

seven-metre (23-foot) bluffs descending to stream estuaries, each fronted by a small beach. Much of the land is low-density residential or cottage-lined beaches.

On the east side of the Oshawa Harbour entrance groynes, reclaimed land has been created by construction of a confined dredge spoil disposal facility. The Oshawa Second Marsh is a large estuarine wetland next to the more exposed McLaughlin Bay. From Darlington Provincial Park, the shoreline rises to bluffs 12 metres (40 feet) high, which occasionally “slump” toward the lake. Darlington Generating Station, built partly on reclaimed land, employs massive armourstone revetments across its extensive shoreline.

At Raby Head, the bluffs are some 12 metres (40 feet) high, descending to a small coastal wetland just west of a large cement company dock, where a 32-hectare (79-acre) lakefill structure projects 675 metres (738 yards) into the lake.

Continuing east, the shoreline is a series of 10-metre (33-foot) bluffs, cut by creeks with small estuarine marshes behind sand and gravel baymouth bars. The estuaries at Port Darlington and Bond Head have been partially dredged for marinas and the baymouth bars are cut by entrance groynes. Still farther east, the pattern is repeated, with some bluffs reaching as high as 20 metres (66 feet); vegetation there suggests a lower rate of erosion. The area behind the bluffs is almost entirely agricultural.

## **SIGNIFICANCE OF SHORELINE MODIFICATION**

The Commission’s interim reports acknowledge that lakefilling and human alterations of the shore have provided

substantial benefits to the region: Ontario Place, Harbourfront, and Bluffers Marina, for example, were constructed on lakefill and have improved the social, cultural, and economic life of the community. These and other projects have expanded the land base; improved public access and amenities such as parks, beaches, and boat-mooring capacity; and/or increased fish and wildlife habitat.

Tommy Thompson Park, located on the five-kilometre (three-mile) spit at the foot of Leslie Street, demonstrates some of the benefits of lakefill, both planned and accidental. Planned benefits include extensive boat mooring capacity, and facilities for sailboards, dinghy sailing, rowing, and canoeing in the sheltered waters of the Outer Harbour, in the lee of the spit. The spontaneous emergence of grasses, herbs, shrubs, and trees provides exceptional habitat for a variety of birds and animals, an urban wilderness of amazing variety. The shallow, sheltered cells within the park provide fish with refuge from the periodic cold-water upwellings that occur, with deadly consequences, along much of the Lake Ontario shore. As a result, populations of perch, pumpkinseed, and pike have expanded rapidly.

Public access to the shoreline has been enhanced by the artificial headlands at Humber Bay East and Bluffer’s Park, and elsewhere thousands enjoy picnicking, walking, and other types of recreation. Groynes and other forms of shoreline erosion control have created new beaches near Oakville and various other places where people can view the lake and enjoy the heat of the summer sun. Homes and properties along the Scarborough Bluffs, among other areas, were saved by measures to halt or

delay erosion. As well, commerce has benefited from lakefilling: thousands of new boat berths have supported the boat building and service industry. Sport fishing, mainly salmon charters and private boats from facilities at Port Credit, Bluffers, and other new marinas, brings millions of dollars in revenue to the region. Extensive condominium, tourism, and commercial facilities stand on land created by lakefilling.

There has been another benefit, particularly to the downtown waterfront area of Metro Toronto: the lake has been a convenient, inexpensive repository for large volumes of material excavated from downtown construction sites.

These benefits extract a price, however, as described in *Shoreline Regeneration*:

Much of the excavated material used for lakefill was contaminated with lead, other heavy metals, and organic materials that found their way

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*The lake has been a convenient, inexpensive repository for large volumes of material excavated from downtown construction sites.*

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into the lake sediments and the food chain. This [fill] material, combined with the much larger sources of pollution, the sewage treatment plants, storm sewers, and urban rivers, has degraded the water quality of the shore. The combined impact of urban development — filling wetlands and river estuaries, and armouring for erosion control, in addition to vast quantities of silt released from lakefill sites — has damaged much of the natural habitat both above and below the water line.

