HUMAN PERCEPTION, SOCIAL FACTORS, AND ESTHETICS OF METROPOLITAN ENVIRONMENT

Ecology of an Urban Park

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ABSTRACT.—A controversial issue in the city of Kitchener, Ontario, involves the proposed extension of a boulevard through Lakeside Park. A study of this proposal revealed several facets of human interrelations with an urban park. Most important, there was a large gap between the perception and the reality of environmental quality. This has several practical implications in planning parks in the city.

LAKESIDE PARK in the city of Kitchener, Ontario, (population 125,000) has been the center of controversy for almost a decade. To complete the network of major arterial roads in a section of the city, it will be necessary to construct a four-lane road through the park. Local residents, citizens groups, politicians, and municipal employees have been embroiled in lengthy debate on the issues. This is a report on some of the findings of a consultant's study of the issues.

In this case man is the significant determinant of the environmental parameters. This introduced a new element, because man's perception of the environment became the issue. There was a large gap between what was perceived to be the status of the environment and the actual case.

Lakeside Park is an area of 32 acres of varied vegetation and landscape. Of special prominence is a 4-acre lake in the middle of the park. Physically, it would be possible to avoid the lake in constructing the road. However, the potential destruction of this little gem of nature became a heated issue. The debate involved the lake, vegetation, wildlife, and recreation.

The study reported here included an examination of the status and interrelations of the physical and biological factors of the environment and an analysis of the park and its users.

THE LAKESIDE PARK ENVIRONMENT

Geology and Groundwater

This part of southern Ontario has been subject to several glacial advances from different directions. The most recent glaciation occurred during the Wisconsin period, 10,000 years ago. Kitchener is on the edge of a large interlobate moraine (the Waterloo Sand Hills), and typical conditions for this landform exist in Lakeside Park. Underlying deposits are varied in texture, and the general topography is rough. The lake itself is a kettle formation, resulting from the depression formed by a large mass of ice.

The park area experienced two periods of glaciation separated by a period dur-

ing which lacustrine clays were deposited. The material deposited during the first glacial period contains large quantities of sands and gravels accumulated to a thickness of 50 to 150 feet over the underlying bedrock. These deposits are water-bearing and are tapped by three municipal wells within the park. Lacustrine clays overlie this aquifer. The clay is, in turn, overlain by organic deposits in the immediate area of the lake and by glacial outwash materials beyond the lake.

The deposits immediately beneath the lake possess a very low permeability, providing a basin in which waters collect to form the lake. These deposits also act as a aquiclude (confining the aquifer below). Observation wells established that the lake is not a perched water table, as had been feared, but that the groundwater system is continuous with depth.

Water Supply and Quality

The lake as it presently exists has a surface area of 3.7 acres and ranges in depth down to 22 feet. As natural processes occur, the lake will gradually fill in with organic materials and waterborne solids. The total land area draining into the lake is 150 acres. The drainage basin is urbanized (except for the park), and three storm sewers discharge into the lake.

The total annual average rainfall in this area is 32 inches. This will result in approximately 150 acre-feet of water discharging to the lake. Drainage from the lake also drains into a small creek when the water level is above a certain elevation. For the rest of the year, there is no outflow. The water level in the lake drops below its outlet during dry periods because of evapotranspiration.

The lake in the park is one of the most eutrophic bodies of water in the Province. Eutrophication is a process whereby the nutrient level or fertility of a water body increases naturally as it ages. These nutrients stimulate the growth of aquatic plants, particularly algae, and the familiar problems of odor, weeds, and a deterioration in esthetics result. Eutrophication may arise through normal runoff and decomposition processes. The addition of storm sewage and runoff from fertilized lands accelerates the process.

Some of the water-quality data collected during study of the lake by the Ontario Ministry of Environment revealed coliform bacteria counts, nitrate nitrogen levels, and organic and ammonia nitrogen levels above the allowable limits for recreational use.

Nuisance water-pollution problems were identified as well. In several samples, the amount of oxidizable organic matter as measured by the BOD_5, COD, and volatile solids tests was greater than that normally found in surface waters. This suggested a high level of decomposition in the lake and the possibility of deoxygenation during nighttime hours. In the hypolimnion, with temperatures several degrees lower than the surface, the dissolved oxygen concentration approached 0 mg./1. Chloride ion, a common indicator of contamination by man, was measured in relatively high concentrations.

The major source of contamination in the lake seems to be storm-sewer discharges during periods of runoff.

Soils and Surficial Sediments

An examination of the soils and surficial sediments of the park revealed that the developed soil profile had been disturbed throughout most of the park.

Two large areas of fill material were discovered. Investigation of the filled area on the east side of the park revealed that this area had once been mined as a gravel pit and subsequently was filled with wastes and debris. The other area of fill was more recent. The upper park consists of stratified sands and fine gravelly sands, which have been remolded at some time.

