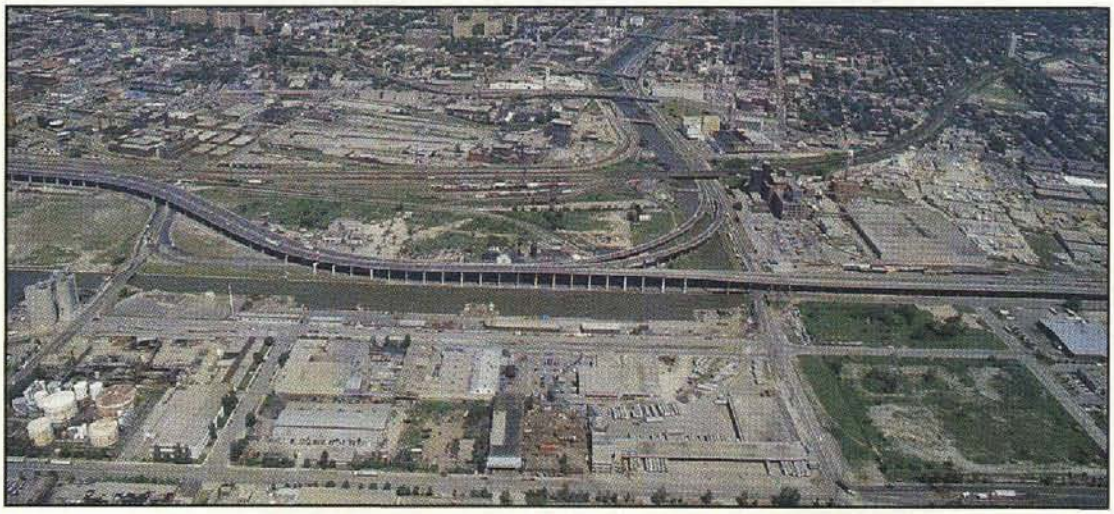
HEALING AN URBAN WATERSHED: THE STORY OF THE DON

The stream that once gurgled through cool forests and flashed with salmon is a storm sewer today. It is fed by filthy water flushed off the city's pavements and by the effluent of a sewage treatment plant. Much of what was once a lovely valley is now a transportation corridor and a repository for road salt, dirty snow, and illegally dumped garbage. The river's lower stretch is strait-jacketed in steel and concrete, while chain-link fences discourage strolls along its degraded banks. Long gone is its natural mouth, an expansive delta that once teemed with life. Instead, a contorted right-angle turn and a tangle of expressways and railway tracks mark the river's entrance into the lake.

But with help, this sad watershed can regenerate, creating healthier human communities as it does so.



The existing mouth of the Don

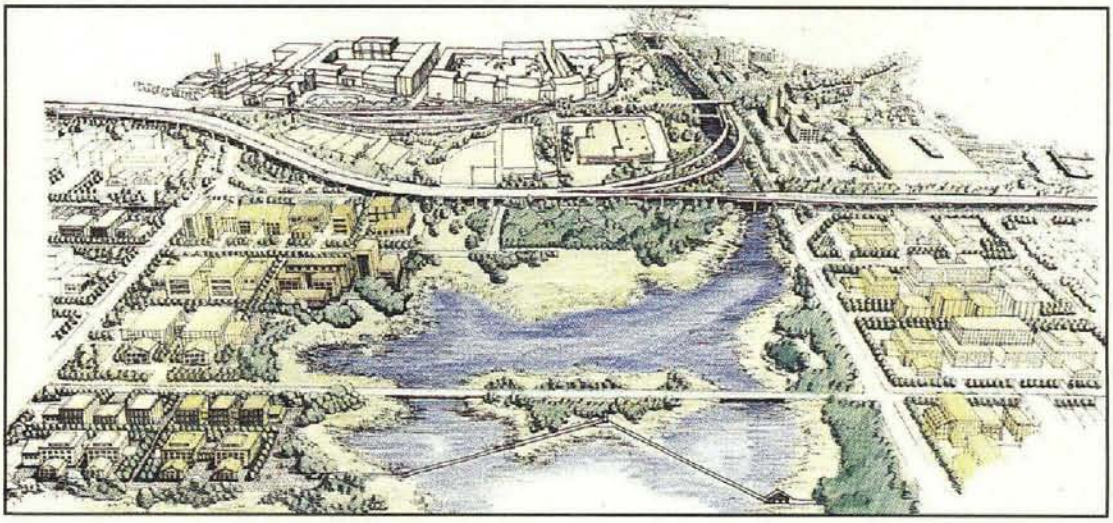


Figure 1 A restored Ashbridge's Marsh

The Don River runs through the heart of Toronto. The Don is similar to most of the urban rivers of North America. Everywhere, city building, industrial development, and suburban sprawl have left a legacy of lost woods, wildlife, and countryside, poisoning the natural environment on which our cities and our own health depend.

systems is a newer and harder task. Yet the Don is not a disgrace throughout. Some headwater streams still trickle through shady woods, the river's entire length is a migratory corridor for birds and other wildlife, and ducks paddle in the oily waters of its mouth. Such signs of life — to be found, if one only looks, along most urban rivers — give

A pond at the source of the Don

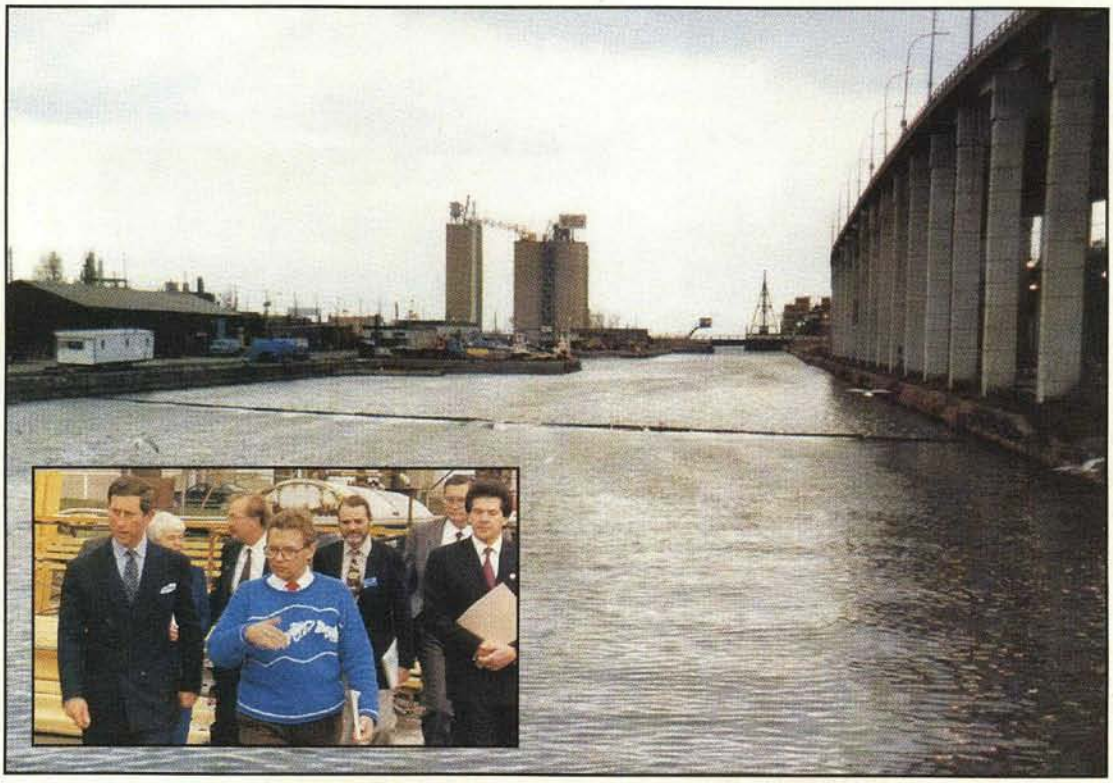
But Toronto's Don watershed has many friends, advocates with a vision for restoring it. They are residents who live nearby, from the headwaters to the mouth 38 kilometres (23.6 miles) to the south. They are schoolchildren attuned to the environment, and seniors who remember the valley in better days. They are naturalists, scientists, planners, and engineers whose expertise is needed to heal the Don. All of them are focusing on the Don because, of Metro's several rivers, it is the most degraded, accounting for much of the chemical, heavy metal, and nutrient pollution in Toronto's harbour. For Torontonians, this river has become a symbol of environmental neglect.

People know how to preserve pristine natural places, but restoring degraded natural

the Don's advocates hope. They attest to nature's own powerful, regenerative life force. Restoring a natural system means working with, not against, such natural processes; it means nature becomes a priority in making planning decisions. For a watershed, it means healing the whole, not just some of its parts.

LINKS TO THE PAST: THE NATURAL HISTORY OF THE DON

The Don River is one of the 60 rivers and major streams in the Greater Toronto bioregion that flow south from the Oak Ridges Moraine into Lake Ontario. This whole watershed is part of the Great Lakes



Keating Channel; mouth of Don. Inset: Mark Wilson, chair of, and Michael Hough, consultant to, the Task Force to Bring Back the Don, explain their ideas for the regeneration of the river to Prince Charles during his 1991 visit to Toronto.

Basin, the most massive concentration of fresh water in the world and home to 35 million people. Air, water, nutrients, and, alas, pollutants cycle repeatedly through the whole basin. That is why restoring the Don will not only improve Toronto's local environment, it will help heal the Great Lakes ecosystem of which it is a part.

In assisting the Don to regenerate, it is necessary to seek connections, not just with other parts of the larger bioregion, but with the watershed's past — its origins and functions in the natural system before the arrival of the first European settlers.

At various times, the Toronto area was covered with shallow seas, glaciers thousands of metres thick, and freshwater lakes and rivers that had basins larger than those of today. Different plants and animals have inhabited the area, responding to changes in climate and land migration routes. Each left its own signature of sedimentary deposits and fossils in the geological record.

Toronto's bedrock was laid down 450 million years ago in the Ordovician period as sediments in shallow seas. These solidified into the blue-grey shale of the Georgian Bay formation. Geologists have found evidence of ancient rivers that once cut through this bedrock, but the Don and its sister rivers in the Toronto area are much younger.

During the Pleistocene epoch, which began one million years ago, three successive waves of glaciation buried the bedrock beneath thick glacial till. The Don was born at the end of that time, only 13,000 years ago. The alternating freezing and thawing of two glacial lobes north of Toronto squeezed a porous, water-filled ridge of glacial debris between them — the Oak Ridges Moraine. As the glaciers retreated, streams began flowing south from the moraine, cutting valleys through the glacial drift. The Don has not reached bedrock yet.

In their early days, the two streams that form the modern Don River's east and west

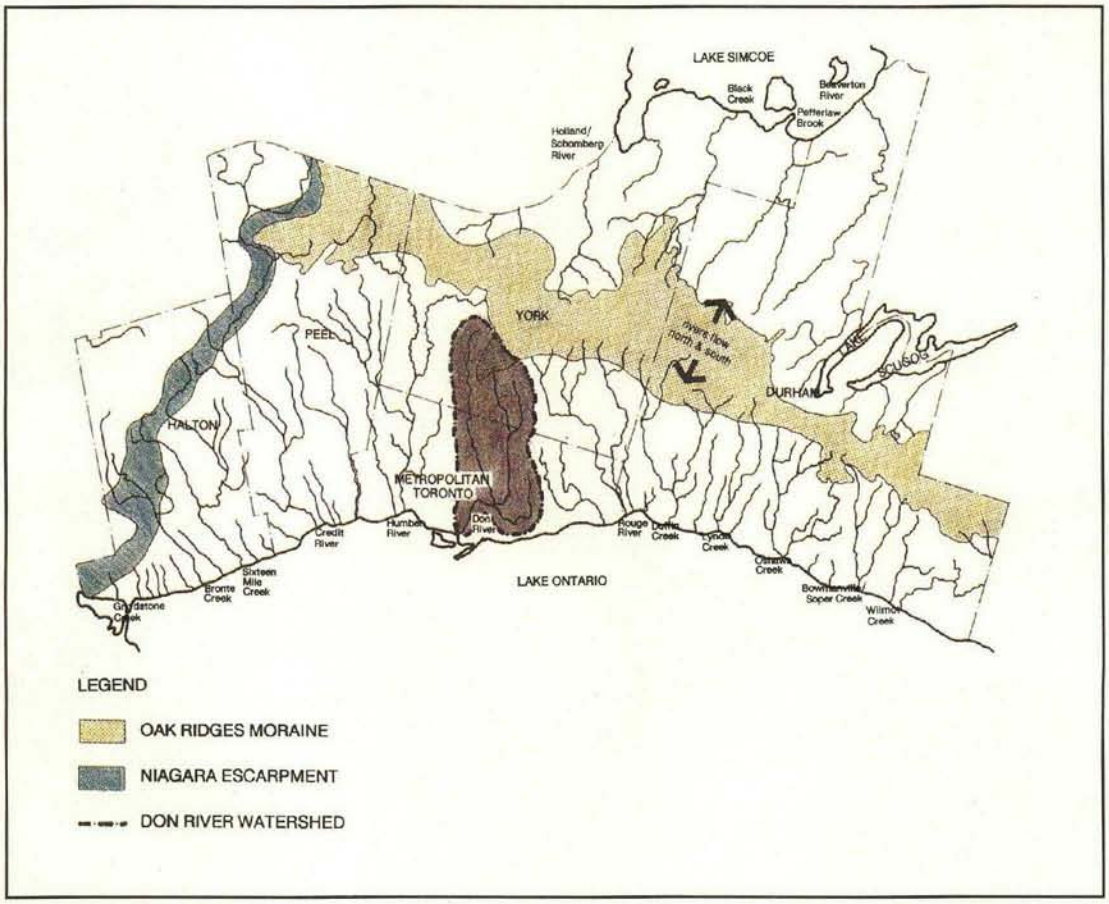


Figure 2 Greater Toronto bioregion

branches ended several kilometres north of the present mouth (Figure 4) at the shores of Lake Iroquois, formed from glacial meltwater, which was larger than its successor body of water, Lake Ontario. Wave action and westward shoreline currents built up a sandy baymouth bar where the young east and west Don entered Lake Iroquois; sands, silts, and clays were deposited in a protected lagoon behind the bar.