The Commission's Shoreline Regeneration Work Group found that the

environmental price was higher than necessary, and sometimes outweighed apparent benefits. In this respect, the Work Group agreed with the position taken by many critics of lakefill who made submissions to the Royal Commission during public hearings.

## **SHORELINE REGENERATION ISSUES**

Concerns about the negative effects of shoreline modification give rise to several issues, including:

- the environmental effects of lakefill structures and erosion control measures, including cumulative effects of many activities, loss or damage to both aquatic and terrestrial habitat, obstruction of sand movement, elimination of traditional sources of sediment through shoreline armouring, and accelerated erosion in other places;
- the degree to which current guidelines and control procedures for materials for lakefilling ensure safety;
- lack of standards for lakefilling methods and structural designs;
- disposal of the waste materials from construction and excavation, including that judged not suitable for lakefill;
- changes in economic opportunities, and the wisdom of spending public money to protect private and public land through armouring — as opposed to acquiring — hazard lands;
- similarly, constructing artificial headlands for private boat clubs; and

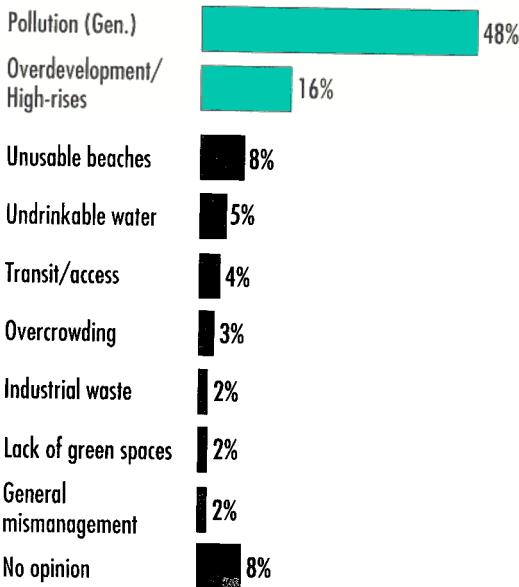
- the impact of shoreline modification on aesthetics, access, vistas, and recreation.

These concerns should be considered in the context of general apprehension about the safety of Lake Ontario as a source of drinking and bathing water.

The preceding chapter of this report describes Lake Ontario's condition and the impact of pollution, even from sources far from the Greater Toronto bioregion's shoreline; it also examines efforts by the International Joint Commission, the Metro Toronto RAP, and other groups to address these problems.

The contaminated sediments, overloaded sewage plant, or toxic pollutants from the Niagara River and elsewhere will take

### Major Waterfront Concern



Pollution is considered the waterfront's major issue by the respondents.

Source: Environics Poll. 1991.

considerable time to correct. Lakefilling, however, is a discretionary activity and can be stopped as a pollution source tomorrow — if we choose to do so. There are choices of methods and materials, as well as of locations at which lakefilling would be allowed.

### IMPACT OF LAKEFILL STRUCTURES AND EROSION CONTROL MEASURES

Artificial headlands — peninsulas created by lakefilling to shelter boat basins — have become common on the shore of the Greater Toronto bioregion. They have created negative impact on the environment in four ways:

- materials used for fill have contributed to contamination and turbidity of the water;
- structures have blocked the lake's ability to rinse its shoreline;

We are a species that, through its intelligence, has exceeded its biological constraints but in the process lost its sense of place in the biosphere. Convinced of our knowledge and ability to control nature, we exploit the very life-support systems of the planet in the name of short-term comfort and economic profit. Wilderness is disappearing throughout the world so quickly that each remaining untouched area becomes that much more rare and precious.

