THE PALEOENVIRONMENTAL CONTEXT OF THE PARSONS SITE

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INTRODUCTION

In this chapter, an attempt is made to reconstruct the environment in the vicinity of the Parsons site as it would have been at the time the site was occupied. Some environmental characteristics, such as landforms and soils, are known to have changed only slightly over the last 500 years. Other paleoenvironmental characteristics, such as forest cover, have changed drastically and must be inferred from a combination of direct and indirect evidence. Direct evidence may be derived from sources such as the wood charcoal recovered from the site (Monckton, this volume), whereas indirect or proxy evidence can be obtained from modern forestry analogues. The purpose of this paleoenvironmental reconstruction is to facilitate interpretations concerning the occupation of the site from an ecological perspective.

THE GEOPHYSICAL SETTING

Lying approximately 24 km upstream from the Lake Ontario shore, at an elevation of 180 m above sea level and roughly 100 m above the lake, the Parsons site falls within the Peel Plain physiographic region (Chapman and Putnam 1984:174-175).

The site overlooks Black Creek and is situated atop a broad promontory of undulating tableland formed by a meander spur on the east side of the creek (Figure 7). Here, Black Creek has cut a steep-sided, terraced ravine, to a depth of approximately 11 m, through the surficial clay loam soils and underlying bevelled till plain, which contains large quantities of shale and limestone.

Black Creek is a primary tributary of the Humber River. In total, the Humber watershed drains an area of over 850 km^2 (Klose and Bacchus 1984:2). As a result of Euro-Canadian forest clearance and agriculture, it is likely that the Humber and its tributaries have been substantially altered since the fifteenth and sixteenth centuries. Deforestation has likely resulted in larger volumes of water flowing into the streams as surface run-off, increasing both the temperature of the watercourses and their sediment content. In addition, the removal of the forest cover has permitted solar radiation to further warm the waters. These and other modern alterations are also likely to have resulted in increased rates of waterflow, which concomitantly, have exacerbated erosion and degradation of the watertable. Prior to land clearance, therefore, it is probable that stream levels in the area of the site were both higher and slower.

Within a 1.0 km radius of the site, soils classified as Chinguacousey clay loam predominate, followed by those classified as Oneida clay loam. A minor proportion of the soils within this catchment consists of bottom land soils, occurring within the floodplain of the creek. The Chinguacousey and Oneida clay looms exemplify the unsorted material, consisting of particles of various sizes (sands, pebbles and stones in a clay matrix), that was deposited by glacial ice and subsequently overlain by both shallow water sand, and deep water silt and clay deposits derived from the Peel Ponds (glacial lakes formed by meltwater accumulating between the Niagara Escarpment and the retreating Lake Ontario ice lobe).

Under the Canadian System of Soil Classification, the imperfectly drained Chinguacousey soil series is classified as a Gleyed Gray Brown Luvisol, while the Oneida series, which is characterized by good drainage, is classified as a Brunisolic Gray Brown Luvisol (ACECSS 1987). Gray Brown Luvisols develop on calcareous parent materials under deciduous or mixed forest conditions where high biological activity, especially that of earthworms, results in the rapid incorporation of forest litter into the dark humic A horizons. The

Figure 7. View Eastward Across Black Creek Towards the Parsons Site.

parent materials are typically till, glaciofluvial or glaciolacustrine deposits. While the productivity of Gray Brown Luvisols is somewhat variable, they are generally highly productive for agriculture with only moderate fertility limitations. The soils of both the Chinguacousey and Oneida clay loam series are rated Class 1 for agriculture, although some Oneida soils are rated 3t, due to limitations imposed by topography (Canada Land Inventory 1972). Soils in Classes 1 to 3 are deemed capable of sustained crop production.

THE CLIMATIC SETTING

The Parsons site is situated in the South Slopes climatic region of southern Ontario, which is characterized by warm summers, mild winters, and a frost-free period of 145 days with generally reliable rainfall (Brown et al. 1968:48). Regional variability is caused primarily by topography, prevailing winds, and proximity to the moderating effects of the Great Lakes (Brown et al. 1968:5).

Consideration of the climatic conditions that prevailed, during the period at which the Parsons site was occupied, may shed light on some of the broader developmental trends noted in the archaeological record of the late pre-contact period. By the Late Iroquoian period, maize horticulture had become of central importance to the subsistence system. Nevertheless, this crop was being grown at its northern limit of tolerance. In this marginal area, climatic fluctuations would have had major impacts on crop yields, and hence on the overall subsistence system.

The length of the growing season was likely to have been the most critical climatic variable affecting the success or failure of the maize harvest. Heidenreich (1971:171-173) has calculated that maize requires a frost-free period of 100 to 130 days to mature, depending on the variety grown. The frost-free period, however, is not a completely satisfactory criteria for evaluating regions suitable for corn production. Brown et al. (1968:29) point out that corn"...is one of the few annual crops that uses the full frost-free period to complete its life cycle, and varieties must be carefully selected to make optimum use of heat and to avoid freeze damage." In order to quantify the necessary availability of heat instead of the simple lack of frost, a formula for "corn heat units" (CHU) has been developed based on average daily minimum and maximum temperatures. In southern Ontario, most grain corn is grown in areas having an annual CHU rating of 2900 or more, although it is also grown in areas having as little as 2500 CHU. Corn for silage may be grown in areas having a rating as low as 2100 CHU (Brown et al. 1968:29-31). Presumably, aboriginal corn would have had similar heat requirements, although Iroquoian farmers would not have been bound by these agronomic units. Given the other inhibitors of corn yield prevalent at the time, however, it may be safe to assume that a minimum of 2100 to 2500 CHU may have been required to produce a satisfactory crop. At present, the Parsons site falls between the 3100 and 2900 CHU isolines, an area without serious climate limitations to corn agriculture.