As the glaciers continued melting, the land began slowly lifting up, and the St. Lawrence channel, previously blocked with ice, opened up. Gradually, Lake Iroquois

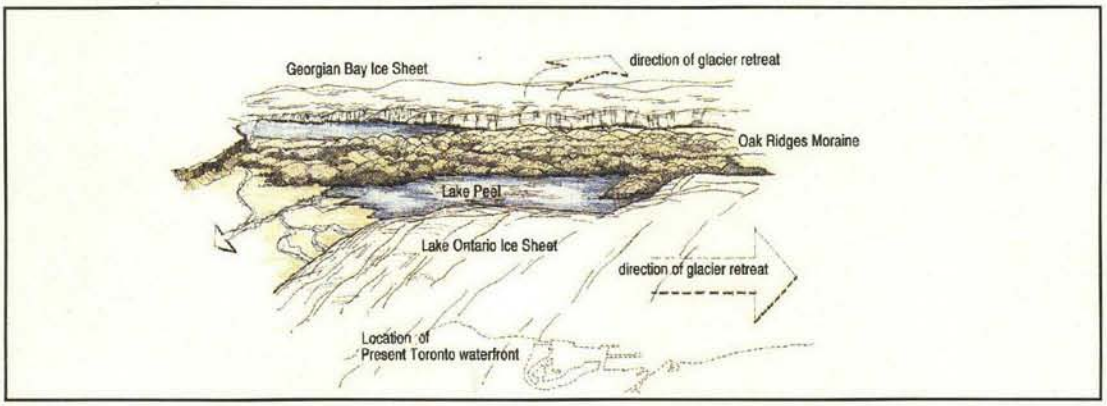


Figure 3 The retreat of the Wisconsin glaciers

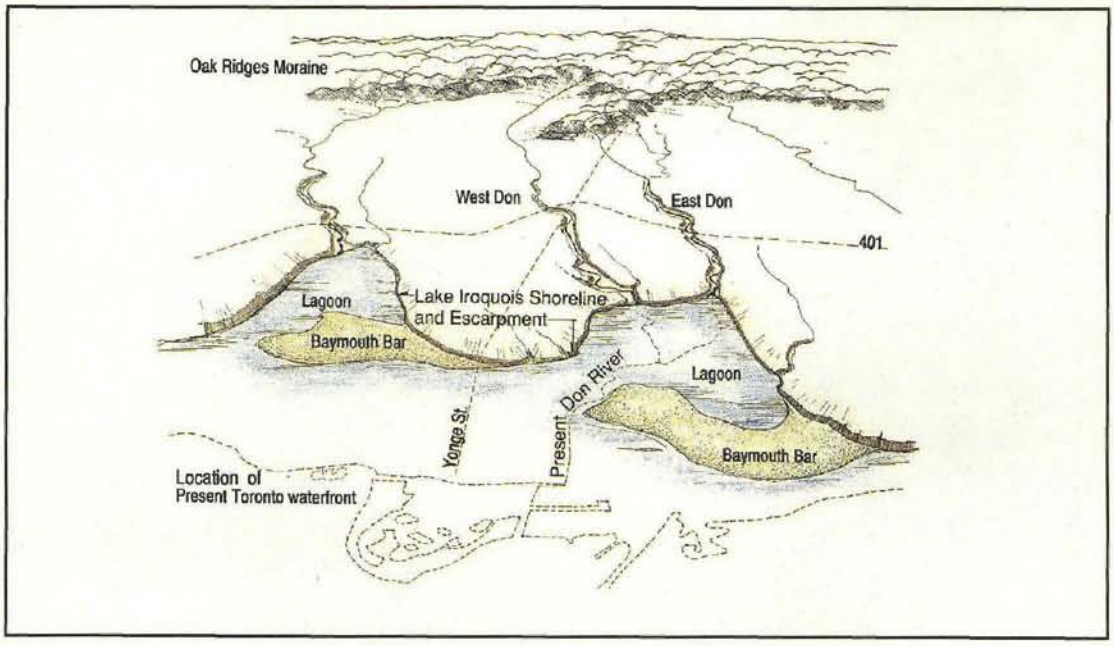


Figure 4 Lake Iroquois shoreline

shrank to become Lake Ontario, leaving behind its old delta at the river's sharp westward bend south of the forks, which was quarried for sand thousands of years later. The old shoreline is the distinct escarpment that extends across Toronto, forming the hill at Yonge Street and St. Clair Avenue and the ridge on which Casa Loma sits.

Now the Don flowed as one river out of its old lagoon and south across the flat sediments of what had been Lake Iroquois. As it entered Lake Ontario, the process of building a baymouth bar and backshore lagoon was repeated, forming the harbour islands spit and a protected lagoon known as Ashbridge's Marsh (Figure 5).

Just as global climate change drove glaciation, the changes in local temperature and precipitation determined which plants and animals could live here. During the three glaciations of the Pleistocene epoch, temperatures ranged from six degrees celsius lower to three degrees celsius higher than our present temperatures.

Perhaps the most renowned Pleistocene geological site in North America is in the Don Valley. The north face of the old brickworks quarry (Figure 6) exposes a rich fossil

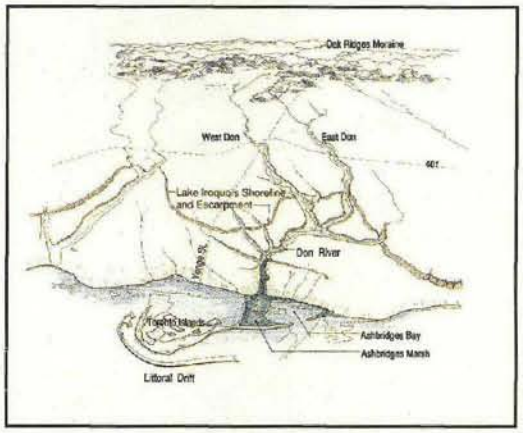


Figure 5 The Don Valley before European settlement

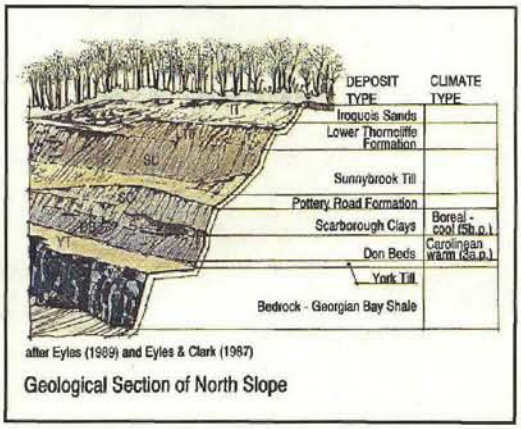


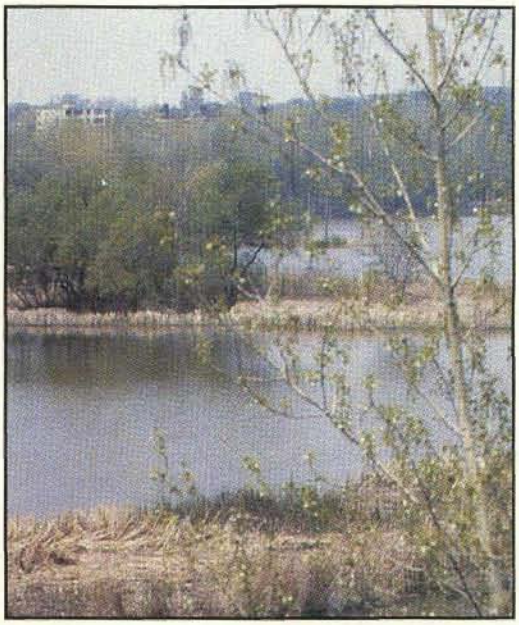
Figure 6 Glacial deposits at the Don Valley Brickworks

sandwich that records astonishing swings in habitat long before the Don's birth. It took only a few thousand years for a cool, northern boreal forest habitat to give way to a warmer Carolinian forest with more southerly plants including sycamore, holly, and grape, and such animals as giant beaver and bison.

But climate does not account entirely for habitat: a snapshot taken of the Don watershed just a few hundred years ago, before European colonization, would reveal healthy, varied, interconnected habitats created by local microclimates, soil types, and the river's action. On the slopes of the moraine, sugar maples and oaks shaded headwater tributaries, an

Natural Habitats of the Don Valley

Upland forest



Marshes along the river

River valley woods

inviting habitat for brook trout. Downstream, one would have found a lowland forest of willow and Manitoba maple in the floodplain, and oak, beech, basswood, maple, and almost pure stands of white pine on the valley slopes, attracting birds and mammals. The northern limits of the oak-dominated Carolinian forest reached the old Lake Iroquois shoreline, and the vast, fertile marshes near the river's mouth connected land and lake, sheltered nurseries for fish and other wildlife, and were home and stopping place to many kinds of fish, amphibians, and birds — including ducks, waders, geese, and mergansers.

Archaeological and early historical records show that natives who inhabited the region almost from the Don's inception lived gently on the land. They harvested wild rice, caught fish and turtles from the marshes, speared salmon from canoes in the river, planted corn on the tableland, trapped animals for food and clothing, and traversed the area on narrow walking trails for hunting, seasonal migrations, and trading. Although life was often hard for the people, the natural system was robust and healthy then, when so few people lived in the watershed, compared to today.

EARLY COLONIAL HISTORY

When Europeans came to the New World, they brought with them an attitude toward nature radically different from that of the native peoples. To the newcomers, nature was less a home than a resource for commerce and, later, an unruly force to be controlled.

The French came first, mapping the Don watershed as early as 1688, but largely ignoring it in their fur-trading operations. Next came the British, who established a

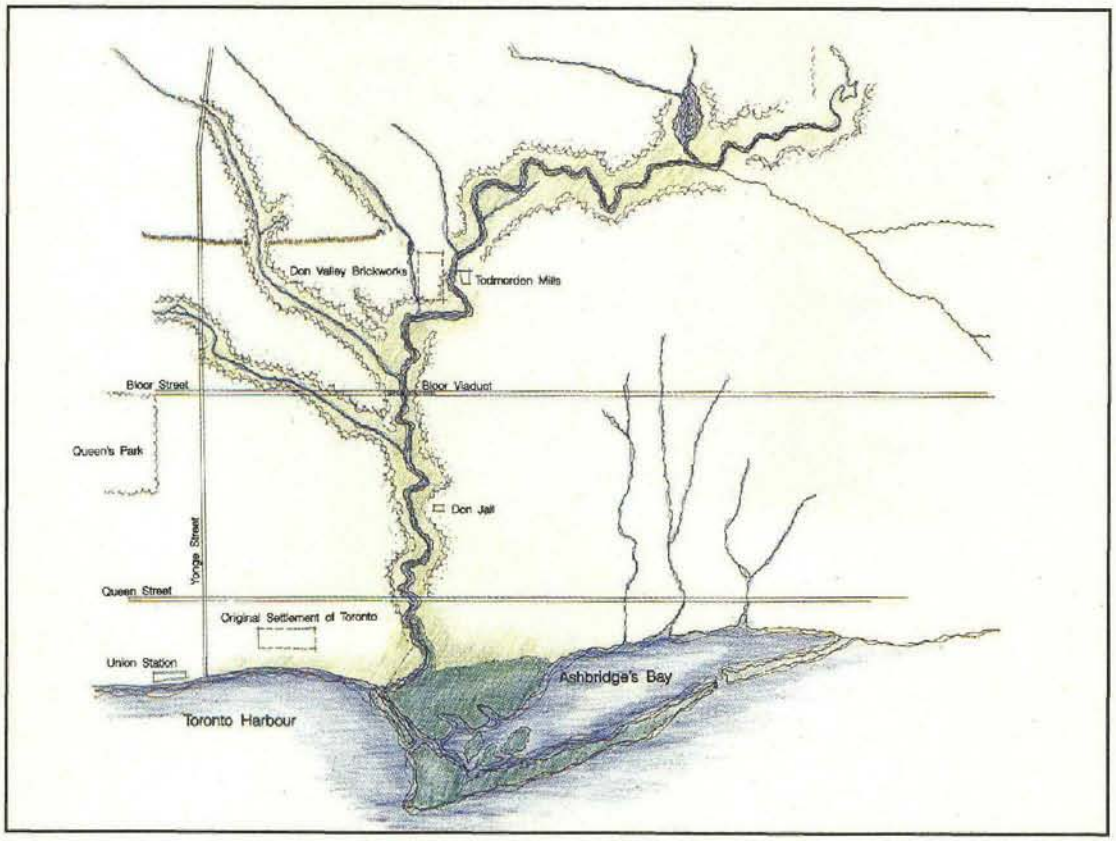


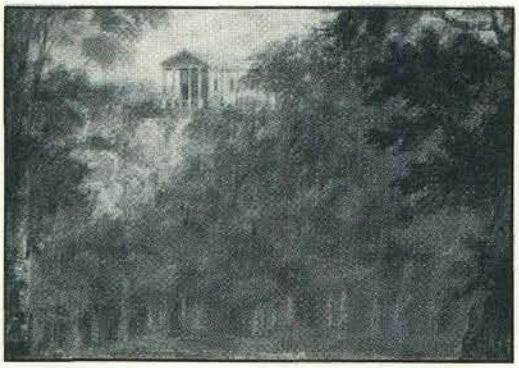
Figure 7 Early places in the valley

military garrison west of the Don, and called it York. But the Don's fate was sealed in 1787, when the British bought the "Toronto Purchase" — the Don watershed — from the Mississauga Indians for the equivalent of £1,700 in cash and goods.

Surveyors laid out a city plan for the future capital of Upper Canada with streets and lots for future homes and shops — a geometric grid branded artificially onto the landscape. City blocks were drawn on top of creeks, which were later buried. Such is the legacy of most North American cities of the 18th and 19th centuries.

Elizabeth Simcoe, wife of Upper Canada's first Lieutenant Governor, loved the valley and river her husband had named the Don, after a river back home in England. (The Indians had called it Necheng-qua-kekonk, meaning perhaps "back-burnt lands" or "woods and wetlands".) When the Simcoe family boated upstream soon after their arrival in 1793, the city was so new that only one residence had been built on the planned lots. Mrs. Simcoe wrote enthusiastically of the valley's forests and grand outlooks, of the Indians spearing salmon at night. She saw to it that the family's summer home, a wooden Grecian temple, which she called Castle Frank after her ailing son, was built on a promontory a few kilometres up the river. Mrs. Simcoe's diary and watercolours of the valley have made her the patron saint of today's advocates of the Don River.