Suzuki, D. 1989. *Carmenah: Artistic Visions of an ancient rain forest*. Vancouver: Western Canada Wilderness Committee.

- transport of sand along the waterfront has been limited; and
- aquatic habitat has been destroyed.

Loss of shallow lake bottom for breeding and feeding at the site reduces habitat, while large amounts of sediment — material that blocks the light and blankets the lake bed — is lost during construction, thus imposing further, indirect harm. In a deep, dark, silt-covered environment, few aquatic species flourish. Light is essential to the growth of some plant organisms that fuel the aquatic food chain. High turbidity results in altered and reduced biotic life and spawning capacity, in the zone that could be most productive.

Embayments and boat basins in artificial headlands, which provide shelter from cold-water upwelling in the exposed lake, can be a positive factor in aquatic habitat. Above the water line, the natural growth of plants, shrubs, and trees on lakefill and erosion control projects have provided new habitat for a wide variety of birds and animals. These benefits would be much more valuable, however, if this attractive environment were not so contaminated.

The new headlands, which have extended as far as five kilometres (3 miles) into the lake, are a significant barrier to longshore movement by waves and current. As a result, suspended and floating materials are trapped and deposited nearby, where they create various pollution problems.

Erosion control embraces a variety of materials applied to the shore to slow or stop the loss of land by wave action. They include vertical steel pilings, concrete walls, large quarry stones (armourstone), construction rubble, and old tires. MTRCA has undertaken massive erosion control

measures at the foot of the Scarborough Bluffs and erosion control efforts by individuals and agencies are estimated to cover as much as 70 per cent of the shore from Burlington to Scarborough.

In addition to habitat loss, erosion control impounds the sediment that would normally drift along the shore, renew beaches, and repair storm damage done to sand and gravel bars that are essential to protecting estuarine marshes. Further, the structures may change wave patterns and accelerate erosion elsewhere on the shoreline.

### **CUMULATIVE EFFECTS**

As the Shoreline Regeneration Work Group observed:

It became evident that many larger problems along the waterfront were not the result of one horrendous event but, rather, the cumulative effect of many acts or interventions. Treating each project in isolation from the rest of the shore was a common cause of significant degradation.

The tendency to treat lakefill and erosion control projects singly is understandable, when each is proposed at a different time, has a different set of characteristics and location, and is subject to decisions by different municipalities and agencies. Nonetheless, they are not independent, and their combined impact will, at some point, exceed the carrying capacity of the shore.

The impact of one artificial headland may be acceptable; but there are now eight new headlands, with many more planned. At some point, the shoreline circulation of water may be so impeded that it creates a regional cesspool.

Similarly, it would be hard to prove that 100 metres (110 yards) of armoured



*House atop eroded Scarborough Bluffs*

shore have starved any beaches or eliminated a significant amount of shallow-water aquatic habitat. However, 50,000 metres (31 miles) of armoured shore is another matter. It is estimated that 90 per cent of aquatic life depends on the shallow near-shore zone that is destroyed by many forms of erosion control. Losing such large areas leads to reduced food supply and spawning capacity. As discussed previously, shoreline modification damages habitat, but that is partially offset by some benefits. Clearly, the important issue is how to alter practices and technology so that they have a positive overall effect on habitat.

Loss of habitat, combined with other stresses such as contaminants and the presence of exotic species like the lamprey eel, has placed great stress on aquatic life forms. Along the Greater Toronto shore,

the number of types of fish, which are an indicator of the health of aquatic ecosystems, has already decreased from 50 to approximately 25 and, in some areas, is as low as 11.

Cumulative effects — the combination of various stresses over time — is a difficult but important issue in evaluating the present and future health of the region's aquatic ecosystem.