Erosion of the steep embankments,

particularly on the eastern side of the lake, has been severe at various periods in the past. This is substantiated by the occurrence of soils consisting of 12 to 30 inches of sand loam and fine sands overlying 5 to 6 feet of organic and marl deposits.

Vegetation

Examination of the vegetation of the site, on air photos and in historic records, revealed that major changes had occurred in the past 25 years. Most notably, Dutch elm disease, land clearance, and filling have resulted in many large trees disappearing. The park does, however, support a diversity of vegetation communities from pond to marsh to upland. In a botanical survey of the site, 213 species of plants were identified.

All the vegetation in the park has been subjected to the influences of man. Characteristically, the vegetation is in secondary succession following severe disturbance. As a result, the canopies of most of the stands are open, with dense growth beneath. Many shrubs are present.

The east side of the park supports more natural stands of vegetation. The west and north sides are predominantly maintained lawns, except in the immediate area of the lake.

Wildlife

Inventories of birds and mammals of the park revealed a pattern of individuals and populations that related strongly to the vegetation structure. Thirty-nine species of birds were identified in the park. The diversity of species on the east side of the pond was identical (24 species) to that on the west side. Though the number of species on each side was the same, there were six species seen on each side that were not observed on the other. The east side had areas of denser tree canopy and more edge between woods and fields, thus attracting rose-breasted grosbeaks, eastern wood peewees, field sparrows and indigo buntings. The west side possessed more open fields, thus attracting species like kiildeer.

The diversity of bird species was related to the structural and botanical diversity of the vegetation. In the west, the cultivated landscape attracted only seven species, though it comprised 84 percent of the area. The more vegetationally diverse sections had 22 species on 16 percent of the area. The four vegetation areas with the most bird species contained a mean of 55 plant species each, which was almost twice as great as the mean for the four areas with the lowest number of bird species. The valuable habitats for birds were identified as those with both the largest amounts of high and low canopy and with the greatest vegetation diversity.

The most common species of mammals trapped in the park surveys were the white-footed mouse, the short-tailed shrew, and the meadow vole. Six of the seven vegetation areas in which small mammals were found are on the east side of the pond. All species prefer the dense herbaceous growth of the more natural environments. This is shown by a comparison of the mean percentage of shrubby cover in the vegetation areas where small mammals were captured (70 percent) with those areas where small mammals were not captured (31 percent).

Recreation

A survey of park users and activities showed several interesting patterns. The park attracts people from only a limited surrounding area, approximately ½ mile for most users. It serves the function of a neighborhood park, providing space for recreation to meet local demands. The people who do use the park do so frequently, averaging 4.8 visits per week. These people are predominantly children aged 1 to 12 and people over 65.

Observations on the spatial patterns

of the summer users produced interesting patterns. The highest concentration of users (32.7 percent) was in the playground off in one corner of the park. Walking, jogging, and the water-related activities showed medium levels of participation. Passive activities, such as sitting and sunning, bird-watching, and picnicking showed low levels of participation. The avoidance of the natural areas and attraction to facilities was obvious.

THE PARK ECOSYSTEM

When these various factors and conclusions were examined as a whole, several important conclusions became evident.

1. People focused on the lake as the significant natural feature of the park. It was perceived to be (by some knowledgeable people) very sensitive to the environmental effects of the proposed road. In fact, however, the lake was in an advanced state of eutrophication, in which many water-quality parameters were above recommended levels for contact recreation. The primary source of water to the lake was storm-water runoff. This rich environment had many benefits because it supported luxuriant aquatic vegetation and high populations of coarse fish for children to catch.
   This suggests that we do not necessarily require the achievement of a high-quality body of water for it to serve a significant amenity or recreation function. The eutrophic natural condition is stable and inexpensive when compared to the cost input necessary to artificially maintain marginally better conditions.
2. The terrestrial environment (soils, vegetation) of the park had been completely altered by man's actions in the past. The vegetation was predominantly early successional weed, shrub, and tree communities — not what one would consider particularly significant. However, because of its structural and vegetational characteristics and the diversity of habitat, the vegetation attracts an unusual number of bird species.
   Thus, although not important in itself, the vegetation of an area—even of 10 or 15 acres—can relate to substantial bird populations and provide a significant environmental resource within a confined space.
   One issue for environmental philosophers that is raised by this case develops from the preservation of the conditions in the park. If allowed to progress long enough, a more uniform and less attractive environment for birds will result. Thus, are we then justified in altering the natural processes to maintain a desirable situation that would extinguish itself?
3. Even though the natural features of the park were perceived as being its outstanding characteristic, particularly by the vocal environmental groups, the average park user did not attempt to come in contact with the more natural areas — except for the young who played on the pond edge. The patterns of man and nature did not overlap. The local naturalists were such a low percentage of park users that they were not recorded during the surveys.
   Thus, in planning for nature in our parks one must ask for whom certain elements are preserved.
   Since the spatial patterns of the recreationists and nature did not conflict in this case, it suggests that careful planning can resolve problems of incompatibility.