Elizabeth Simcoe



Castle Frank

FIGHTING THE RIVER

Most settlers were too busy taming the wilderness to appreciate the Don River as a place of beauty and recreation: they used it for transportation, and harnessed its energy, building mills for lumber, flour, wool, and paper along its main trunk and tributaries. They farmed its floodplain and fished it for salmon and trout. They mined the old baymouth bar for sand, and baked the clay south of the forks into the bricks that were Toronto's favourite building material for more than half a century. In less than 150 years, the settlers cleared the lower valley almost entirely of trees. The watershed was a vast resource, its apparent purpose being to provide sustenance and raw materials for the young, growing city.

The settlers also viewed the river as a nuisance, a threat, and an obstacle. Floods regularly swept away mills and bridges. The Don was a barrier to the city's eastward expansion. The huge marsh at Ashbridge's Bay — its waters fouled by human and cattle wastes — was reviled as an unhealthy swamp. Habitat destruction was well under way. In the 1860s, the salmon finally stopped spawning in the Don, and the only brook trout in the headwaters today are escapees from the Ministry of Natural Resources' hatchery.

In the late 19th century, engineers set out to tame the river and, by the end of the century, they had strapped the meandering

lower Don into a five-kilometre (3-mile) linear canal. Bridges would now be more secure and the railway north of the waterfront could be easily built along its edge. In the years after 1912, the Ashbridge's Bay marshes were filled in to create the port lands, the most massive engineering project on the continent in its time, forcing the Don into a right-angle exit into the harbour.

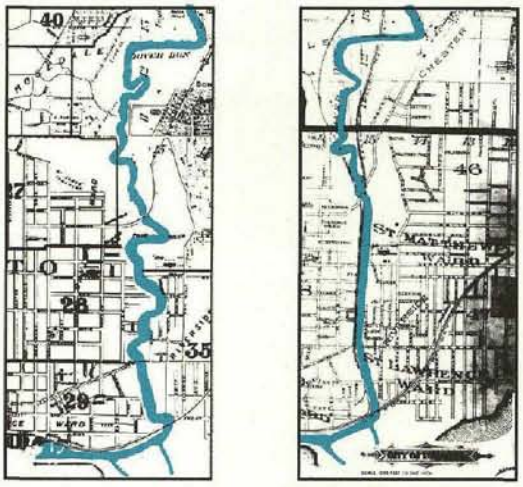


Figure 8 The lower Don before and after channelling

Filling in Ashbridge's Marsh

An early flood on the Don

Forks of the Don today

But, despite the constraints, the Don continued doing what rivers naturally do. Deprived of its delta, it dumped thousands of tonnes of silt in its lower reach — which has necessitated an expensive dredging annually ever since. With its lowland forests and most of its marshes gone and its flow swollen by urban run-off from the storm sewers, it flooded more devastatingly than ever before. In 1954, Hurricane Hazel, the worst storm on record, ripped out bridges and buildings along the Don and Humber rivers, and claimed 84 lives.

A 19th-century Torontonian would hardly recognize the Don watershed of the late 20th century. It is difficult for seniors to see in today's urbanized area the wild valley they once enjoyed for hiking, fishing, and swimming. Construction in the 1950s of the Don Valley Expressway and the Bayview Extension turned what had been a corridor for wildlife into one for cars. Not only has traffic radically changed the area's character, but pollution from road salt, lead, and oil seeping off the expressway, and snow dumps in the valley continue to degrade habitats.

Each decade of the 20th century has seen thousands more hectares of countryside paved over by development until, today, the watershed is 70-percent urbanized and houses 800,000 people. Much of the remaining countryside is owned by developers.

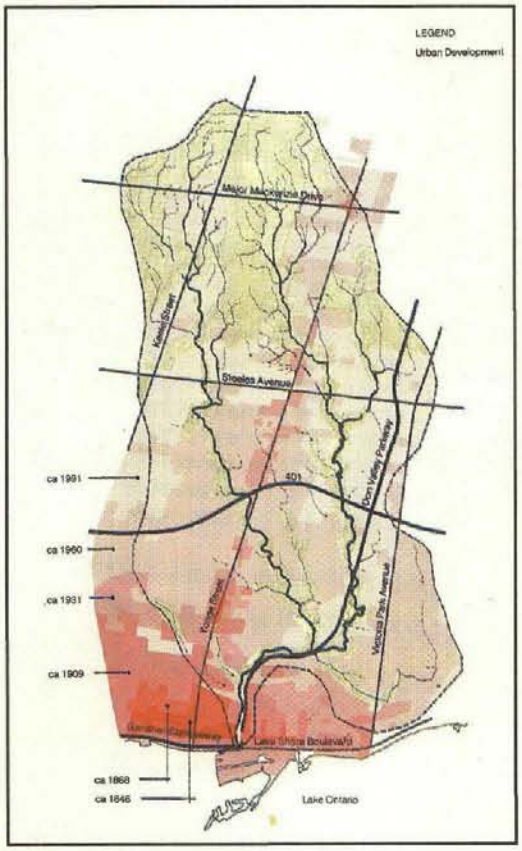


Figure 9 History of development in the Don Watershed

THE DON TODAY

Healing a damaged watershed is a great challenge. First, it requires changing the attitude that nature is merely a resource to be used, and abused, by human beings. That kind of "old-think" — clear the woodlands, fill the marshes, pave over the countryside, and treat streams as storm sewers — is still pervasive. It is our most environmentally damaging inheritance.

Nowhere is that attitude more prevalent than in the Don's sensitive headwaters, today the most threatened portion of the river, where many square kilometres of countryside have already succumbed to tract housing, monster homes, industries, shopping malls, and parking lots.

The cumulative effect of development has a major impact on ecological health. Silt from construction pours into streams, suffocating life and clogging the river's mouth far downstream. Untreated stormwater from completed developments worsens flooding and further poisons habitats. In the Don watershed, a total of 1,185 storm-sewer outfalls discharge directly into the river and its tributaries. Ninety-five per cent of the Don's pollution originates north of the City of Toronto.

As the source of many rivers, the Oak Ridges Moraine is of special concern. Uncontrolled development there threatens highly vulnerable habitats. It acts as a cap on the land, reducing the amount of precipitation that recharges aquifers. And, because the

Development continues in the headwaters

moraine is so porous, it also threatens the aquifers with pollution. One moraine site that should be monitored closely is the Keele Valley Landfill, the third largest garbage dump on the continent. While engineers insist that there is no leakage through the site's clay liners, what will happen 50 or 100 years from now?

Although the Don's biggest polluter is urban run-off (carrying lead, oil, salt, animal feces, garden and park chemicals, and whatever residents pour down the storm drains), raw human sewage, and industrial wastes also continue to foul the river. Although work to disconnect them continues, 30 combined sewers in Toronto and East York discharge untreated human waste directly into the Don after heavy rainfalls. So do an unknown number of illegal cross-connections between sanitary and storm sewers. And, while it is now illegal for industries to discharge polluted wastewater directly into watercourses, many companies send their wastes to the North Toronto Sewage Treatment Plant, the daily effluent of which accounts for a quarter of the Don's downstream volume. The plant, built in 1927 and upgraded very little since then, is ill-equipped to handle metals and organic chemicals.

Throughout, the valley is a repository for harmful substances. Golf courses and parks may appear benign uses of floodplain land, but the tons of herbicides, pesticides, and fertilizers needed to maintain their 1950s style manicured look run right into the river. Public works departments store road salt, PCBs, and polluted snow in the valley.

The lower Don, the part most residents and tourists see, suffers from channelization, a sterile mouth, buried tributaries, and the entire river's accumulated pollution. Expressways, railways, and chain-link fences discourage public access. Downtown neighbourhoods symbolically turn their backs on the river: most buildings don't even have windows on the valley side.

Vignettes of the Valley

Golf course under construction

Keele Valley Landfill

The Ross Lord Dam and reservoir

Restricted access — lower Don

Expressways at the river's mouth

Nonetheless, there is cause for hope. The Don's water quality is actually better now than it was 40 or 50 years ago, when industries discharged directly into it and paint factories often turned the Don into a flowing rainbow of colours. At that time, dozens of small, overloaded sewage treatment plants sent their smelly brew into the river. Once, when Princess Margaret visited Toronto, the City had perfume poured into the Don, to mask its stench.

Because many citizens now view the watershed as a place in its own right, a precious stretch of nature in the city, there is even more cause for hope. Rejecting the old attitude of the valley as a "resource", they are fighting insensitive development and protesting unsound environmental policies at all levels of government. Activist citizens' groups from all parts of the valley — from Save the Oak Ridges Moraine (STORM) at the river's source, to the Task Force to Bring Back the Don in the city core — are banding together, determined to heal the watershed.

A NEW VISION FOR THE VALLEY

The Nature of Restoration

A healthy city depends on a healthy environment: you can't have one without the other. In order to help a watershed regenerate into a healthy natural system, people must treat nature with respect. Connections to the natural and cultural past must be maintained — for example, by protecting remnant woodlands and retaining historical links. Sometimes healing requires intervention to create the conditions for nature's own regeneration. It certainly means that the health of the environment must have a higher priority in planning decisions than short-term human gains.

In the following pages, the guidelines for regenerating the watershed are based on the principles of ecosystem planning as defined in Part I of this report. Although our focus on the Don Valley, "clean, green, useable, diverse, open, accessible, connected, affordable, and attractive" can be applied to regenerating any urban watershed.

The guidelines are not listed in sequence: they must be implemented together. For, as the American ecologist Barry Commoner has said, "Everything connects to everything else". Taken as a whole, the guidelines treat the entire watershed, although quite different approaches are often needed in different areas: the urban core, the suburbs, and the remaining natural or agricultural areas. They require a new way of thinking: the old dichotomies of city and country, urban and natural, people and nature disappear because, in an urban watershed, the human and natural communities are one.

Allowing nature to regenerate

Preserving historical links

Preserving natural remnants

REGENERATION GUIDELINES

One: Protect Natural and Cultural Features

Moraines, aquifers, and natural springs are the watershed's ultimate source of cool, pure water, and should be sacrosanct. Wetlands are not undeveloped land waiting for fill; they control flooding, absorb pollutants, release purified water to groundwater and streams, and are havens for birds and other wildlife. Woodlands, too, recharge groundwater and create wildlife habitats. Trees cool streams, maintaining aquatic habitats, absorb carbon dioxide, and release oxygen into the air. Healthy tributary streams, valuable in their own right, also contribute to watershed health downstream. Historical farms and mills connect us to our human past, while farm hedgerows and fencelines have become important links for wildlife migration. Old industrial buildings need protection too: often, they are where artists work and new businesses begin.

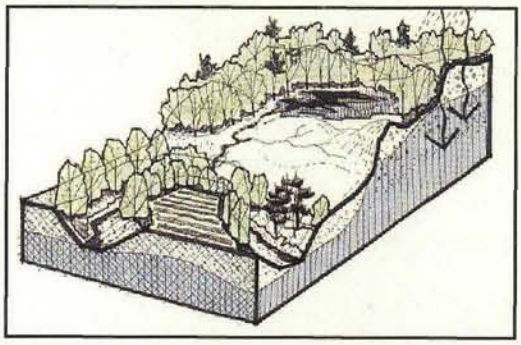


Figure 10

Two: Let Topography and Countryside Define Urban Form

Urban sprawl has imposed a sameness over the North American landscape, despoiling natural habitats, destroying the working countryside, and obliterating any local sense of place with monotonous tracts of housing and shopping malls. While population increases close to economically thriving cities are probably inevitable, alternatives to conventional development can actually enhance environmental health. No tract developments should be allowed on headwater moraines and other sensitive groundwater recharge zones. Instead, increases in population can be accommodated by building in established town centres, where municipal services already exist.

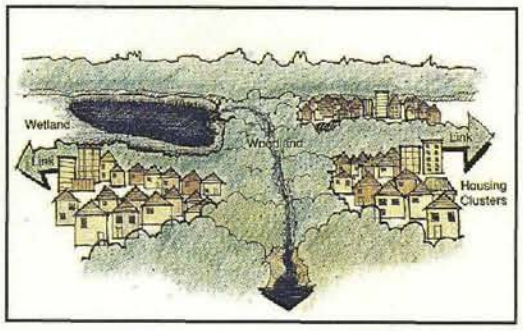


Figure 11

In upland areas of the watershed, medium- to high-density developments should be clustered on the least sensitive land, preserving river valleys and ravines, wetlands,

woodlots, hillocks, and farms. This is not only aesthetically pleasing: it maintains the open natural and farmland areas that attract people to the countryside, and protects streams and healthy, diverse habitats for native plants and animals.

Three: Ensure That Development Enhances Environmental Health

Development can no longer be tolerated as an inevitable despoliation of nature and countryside; rivers and streams can no longer be used as ready-made storm sewers. New development should be seen as an opportunity to improve stream health, and to strengthen existing green corridors. It should adhere to a policy of zero increases in pollution siltation and run-off. No silt during construction or increases in stormwater afterwards should discharge into streams. Wetlands should be protected, restored or created to help treat run-off biologically and, wherever possible and if groundwater is not at risk, stormwater should be directed into the ground. In existing urban areas, the storm sewers that discharge into streams should be gradually replaced by biological treatment wherever possible. A network of storage ponds and wetlands on available floodplain land could treat stormwater while creating new wildlife habitats.

