR District Biologist in 1982, was fortunate enough to have the pleasure of working with a local conservationist, Osbourne "Os" McArthur. Os, now just over 80 years old, has been active in stream improvement since the late 1940's, starting in the Spey River and later with improvement projects in the Sydenham River during the 1960's. Tim and Os, with the help of Sydenham Sportmen's Association volunteers, other clubs and the local conservation authority, added spawning gravel, constructed floating covers, installed pallet cover structures and placed instream boulders to help restore a dwindling resident brown trout population in the Sydenham River, just above Inglis Falls. Tim still treasures the memories of four and six-pound browns using those same habitat structures in the years that followed.

Besides the personal experiences of these people, a great deal of external influence in stream rehabilitation and habitat enhancement came from the United States and British Columbia, through books and technical publications. The B.C. Fisheries Enhancement Guide, by Ray Biette; Stream Conservation Handbook, by Save Our Streams; Better Trout Habitat, from the Montana Land Reliance; and the variety of publications from the Wisconsin Department of Conservation, provided a basis from which to refine techniques that were considered applicable to Ontario's streams and rivers.

Not enough gratitude can be expressed to these outstanding volunteer organizations and the personal time they have committed over the years. Even today, the Sydenham Sportmen's Association is just as busy, with over 50 years into local conservation programs including stream rehabilitation and youth education. Similarly, the Izaak Walton Fly Fishers Club, Cold Creek Fly Fishers Club, Brant Rod and Gun Club, Islington Sportmen's Club, and Trout Unlimited have made significant contributions of time and money into rehabilitating the Grand River, Bronte Creek, the Credit River, Humber River and Cold Creek of the Trent watershed. Much of that work has been based on the encouraging words of seasoned MNR staff such as Allan Wainio, Jack Imhof, Doug Dodge, and Jerry Smitka.



Time and time again, when asked the question “what are the most important aspects of stream rehabilitation?” these skilled practitioners spoke of priorities that protect first, then rehabilitate, and always involve the local community. If the stream appears to be in need of helping hands, you must first spend sufficient time with it in order to understand the problems and potential solutions. Developing partnerships with the public, your business community, non-government organizations and government agencies early in the planning stages builds ownership in a project, and will be a definite asset during the implementation of your plan. Homework is essential to planning a successful project.

Partnerships Mean Ownership

Management skills associated with planning and implementation of projects have evolved considerably over the last two decades. In the 1970’s through to the late 1980’s, public agencies dominated the planning, design, and implementation of regeneration projects involving natural resources. We watched large sums of public tax dollars being spent on the rehabilitation of lakes, rivers and streams, as the international demand for clean water and protection of fish and wildlife escalated. The growing publicity about polluted air, water, and land associated with industrial, agricultural and urban growth created an environmental consciousness within the general public that prompted the need for remedial action. Various levels of government also acknowledged the need for action and during that period of economic growth, governments had sufficient resources to commit staff and public funds to create remedial action plans.

The International Joint Commission (IJC), which was founded in 1909 and is responsible for managing boundary water issues between Canada and the United States, had spent many years researching and monitoring pollution in the Great Lakes. In 1985, it released a list of 42 Areas of Concern that it believed had significant problems with water pollution. Seventeen of these sites are found within the waters of Ontario. After issuing the list, the IJC asked the respective governments to develop Remedial Action Plans to restore the quality of the water and the associated beneficial uses. Each Area of Concern was identified as being unique, but there were some pollution-related similarities that impaired common beneficial uses such as drinking, swimming, fishing, transportation, and/or fish and wildlife populations.

Once the governments committed to cleaning up those areas, Environment Canada and the provincial Ministry of Environment, along with support from Agriculture Canada, Departments of Fisheries and Oceans (DFO), Ontario Ministries of Natural Resources (OMNR) and Agriculture, Food and Rural Affairs (OMAFRA), and local regional and municipal governments, embarked on a three phase Remedial Action Plan (RAP). The intention of the RAP was to identify the problems, set goals, formulate remedial options, and develop an implementation plan. For the majority of the sites, the problems were complex and often regional in nature, spanning the entire area of a watershed or several watersheds. The development of the plan involved a structured arrangement of a RAP Team steering the process and public, scientific and technical advisory committees providing a support role.

When we step back and look at this Team and the support committees as a model, we see a diverse representation from:

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| Environment Canada | Federal Agencies and Commissions |
| Other Federal Departments | Agricultural Sector |
| Ontario Ministry of Energy | Business/Industry Sector |
| Other Provincial Ministries | Community Groups and Individuals |
| Local Conservation Authorities | Environment and Conservation Organizations |
| Regional Government | Recreation and Tourism Sector |
| Local Municipalities | |

Often, some of those organizations had support roles spanning several functions within this structure. They shared a degree of ownership with the identified water quality concerns, and it is that common denominator that perpetuated communication between this diverse arrangement of groups. Although the term “partnership” was not considered at the beginning of the process, it was definitely implied early in the development of the Remedial Action Plans.

As local government resources dwindled, parallel with the economic recessions of the United States and Canada, the RAP process struggled to continue. Gradual adjustments were made with respect to leadership and the ability to implement remedial actions. As the financial support of federal, provincial and municipal governments faded, the call for remedial implementation focused on the local partnerships that had evolved through the process. Those same organizations, which were represented on steering and advisory committees, were seen as the partners that would implement the recommendations from the Remedial Action Plans. Currently, much of the remedial work within the RAP areas is completed through local agencies and non-government partners. Their unique blend of resources and abilities has proven to be a strength during a period of fiscal constraint.

Even within the magnitude of the RAPs, a decision-making process involving the public was followed. The public *needs* and *wants* to participate in your rehabilitation initiative right from the beginning. In addition, stakeholders, who represent government, non-government and private interests, also need to be included. Stakeholders offer a wealth of support by bringing to the table some common ecological, social, analytical, and organizational principles that help to guide the management of the project and the activities centered on stream rehabilitation. It is essential to include the public and stakeholders from the start of planning the project, in order to gain their support and interest as partners. They have unique roles and add strength to the project as they share their expertise, financial support, equipment, and other resources. There are limits to the amount of public input for the decision making process and that is commonly based on the magnitude and location of a project. Large-scale projects and those involving public lands usually need significantly more public input than what is required for work on a small reach of stream owned by a single party. Typically, more partners are needed to effectively implement a large-scale initiative. In any case, open and honest dialogue is essential to forming the partnerships needed to

implement a stream rehabilitation project. These relationships will evolve as the project gains momentum. Regardless of the project, the consultation process remains the same, although the complexity and duration will increase with project magnitude.

Stream rehabilitation projects can be rewarding for individuals and community groups and promise to be the foundation for our ongoing need to preserve our waterways. No matter how large or small a project may be, the long term positive effects will benefit future generations. We encourage you to use this manual and its resources as a guide in the new challenges that lie ahead.



Figure 1.4: The Government of Ontario has encouraged the protection and rehabilitation of our streams and rivers through public stewardship - as depicted here with publications from 1971, 1974 and 1984 (left to right)