## **SAFETY OF CURRENT GUIDELINES AND CONTROL**

Materials for open water disposal — lakefilling — are controlled according to a system defined by the Ministry of the Environment, using maximum levels of contaminants set out as "Sediment Guidelines". In the Metro area, the control system is operated for MOE by the Metropolitan

Toronto and Region Conservation Authority. MTRCA samples soil in large construction sites, and accepts or rejects fill from them, based on the results of its tests of contents. In the past, trucks were sampled when they arrived at the lakefill site, but results were not available until days after the sampling. MTRCA records show that some material used in lakefill (25 per cent in 1989, 15 per cent in 1990) was contaminated beyond the levels suggested by the existing MOE sediment guidelines.

The Royal Commission was given persuasive evidence, based on MOE research, showing that toxic materials moved from contaminated sediments to nearby plants and fish. Aquatic life accumulates some of the contaminants and introduces them, in concentrated form, to the food chain. This pattern has raised public and regulatory concern.

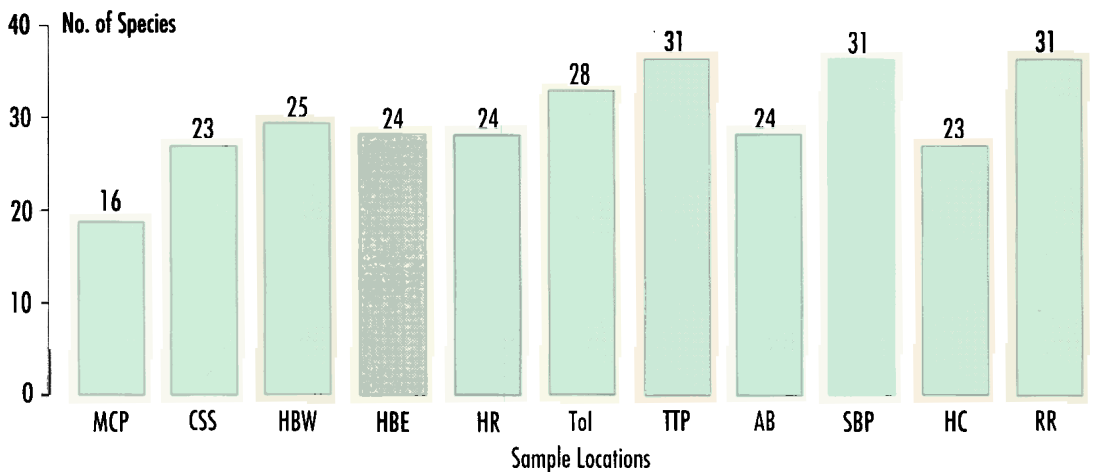
Established in 1976, current MOE sediment guidelines consider a very limited

range of toxic contaminants to establish nominally safe levels in materials for open water disposal. Many toxic substances are omitted. Recent work on contaminants in the 1976 list has shown that some are higher than the “no-effect level”, that is, the greatest concentration that showed no measurable effects when tested on indicator species. Considering this new information, the 1976 guidelines can no longer be relied on to define concentrations that are not harmful.

### STANDARDS FOR MARINE CONSTRUCTION

There are no standards or codes to define what level of storms artificial headlands must be able to withstand, what water levels they must attain or even how fill must be controlled to avoid pollution and turbidity. Without such minimum standards, it is not surprising that minimum initial cost can

**Figure 4.1 Number of fish species found — Toronto waterfront fish collections, 1989**



- Notes:
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|---------------------------|----------------------|---------------------------------|--------------------|
| MCP: Marie Curtis Park    | HBE: Humber Bay East | TTP: Tommy Thompson Park        | HC: Highland Creek |
| CSS: Colonel Samuel Smith | HR: Humber River     | AB: Ashbridge's Bay             | RR: Rouge River    |
| HBW: Humber Bay West      | Tol: Toronto Islands | SBP: Scarborough Bluffer's Park |                    |

Source: Buchanan, I.D. 1991. *Presentation for the Royal Commission on the Future of the Toronto Waterfront*. Maple: Ontario. Ministry of Natural Resources.