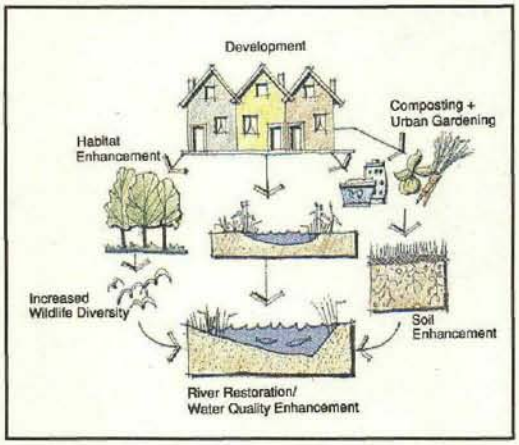


Figure 12

Four: Intensify and Diversify Development

Conventional suburbs waste space. Land in the headwaters region of the watershed can be saved if development intensifies in existing suburbs and the urban core. Housing, shops, and small clean industries can infill parking lots, and apartments can be built over the stores in low-rise commercial strips. In the downtown core, unused industrial land can be transformed into small, intimate neighbourhoods of medium- and high-density housing, if the soil is safe or can be decontaminated. In many cases, relaxing zoning regulations encourages homeowners to create basement apartments, split large homes

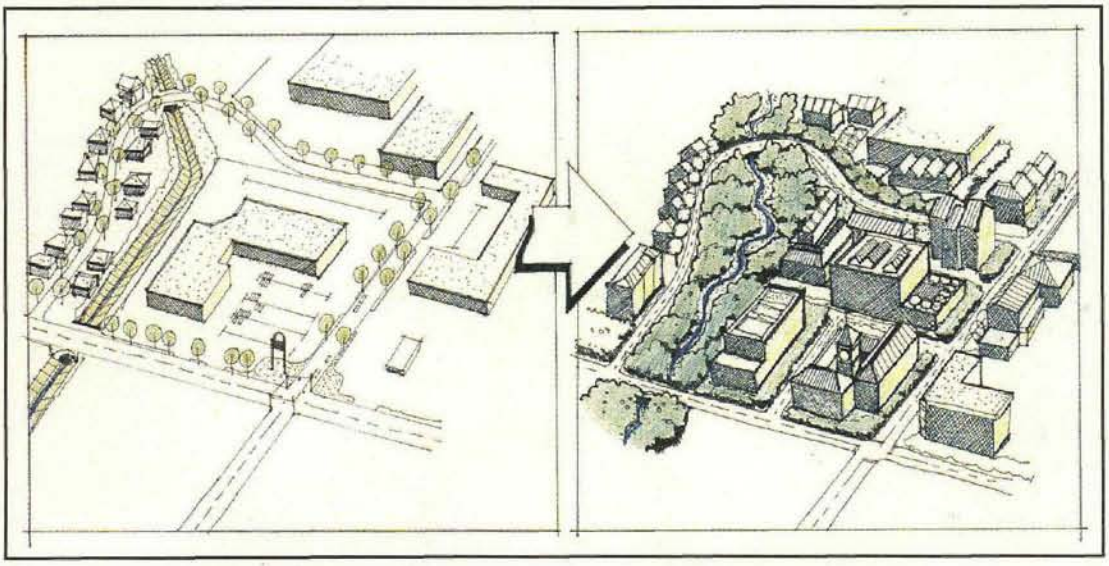


Figure 13

into several units or build "granny houses" in backyards. Such measures use land responsibly and help create diverse, interesting neighbourhoods while, at the same time, streams and ravines are protected and railway and electrical rights-of-way are enhanced as wildlife corridors and walking trails.

Five: Maintain Rural Traditions

When farmland is lost to urbanization and exotic horticultural species replace native plant communities, the city loses its connection to its rural base. The healthy, diverse urban communities of the future will maintain family farms, market gardens, and rural-based industries at the city's edges, as European cities have done for centuries. Where farmland has been sold, the "waste space" in new industrial developments can be returned to agriculture, boosting rural employment and creating a new living and working environment in the countryside.

Zoning regulations in suburbs and the urban core should encourage vegetable gardening, a productive practice that was popular, especially during World War II, and is being revived by immigrant families. Rooftop and backyard gardens, composting, and community gardens on floodplain or unused industrial land connect the city to sustainable rural traditions. The health of the watershed only improves when "users" become "stewards".

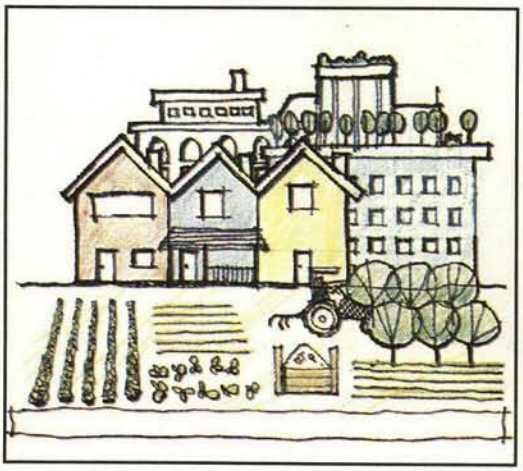


Figure 14

Six: Work with Nature

Nature has great restorative powers; even quite degraded parts of a watershed can return to a state of health if natural regeneration is allowed to take place. That sometimes means fencing off an eroded stream bank to keep people, dogs, and livestock out for a while. It always means working to eliminate harmful substances that pollute natural habitats. The watershed can benefit if parks and private property, including the edges of golf fairways, are allowed to naturalize, rather than continuously being subjected to expensive and polluting maintenance.

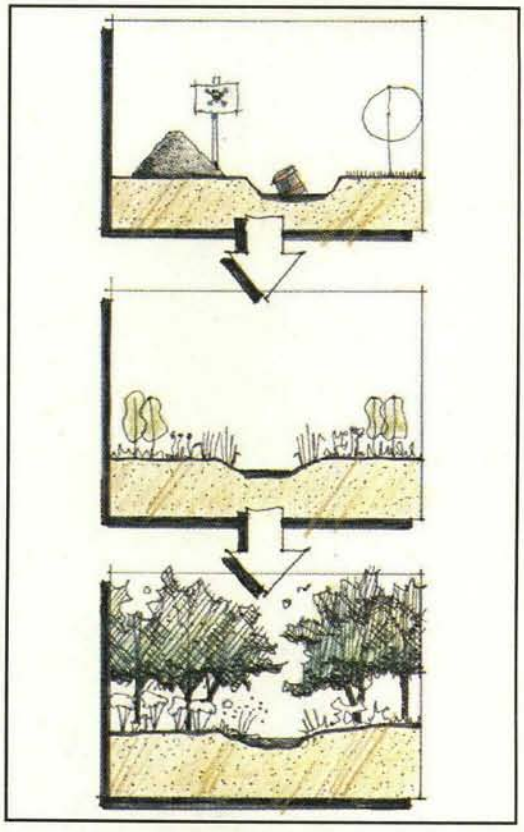


Figure 15

Minimal intervention is often necessary in places that might otherwise take decades to restore themselves, or where major human changes have made natural regeneration impossible. Planting native trees and shrubs to enhance a green corridor or stabilize a stream bank, creating wetlands to improve water

quality, and stocking a newly restored stream with native fish help nature's own healing. It is sometimes necessary to reverse past engineering: redirecting storm-sewer outfalls, restoring a buried stream, removing artificially channelled banks, or re-creating a natural delta. Engineering must be the minimum possible, small in scale, and it must work with, never against, the processes of nature.

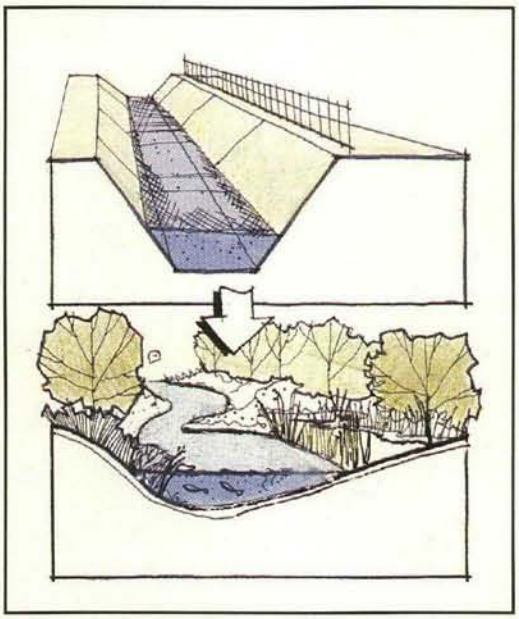


Figure 16

Seven: Encourage Watershed Consciousness

The desire to restore an urban watershed originates with the people who live there, who want healthy natural places in and near the city. When planners become involved, there is an opportunity for citizens and experts to work closely together. Neighbourhoods can initiate local stream rehabilitations, naturalized plantings, and ravine clean-ups. This happens when people have an investment in the health of their own local area, and is encouraged when authorities ensure easy and safe access to ravines and river valleys.

Community groups can also serve as watchdogs, reporting spills and nature vandalism. All citizens should understand the effects of household and garden chemicals on local watercourses. And since a watershed must be healed as a whole, new mechanisms must be found to protect, plan, and restore beyond the boundaries of local jurisdictions: to create stewardship programs with private landowners, provide shared funding, and help citizens' groups co-ordinate throughout the watershed.

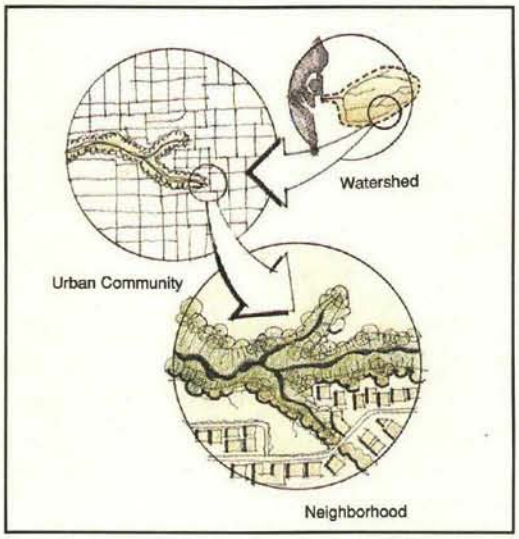


Figure 17

APPLYING REGENERATION TO THE DON

In the coming decades, population pressures on the Don watershed will grow. No one wants the entire valley to look like the city core, or believes that what remains of the countryside should be paved with suburbs. To protect the health of the natural system and the human communities that are part of it, all further human change to the watershed must be directed towards improving the environmental health of the river system.

Protecting the Oak Ridges Moraine and its agricultural slopes is crucial to the future of the Don. Not only is the moraine the source of many of southern Ontario's rivers, it is a rare and beautiful area enjoyed by hikers, school groups, and naturalists from every part of the Greater Toronto bioregion.

Farmland in the headwaters

This Commission supports the efforts of the joint citizens' and provincial government planning committee to devise strategies that will protect the entire moraine. Taking inventories of its habitats and aquifers; assessing the cumulative ill effects of development, gravel extraction, roads, and sewers; and creating a greenway along its entire length are important. The most effective protection measure would be to accommodate population growth only in existing towns, where municipal services already exist. Development on the moraine countryside, if allowed at all, should be severely restricted.

If the current rate at which development is gobbling up farmland continues, Toronto will soon be severed from its rural base. It is time to consider direct aid to farmers — whether in the form of land-stewardship programs, conservation deeds to farm certain lands in perpetuity, land-banking for future agricultural needs, or tax relief — which will keep farming and rural-based industries viable at the city's edge. Limited development in the agricultural uplands must then fit into and enhance working farms.

Countryside can be protected by building more living and working space in existing suburbs, the urban core, and under-used industrial areas. This also helps create more diverse and interesting human communities. Throughout the watershed, stormwater management must be radically changed, so that it will enhance, rather than destroy, aquatic habitats. And in the urban core, as well as intensifying neighbourhoods, a dramatic plan to give the Don back its natural mouth would regenerate the lower river and the Toronto waterfront for wildlife and people alike.

In this section, seven regeneration guidelines are applied throughout the Don watershed, with different emphases for the countryside, the suburbs, and the urban core. Although we still need to learn a great deal about restoring natural systems, we know that we cannot continue doing things in the old way.

THE COUNTRYSIDE

Conventional tract suburbs in the Don's headwaters have already steamrolled over many rural and village scenes (Figure 18). Headwater streams are especially sensitive: often little more than braided rivulets, their health depends on the shade and water-retaining ability of woodlands. Conventional

development, as illustrated in Figure 19, consumes far too much land. In the landscape shown in Figure 20, development can protect natural features, as well as the farm and village, simply by concentrating growth within the town by creating higher storey build-up and infilling with housing and shops. When a clear edge is kept between town and country, malls, commercial strips, and conventional housing tracts do not spill over the countryside: residents can then enjoy both the livelier village and the more serene countryside. Topography and cultural features define the urban form; rural traditions are maintained; streams and woodlands are protected.

When new development is allowed in the upper watershed, it might best be clustered as villages that fit unobtrusively