Although late Holocene paleoclimatic models for the Great Lakes currently lack the resolution necessary to reconstruct the local climate, thus inhibiting any accurate assessment of the contemporary suitability of the area for corn production or the potential magnitude of change brought about by any climatic fluctuations, some general comments may be offered.

Data presented by Lamb (1982:201) suggest that northern hemisphere temperatures at circa A.D. 1450-1500 were at a level only slightly lower than modern norms. Given the moderating effects of the Great Lakes, it is probable that the climate of southern Ontario at this time was approximately the same as it is today, although there may have been slightly cooler temperatures and slightly higher levels of precipitation.

After circa 1500, however, the climate of the northern hemisphere began to deteriorate, as the circumpolar vortex (the westerly rotation of air around the north pole) expanded southward (Baerris and Bryson 1965:216-217; Bryson and Murray 1977:72; Lamb 1982:201). This marked the onset of a cooling period, known as the "Little Ice Age" that would last for roughly the next 380 years. While it is possible that precipitation levels in southern Ontario were little effected by this development, it is likely that the mean annual temperature may have dropped by 0.6 degrees Celsius. More importantly, early fall temperatures may have dropped 1.8 degrees Celsius. Such changes may have had a significant impact upon the growing season, and consequently on crop yields. It has even been suggested that climatic deterioration during the Little Ice Age had serious consequences for Iroquoian agriculture, resulting in considerable social and economic disruption-us evidenced by population contraction and dispersal, changing residential patterns, the absorption of foreigners and exotic goods into communities, and possibly increased intercultural conflict-from the sixteenth century onwards (Fitzgerald 1992:15-18). Nevertheless, such a monocausal explanation for such wide-ranging changes in Iroquoian society at this time must be regarded with caution.

THE BIOPHYSICAL SETTING

Under the widely used ecological zonation developed for Ontario by Hills (1959), the Parsons site is situated in Ecological District 6E. As illustrated in Table 1, the climax forest in this region, under median moisture regimes and eco-climates, tends to be dominated by hard or sugar maple (Acer *saccharum),* and beech *(Fagus grandifolia),* often in association with red oak (Quercus *rubra)* and hemlock *(Tsuga canadensis).* Red maple (Acer rubrum), white oak (Quercus alba), white ash *(Fraxinus americana),* yellow birch *(Betulalutea),* balsam fir (Abies balsamea), white cedar *(Thuja* occidentalis), and American elm *(Ulmus americana)* are other species of intermediate

Table 1. Typical Tree Species of Forest Region 6E

HOTTER			NORMAL			COLDER		
Drier	Fresh	Wetter	Drier	Fresh	Wetter	Drier	Fresh	Wetter
beech	white oak	***hard maple***	**hard maple**	**beech**	hemlock	white pine	white	balsam fir
hemlock	red oak	***soft maple***	**red maple**	**hard maple**	yellow birch	white ash	spruce	black spruce
red oak	shagbark hickory	***red maple***	**white oak**	**red oak**	american elm	american elm	balsam fir	white spruce
		yellow birch	**red oak**	**hemlock**	slippery elm	red elm		tamarack
		walnut	**white ash**		white cedar			
		black cherry	**american elm**		balsam fir			

Bold = High proportion of Forest Region
Normal = Moderate proportion of Forest Region
Italics = Low proportion of Forest Region

(From Hills 1959:124; Anderson et al. 1990:16) importance in the climax forest. White pine (*Pinus* strobus), although classed as a mid-successional species, is moderately tolerant of shade and competition. It is therefore capable of maintaining a presence in subclimax and climax communities.

Konrad (1973:126), using pre-European vegetational classes based upon species mentioned in association by early nineteenth century land surveyors, and the drainage preferences for those species, characterized the general area of the Parsons site as having been covered by maple, oak, basswood, pine, hemlock and beech.

This broad understanding of the potential character of the forest cover can be further refined through consideration of some of the few comparatively undisturbed habitats recorded along the lower and middle reaches of the Humber. The steep slopes of the river valleys, and the floodplains themselves supported complex communities of sugar maple in association with eastern hemlock, white birch *(Betula papyrifera),* balsam poplar *(Populus balsamifera),* tamarack, yellow birch typical of mixed forests, together with numerous Carolinian species, including butternut *(Juglans* cinerea), blue beech *(Carpinus caroliniana),* black cherry *(Prunus serotina),* and witch hazel (Ham amelis *virginiana),* as well as numerous prairie-type species (MTCRA 1982: Humber drainage ESA #6, 7 and 8).

In summary, it would appear that the Parsons village was situated in order to take advantage of the diversity of resources afforded by the range of microenvironments available within the immediate catchment area. The position of the site at the interface between the Black Creek ravine and the surrounding tablelands suggests a settlement location strategy aimed at maximizing access to the broadest possible range of floral and faunal resources. The Black Creek valley system may be characterized as a nested assemblage of microenvironments; as one proceeds outwards from the riparian wetlands at the centre of the valley, the moisture regime-and hence the forest type-changes. Since the valley is essentially linear, so too is the pattern of nested microenvironments, allowing for optimum access to a relatively dense cluster of varied resources.

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