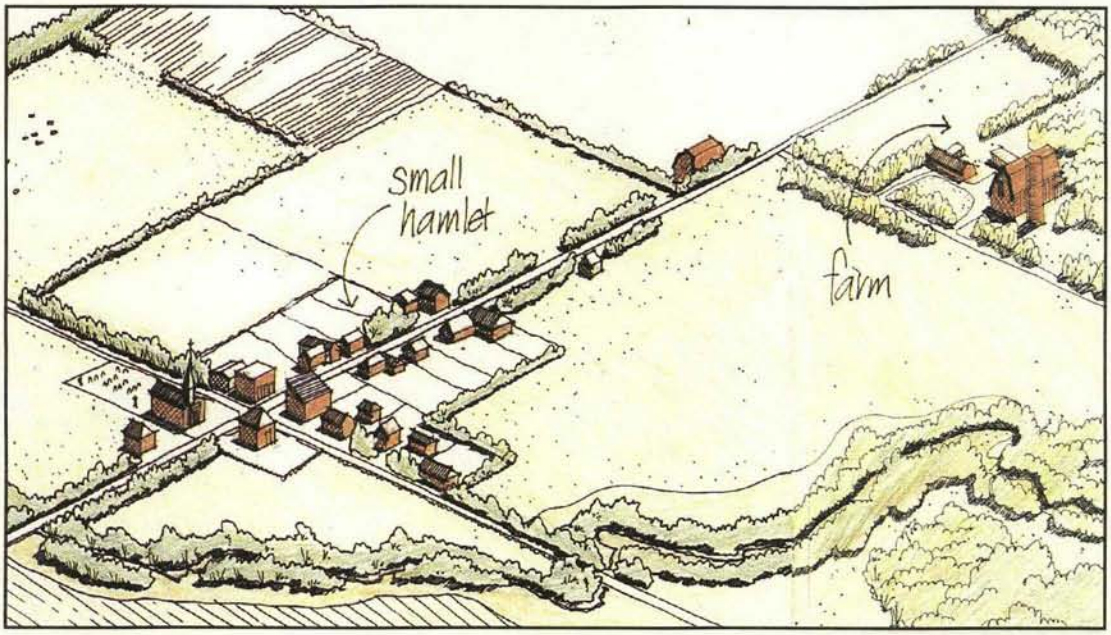


Figure 18 Traditional rural village in the moraine

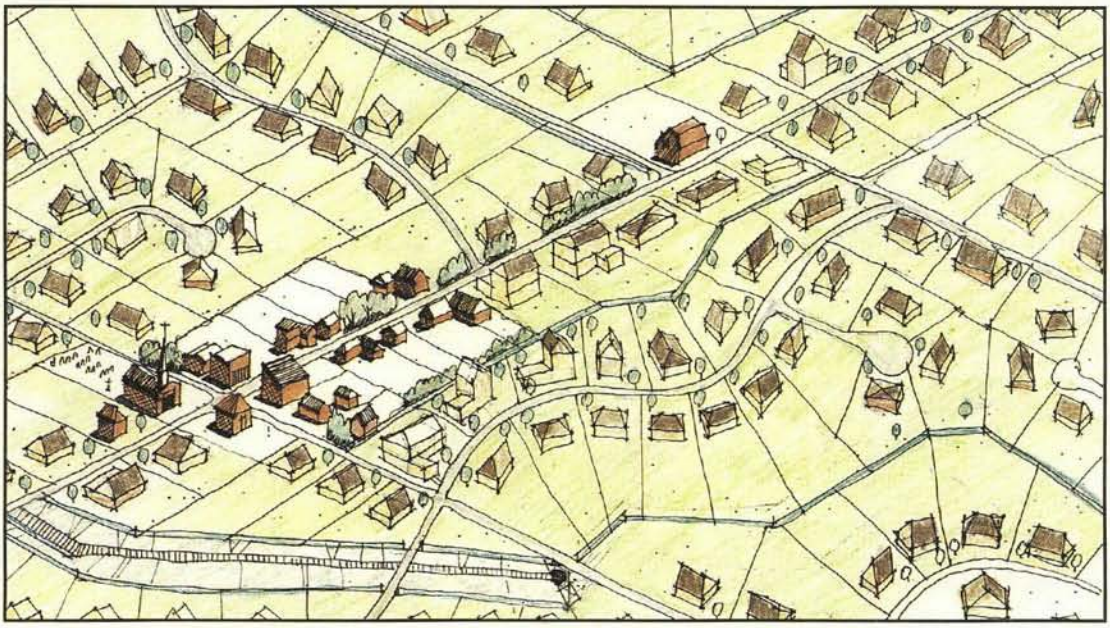


Figure 19 Village and farmland obliterated by conventional development

into the natural system and landscape as shown in Figure 21. Increasing housing densities, by permitting multi-storey houses, duplexes, and triplexes, and by decreasing the private space around them, protects countryside. Streets should be narrow to cut both traffic speed and waste space. Grouping commercial shops at corners fosters a sense of neighbourhood, and encouraging market gardens brings rural practices into the new village. Farm hedgerows, fencelines, and old railroad tracks should be conserved as wildlife corridors and paths for people. Taking these steps enables the human community to become part of the countryside, neither dominating nor degrading it.

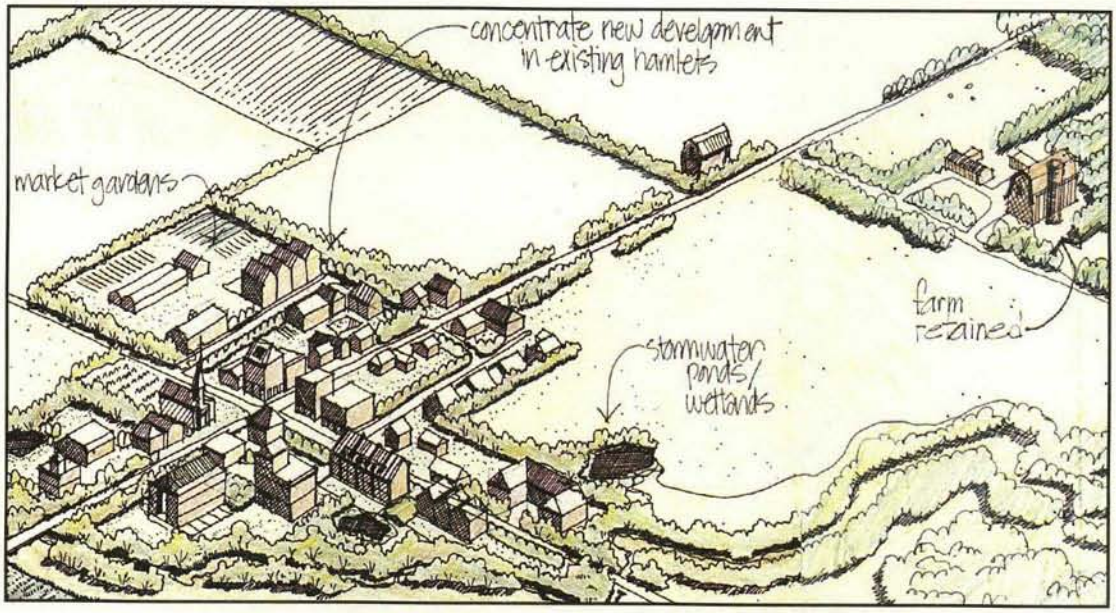


Figure 20 Clustering new development around existing hamlet

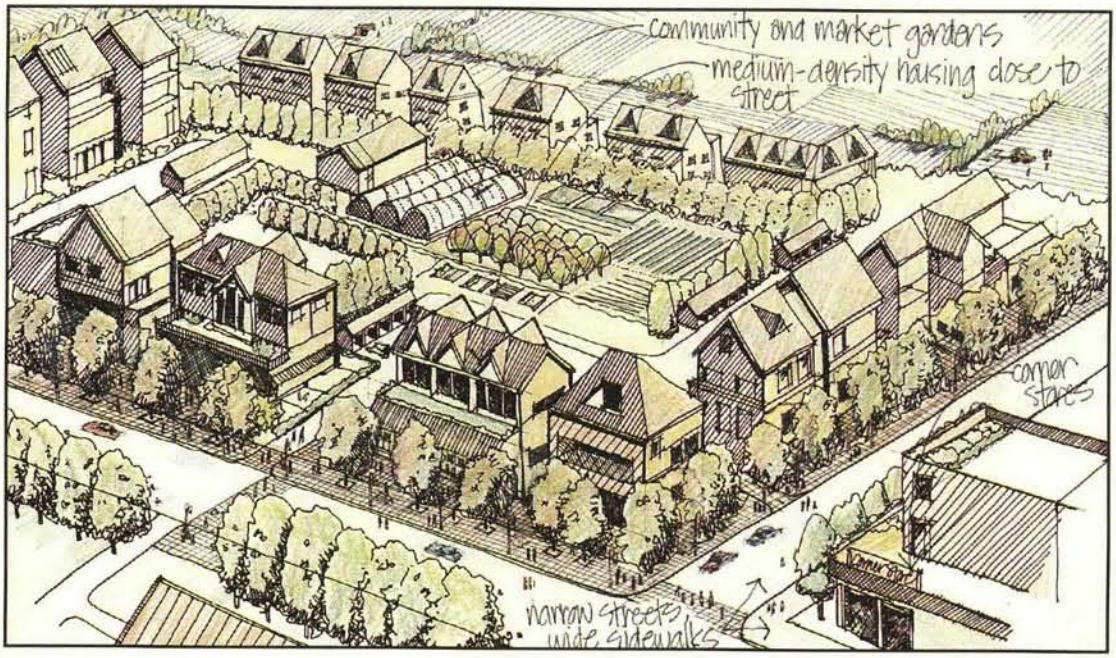


Figure 21 Mixed use in new residential areas

EXISTING SUBURBS

A home in the suburbs, the North American dream of the 1950s and 1960s, is beyond our environmental means today. Car-dominated, low-density living consumes too much land and energy for transportation. The expanses of lawns around buildings waste space and energy, and add to the watershed's burden of chemicals. As well, the hectares of wide roads, driveways, parking lots, and malls squander space and make polluted urban run-off a problem of major proportions.

But existing suburban development (Figure 22) could accommodate many more people, protecting countryside elsewhere. Furthermore, diversifying housing and land use can create far more interesting communities (Figure 23). In the suburbs today, many people, especially in immigrant families, want to change their property in ways that contribute to a healthier environment.

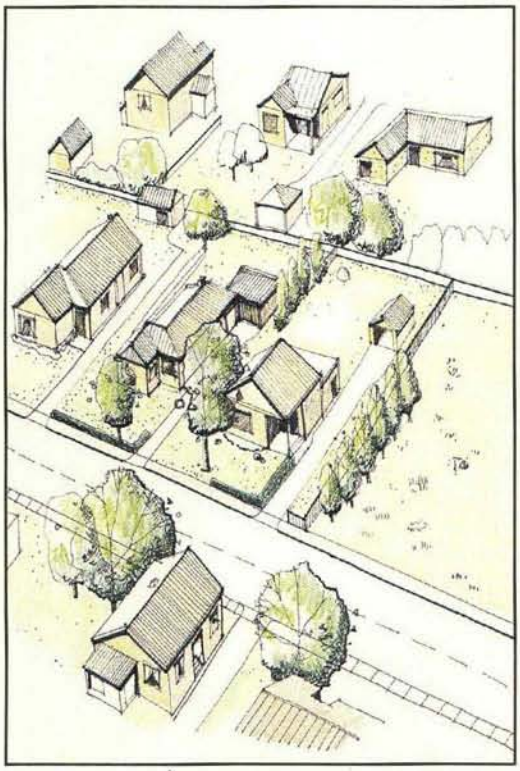


Figure 22 Existing suburb

Homeowners should be allowed to create basement apartments, split large homes into duplexes and triplexes, add extensions, in-fill townhouses in side yards, or build granny flats in backyards or over garages. In addition, energy-consuming lawns can be converted into more productive organic vegetable and flower gardens.

At the same time, narrowing the typical suburb's wide streets would create more shared neighbourhood space, with wider sidewalks and more trees to provide a shady and pleasant street environment.

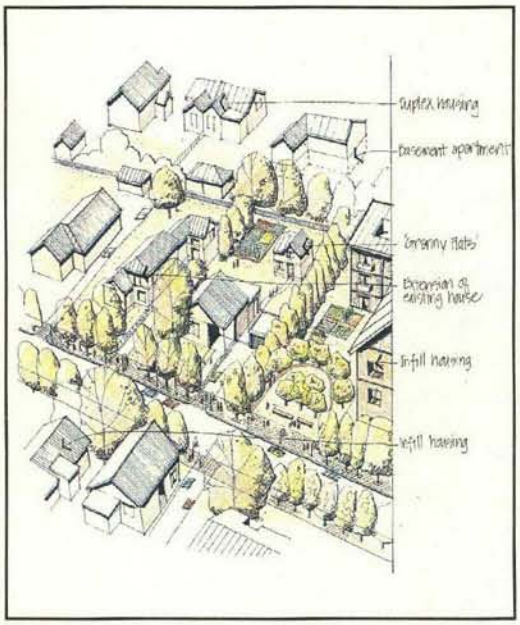


Figure 23 Alternative potential

INDUSTRIAL/COMMERCIAL DEVELOPMENT

Other than outmoded zoning regulations, there is no reason why clean industrial sites should not include housing and shops. When people live close to where they work and shop, walking and bicycling replace polluting commuting by car, and real communities can spring up — a far cry from separate bedroom suburbs, shopping malls, and sterile industrial parks. Turning some

land back to agricultural use as private or community gardens, and transforming industrial flat roofs into vegetable gardens or rooftop wetlands can enliven and diversify healthy communities even further. Here again, intensifying industrial sites, whether in the city's core or at the outskirts, reduces population pressures on the countryside.

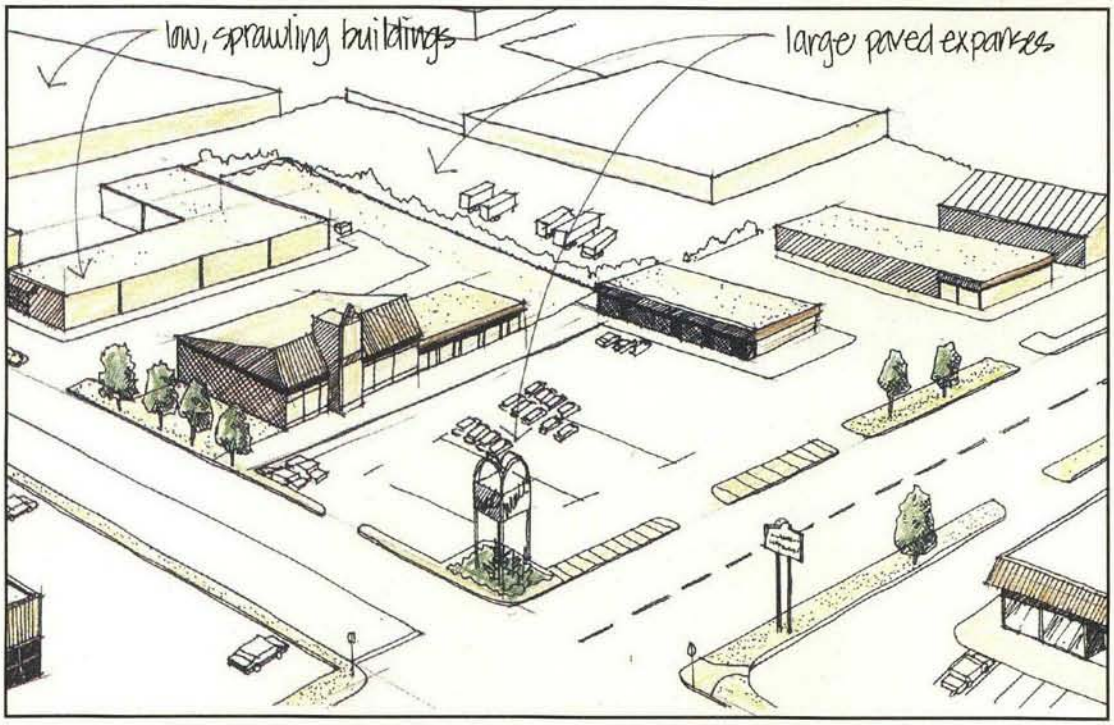


Figure 24 Conventional industrial / commercial development

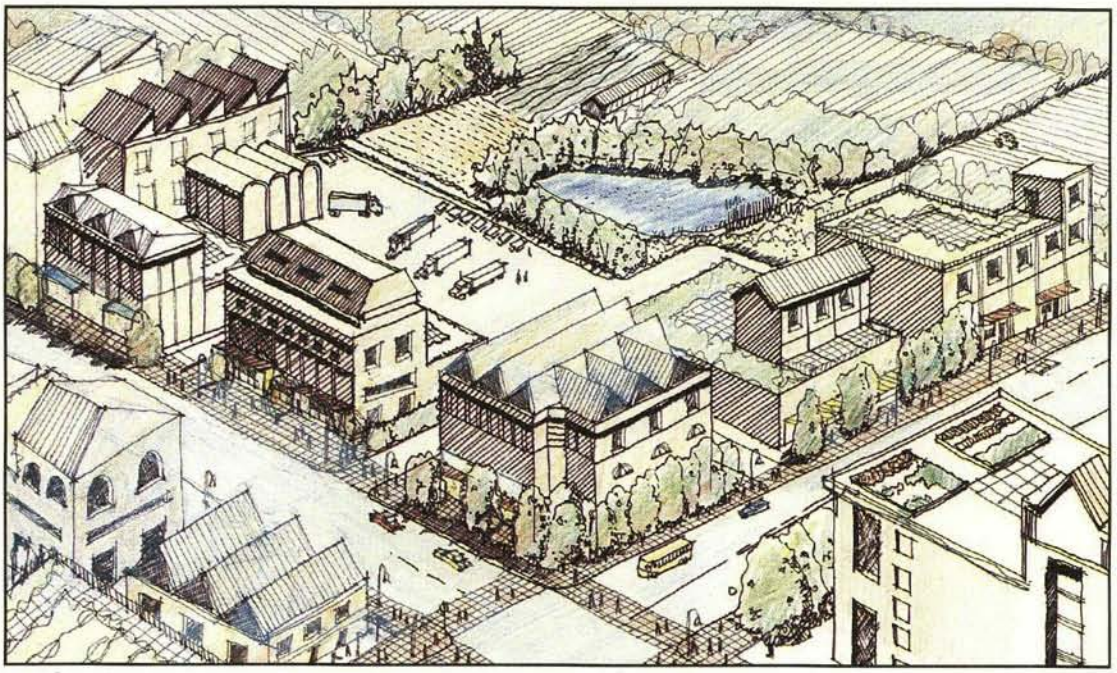


Figure 25 Intensified industrial / commercial

AN ECOSYSTEM APPROACH TO DEVELOPMENT

Figure 26 is a picture of a typical scene in the upper Don watershed: farm fields, interspersed with hedgerows and hillocks, nestle near a branching, wooded stream. But developers have bought the land from farmers, and the town council has approved a zoning change that will bring in far more tax revenue than farming ever did.

Soon, bulldozers and graders will scrape off the topsoil, remove trees and hillocks, and grade the former fertile farmland to a sterile, monotonous, easy-to-build-on level plain. Any wetlands, too, will be routinely filled. During development, which may last up to four years, the headwater stream will be subject to massive siltation and erosion. Eventually, it may be channelled in concrete.

The developer will put in the typical infrastructure: hard-surfaced graded roads, gutters, storm sewers, and lines for gas, water, and sanitary sewage. He will then sell parcels of prepared land to other companies, which will erect large, low-density offices and industrial plants, and pave over several hectares for parking lots — similar to those nearby. Most of the unpaved land will be turned into lawns dotted with non-native "lollipop trees" (Figure 27).

But, with some imagination and sensitivity to natural systems, this development could protect and fit into the countryside and its habitats. Tighter, higher-density mixed development could edge the site, preserving the stream and its treed banks as the natural centre and human focus (Figure 28). Woodlands, hillocks, some farm fields and buildings, and any wetlands could be conserved. Rather than destroying the stream, urban run-off could be directed into ponds and new wetlands.

Such a development follows all the guidelines of regeneration: it protects nature and countryside; its form adheres to local topography by clustering on the least sensitive land; and it enhances environmental health. The development is dense and diverse (with mixed industrial, commercial,

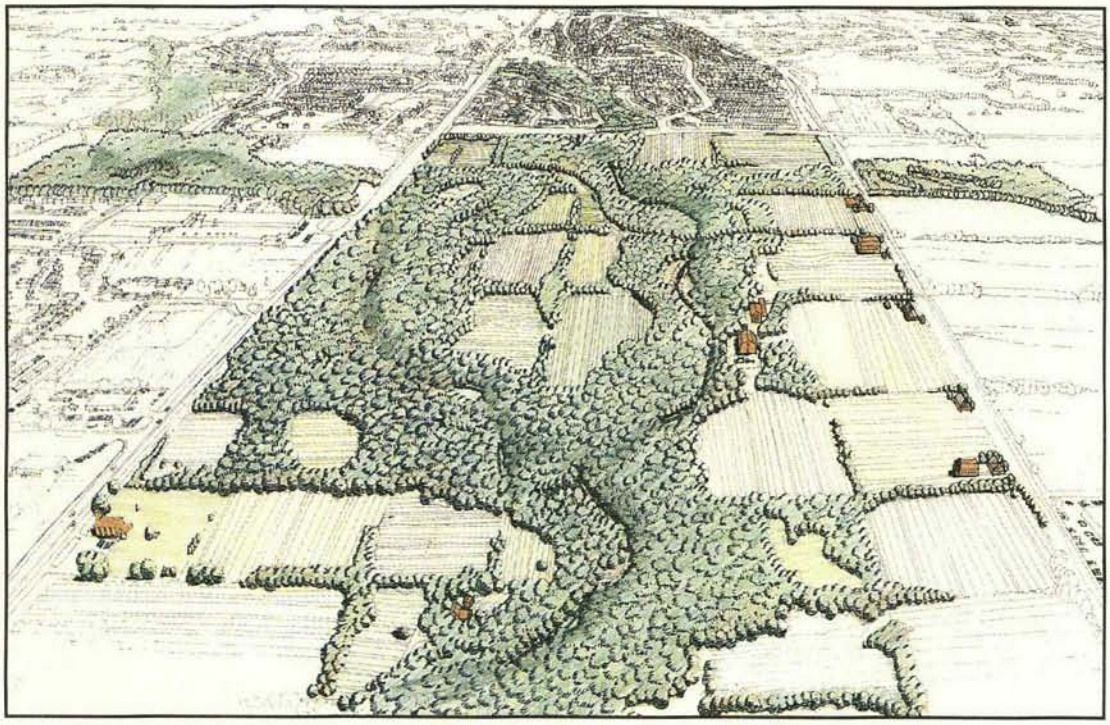


Figure 26 Existing landscape patterns

and residential buildings), and maintains rural traditions by protecting farmland and incorporating land-based industries. Throughout, it works with — rather than against — nature. The people who live in it cannot help but develop a watershed consciousness. Given the rate at which urbanization is steamrolling countryside in the Don watershed, it is crucial that developments follow this new pattern.

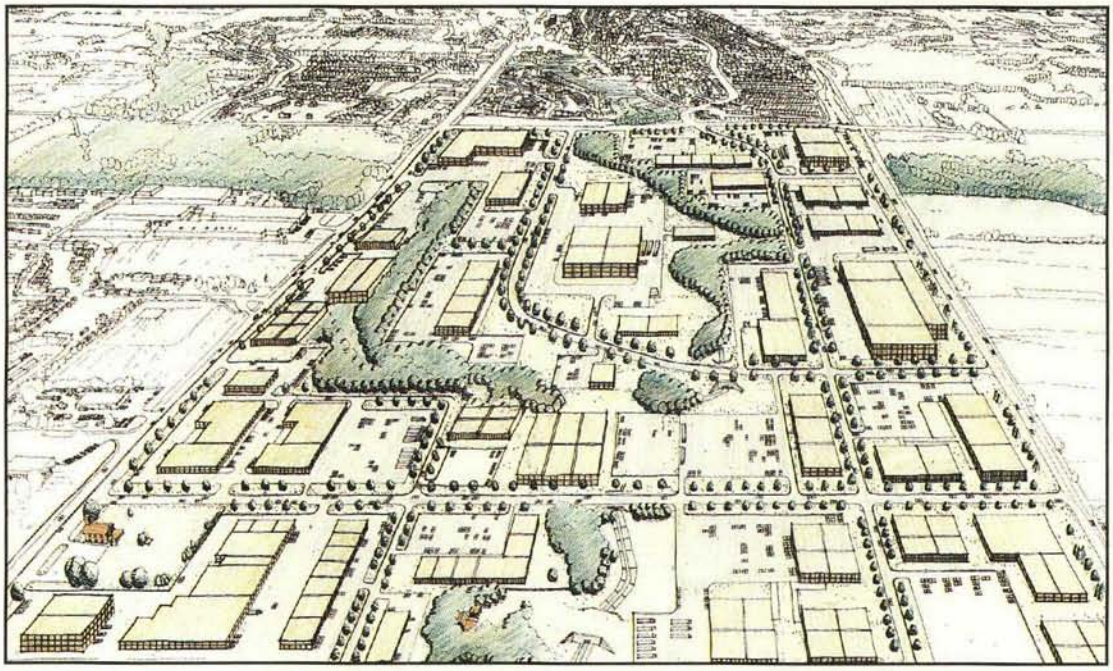


Figure 27 Conventional development

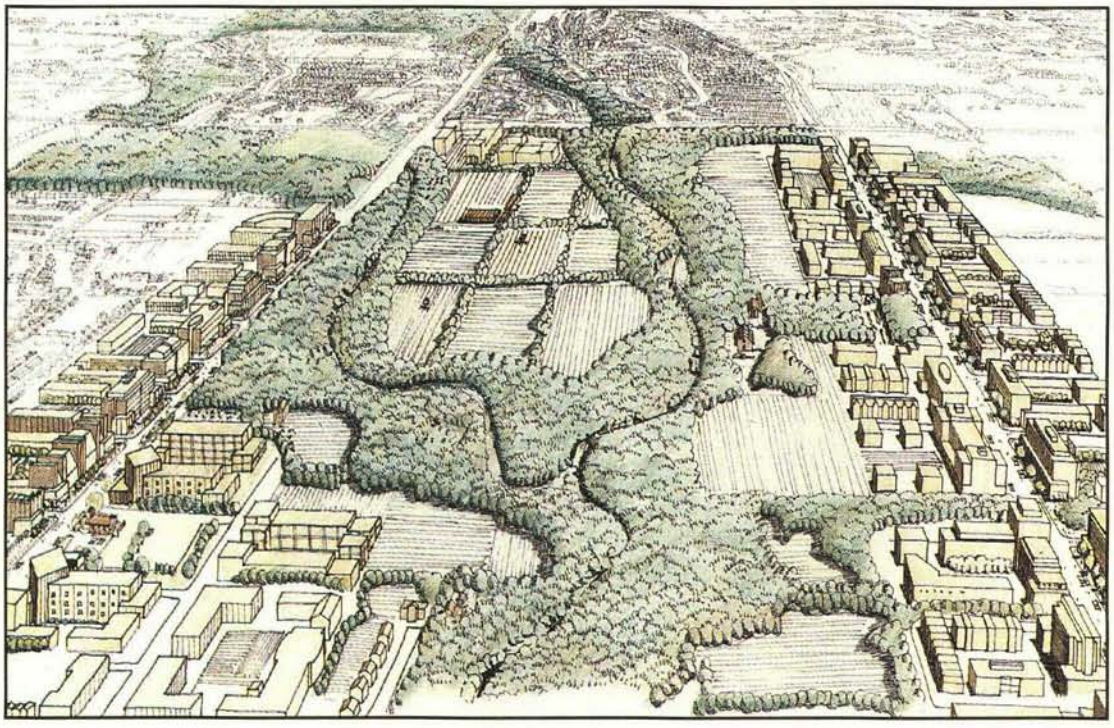


Figure 28 Mixed development intensified along major routes

STORMWATER MANAGEMENT: OLD HABITS, NEW SOLUTIONS

The most effective way to help aquatic habitats regenerate would be to make radical changes to the conventional system for handling stormwater. In the Don, stormwater — urban run-off — discharging directly into the river is the main cause of the river's pollution and its peak high and low flows, both of which degrade habitats severely. Stormwater damage is ubiquitous in the watershed, in new developments, existing suburbs, and the urban core.

The concrete and steel infrastructure of gutters, drains, catchbasins, and underground storm pipes rushes polluted water off city pavements as rapidly as possible and into rivers, streams or lakes. Designed for the safety and comfort of urban residents, the system keeps feet dry and prevents standing water that could freeze to slick ice. Untreated run-off water carries with it oil, lead, salts, fertilizers, herbicides, pesticides, decaying leaves, animal feces — plus whatever people pour down the storm drains — straight into rivers and streams.

Sudden, excess stormwater pouring into the river causes rapid high flows and dangerous flash floods. Ironically, the water moves so efficiently out to the lake that, in dry periods, there is little reserve; streams dry up, levels in the lower Don fall, and the river becomes sluggish. The extremes of floods and low flows — added to the pollutants in the run-off — wipe out habitats for fish, turtles, and amphibians. Small wonder that only four small hardy fish species survive in the Don.

A typical storm-sewer outfall

In order to keep it from harming the natural system, before it reaches watercourses, all stormwater could be treated in the same way as sanitary sewage, an extremely expensive undertaking. Better still, all substances polluting stormwater could be stopped at source. That would mean finding safe alternatives for road salt, prohibiting the use of chemicals on parklands, golf courses, and gardens, discouraging the use of cars, and fining residents who operate leaky cars, dump toxins in storm drains, and ignore stoop-and-scoop laws.

In addition, adjustments could be made to the conventional storm-sewer system itself, using such methods as regulating its flow during storms, creating detention areas or gradually replacing the hard, impervious surfaces of storm pipes, sidewalks, parking lot surfaces, and gutters with porous materials.

While such measures should be considered seriously, there are other ways to work with nature and ensure that stormwater helps enhance the health of rivers and streams.

Wetlands provide wildlife habitats and also cleanse water effectively: such plants as bulrushes absorb pollutants. Throughout the watershed, every opportunity to create marshes and wetlands should be welcomed. Even in the urban core, there is often space to move stormwater outflows away from stream and river banks to create small, narrow wetlands farther back. In addition, ditches can replace hard pavements along expressways and major roads, allowing run-off water to simply be absorbed into the ground. In such conditions, wetland plants often move in and find a home. Finally, reforestation — aside from the other benefits trees confer — helps the soil throughout the watershed retain and cleanse water naturally.

Rather than being seen as a waste to be gotten rid of quickly, stormwater, handled according to regeneration principles, becomes a means of creating diverse and beautiful places. In urban areas, they profit the human community as well as enhancing the natural one.

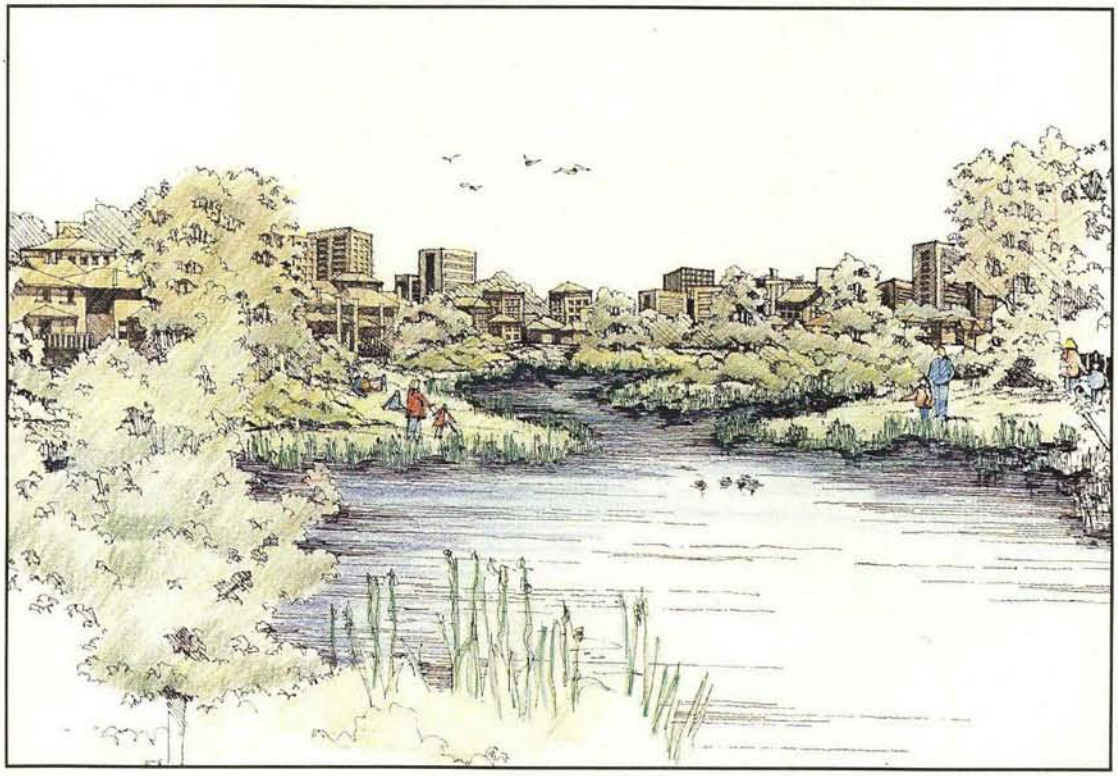


Figure 29 Wetland vegetation for stormwater treatment and habitat enhancement

LOWER DON DELTA

Conventional development of port lands tends to create dreary, sterile industrial parks dotted with horticultural plantings — places that are welcoming neither to wildlife nor to people. But applying regeneration guidelines can revolutionize the look and function of port lands: historical and natural features can be protected, and development can be intensified to leave extensive naturalized greenspace. A 1991 plan by the City of Toronto's Task Force to Bring Back the Don would work dramatically with nature, helping the river once more create a natural, marshland delta on the port lands site itself.

In the 1990 *Watershed* report, the Commission recommended that green industries and parkland be established on the existing East Bayfront/Port Industrial Area, which is the old, filled Ashbridge's Marsh. According to the Task Force's plan, the river would meander through a 50.6 hectares (125-acre) regenerating marsh, emptying into the shipping channel to the south, with office buildings and clean industries clustered on either side. Compared to conventional port land development, this is an exciting prospect (see contrasting views, Figures 30 and 31).

The Task Force believes that encouraging the Don to regenerate a marshland delta, which engineers removed 80 years ago, would help re-establish a wildlife corridor between the Don Valley and the Leslie Street Spit (home and resting place to hundreds of waterfowl and other birds); recreate a healthy delta habitat for fish, amphibians, birds, and other wildlife; and create a large naturalized greenspace at the Toronto waterfront for city dwellers to enjoy. The long-abused river would end its journey as a river should, with the dignity of a natural mouth.

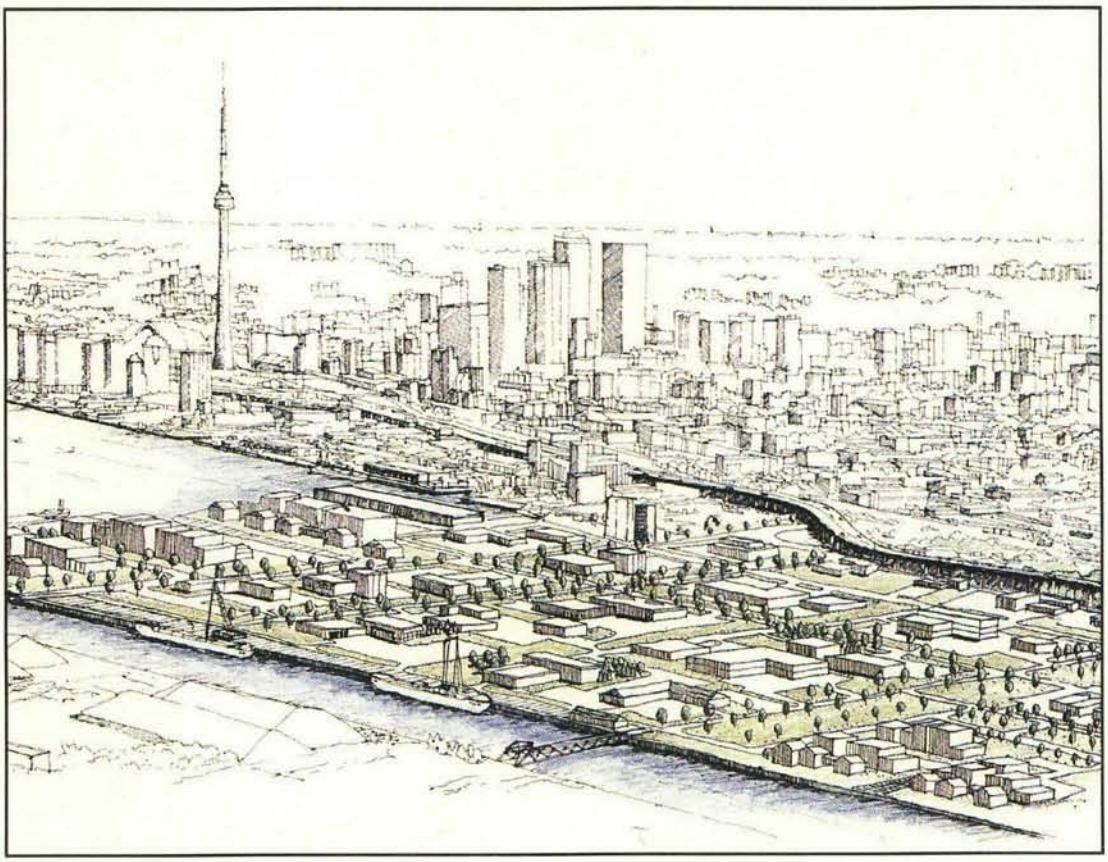


Figure 30 Conventional development

The Task Force planning team is now examining detailed technical requirements for achieving the delta vision. The strategy would integrate hydrology, biology, engineering, and environmental planning to restore, rather than control, nature — to work with, rather than against, natural processes.

For like all rivers, the Don "wants" to build up a delta. Every year, the Toronto Harbour Commissioners dredge 100,000 cubic metres (3,531,467 cubic feet) of silt to prevent silting and keep the Keating Channel open. With a delta marsh, the need for that $600,000 annual effort would be greatly reduced: instead — by diking and controlling where the delta forms — the Don would be allowed to create the marsh, and would fill in the Keating Channel and, by this one significant change, would alter the situation upriver.

This vision for the Don would transform Toronto's waterfront. It would make the river the focus of the city, rather than a sewer to be ignored. The Task Force's plan is long-term and the group proposes that, in the 20 to 40 years needed to carry it out, a research and education station be established in the port lands to study the natural processes of delta and marsh generation.

LOWER DON ROSEDALE FLATS

During its natural evolution, as the glaciers melted and the waters of Lake Iroquois finally fell, the Don River snaked slowly across the exposed flat lake bed, creating a huge delta of wetlands, ponds, and lagoons on its way (Figure 4). That is why the flat, channelled lower Don fills with silt today: it is still "trying" to form its old delta.

Simply allowing that to happen would obliterate much of the city's infrastructure that now hems in the lower part of the river.

Figure 31 Alternative development

Initial studies by the Task Force suggest that the river's gradient must be made steeper so that it provides the extra energy needed to pull the Don's silt out to a delta in the port lands. A two- to three-metre weir at the Rosedale Flats just north of Gerrard Street would do just that — a case in which nature can regenerate itself only with human intervention. Because of massive past engineering changes to the Don, some restorative work will now be needed to bring the lower watershed back to health and to approximate its former natural state.

Building a weir at Rosedale Flats would act like a beaver dam, creating behind it a headpond that would fill with sediments and create opportunities for varied bottomland habitats of meadow, wetland and woodland. Ponds and wetlands would help regulate flooding, wildlife would return, and people could enjoy renewed recreation opportunities.

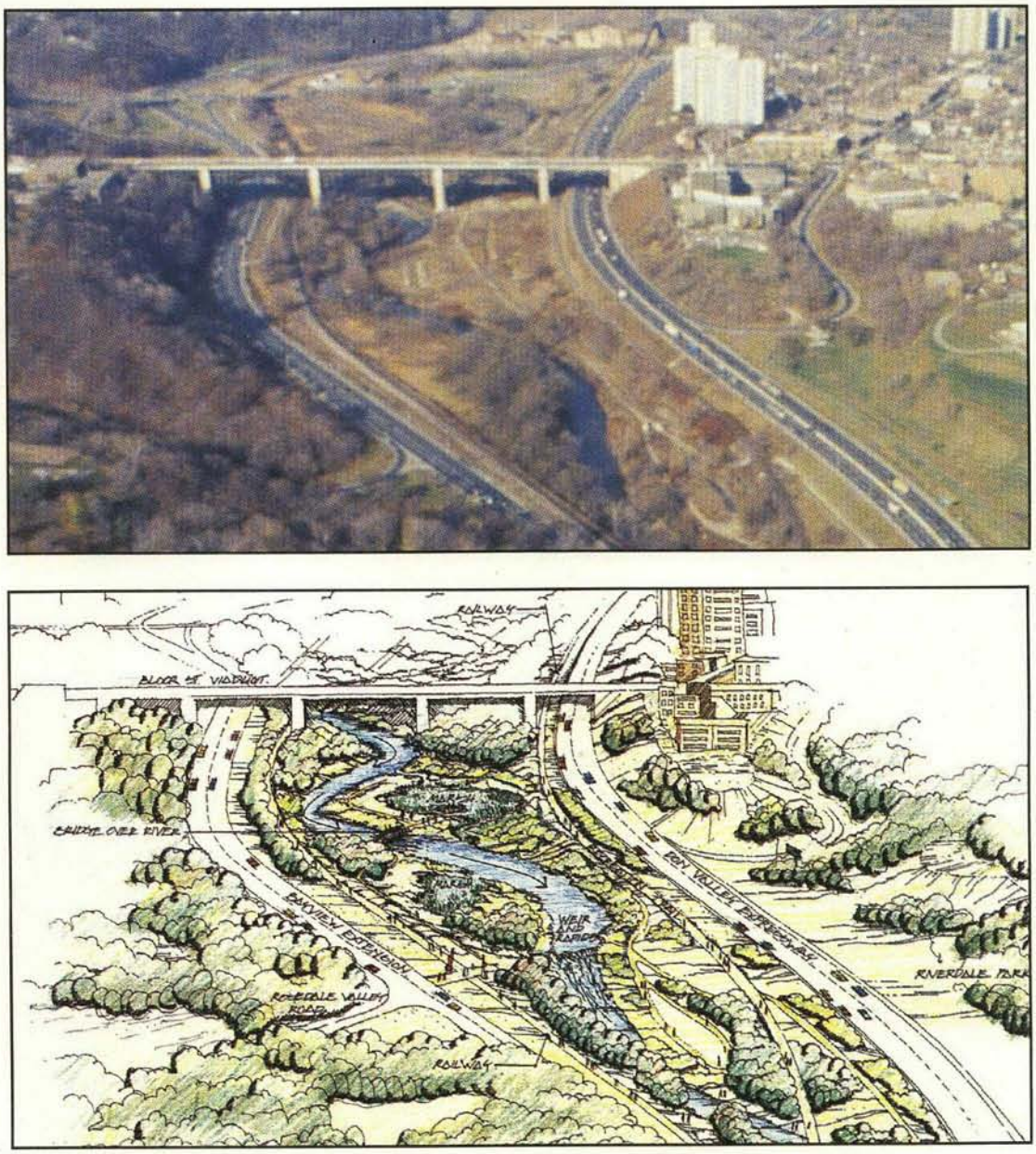


Figure 32 Lower Don Rosedale Flats

LOWER DON CHANNEL

It is difficult to naturalize a linear, channelled river like the Don between Rosedale and the proposed new delta. The City found it challenging just to find space for a cycling and walking trail there two years ago. Because the railroad tracks, expressways, and steel and concrete banks that hem in the lower Don seem to be here to stay, this highly urbanized stretch might better be treated more formally, as an attractive riverside park.

As part of the delta restoration, the Don Task Force suggests pools and rapids every hundred metres or so in the Don. They would help maintain the river's new and steeper gradient, and provide upstream access for fish. Fast-growing, water-loving willows and poplars could be planted on the almost treeless banks; their shade, as well as falling leaves and insects, would improve fish habitats and food sources. But, most important, the degraded lower Don would become a "people place" with welcoming shade trees, the pleasant sounds of a more natural river, and spots to sit and watch ducks paddling and fish circling in the pools.

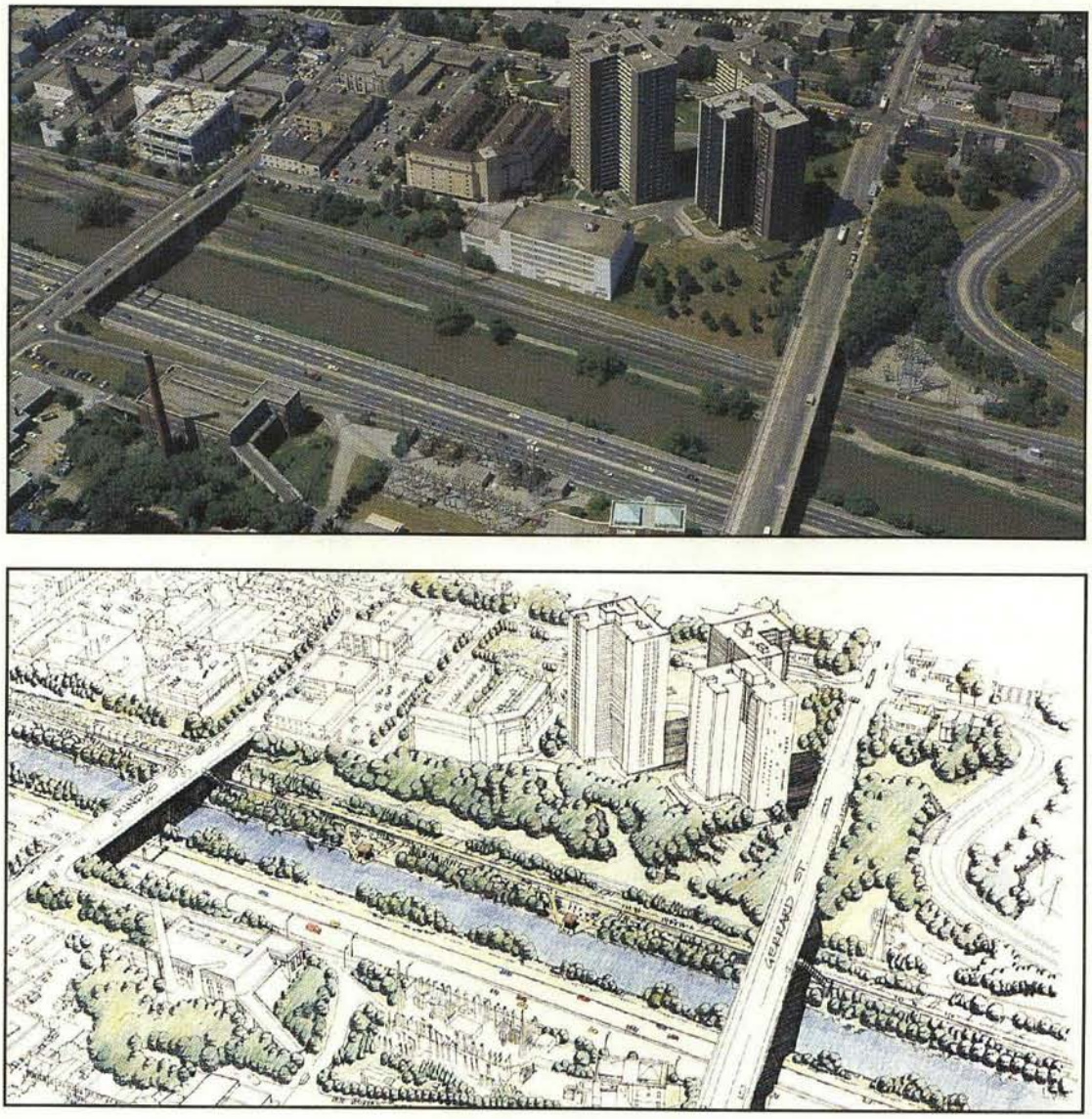


Figure 33 Lower Don Channel

ACCESS AND RECREATION

The Don watershed is a dramatic network of branching green valleys and ravines in one of North America's largest urban centres. Through regeneration, it can again become a healthy home and migration corridor for wildlife. It can become a haven for people too, maintaining vital connections with nature and offering respite from the pressures of the city within the city itself. The mobilizing force for restoration is access. The more people who enjoy the valley, even in its present state, the greater the groundswell for its healing.

What better way to encourage a watershed consciousness than to link up existing

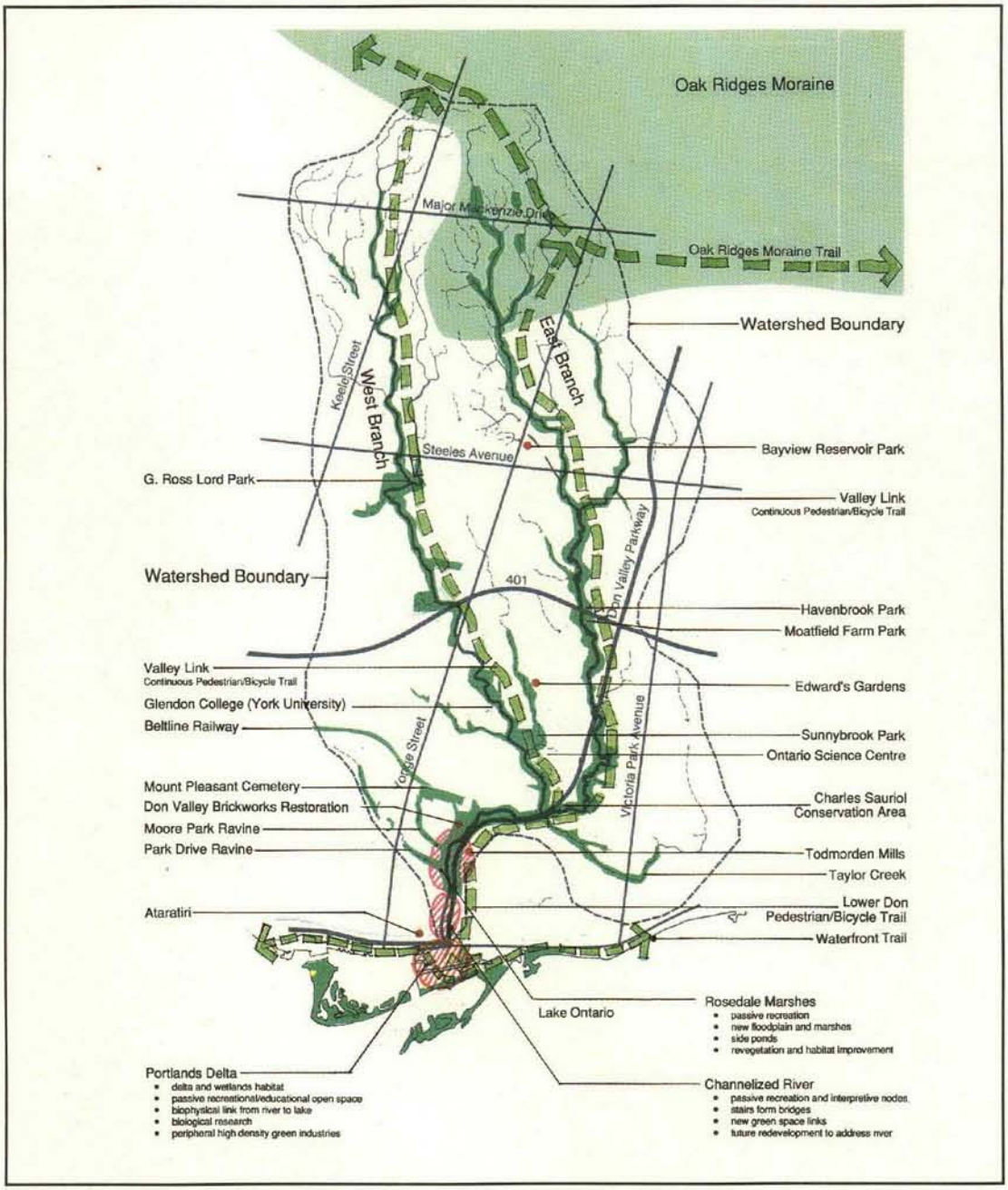


Figure 34 Connecting the watershed

trails — such as the lower Don bicycle path and the nature trail through the Charles Sauriol Conservation Reserve — through the whole watershed? That, in turn, would link the Martin Goodman Trail along the lakeshore with the proposed greenway on the Oak Ridges Moraine. Ever since the City opened a path on the lower Don — especially since an access stairway was built at Riverdale Park — dozens of cyclists, joggers, bird-watchers, and people just out for a stroll enjoy the lower valley every weekend.

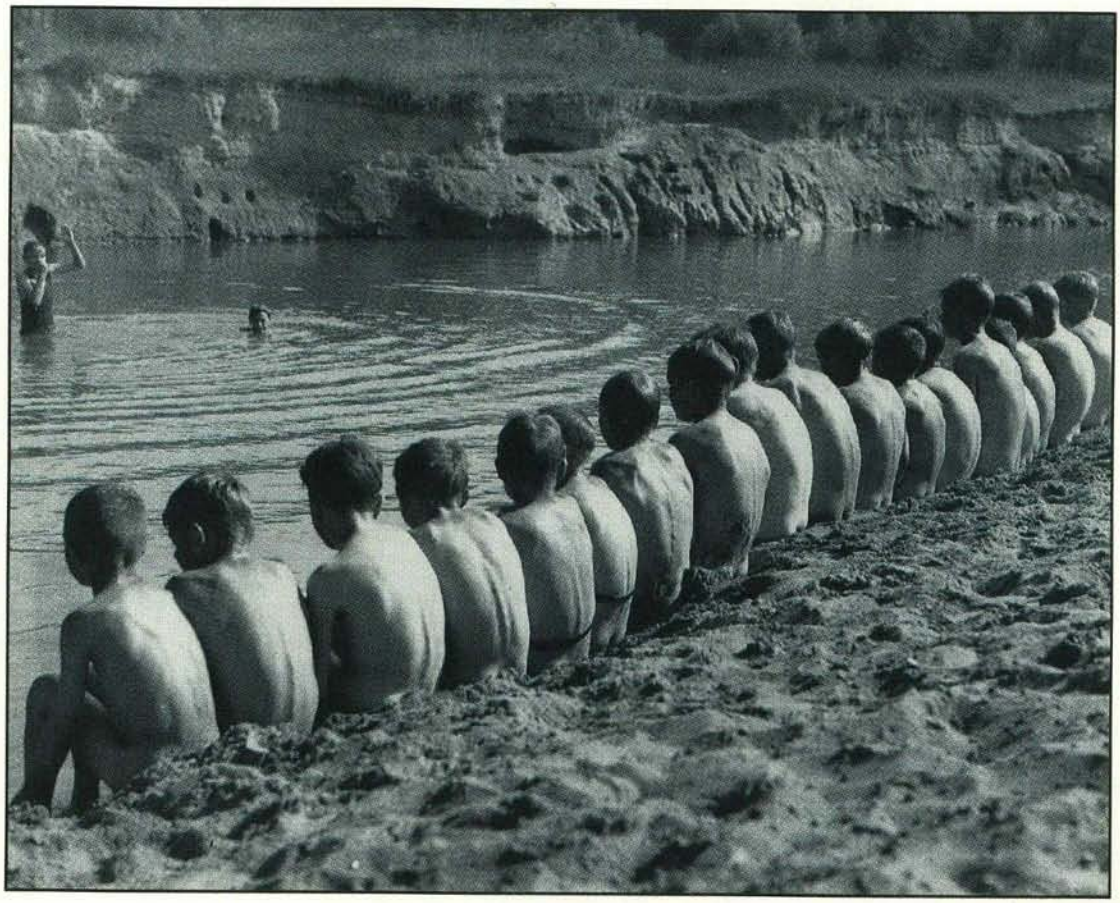
Apart from any recreational or spiritual uses it may provide human beings, the Don watershed is valuable in its own right as a natural system. Nonetheless, because people are now an inextricable part of the natural system, the point is to heal the watershed for all. The Don's advocates hope that, someday, when the foxes, turtles, and maybe even salmon return, children will be able to splash in the Don's swimming holes again.

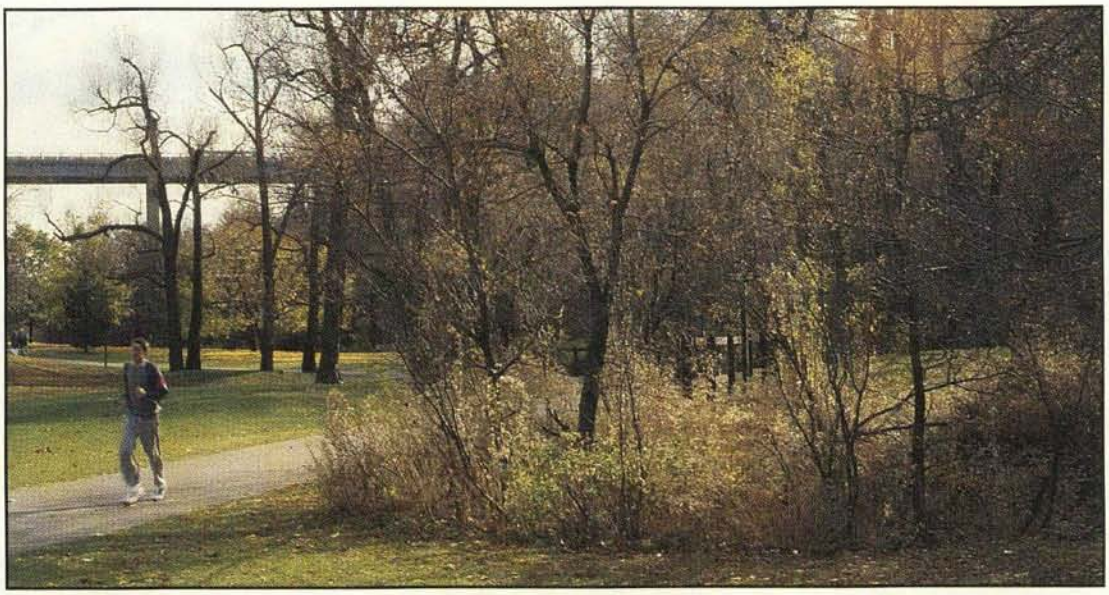
THOUGHTS ON ACHIEVING THE VISION

How do 800,000 people in seven municipal jurisdictions, with bureaucrats from several different provincial and federal ministries — plus troops of interested planners, politicians, naturalists, biologists, engineers, landscape architects, and lawyers — achieve a vision as far-reaching as restoration of a watershed?

One way not to achieve the vision is for each city and town in the watershed to continue acting on its own. What may benefit one local municipality may harm the entire watershed as well as local natural areas.

A further recipe for failure is to allow the vision to slip out of the hands of citizens and become the sole property of experts.





Dictating regeneration from above — by governments and their consultants — almost guarantees the loss of public support and stifles valuable initiatives. Neighbourhood and citizens' groups already practise restoration locally: planting trees, cleaning up ravines, and acting as watchdogs to stop chemical spills and vandalism of nature. They must become part of a co-ordinated process for watershed regeneration.