

**PRAIRIE PERSPECTIVES:
GEOGRAPHICAL ESSAYS**

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USA

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Preface

Hosted by the Association of North Dakota Geographers and the Department of Geography of the University of North Dakota, the 24th annual meeting of the Prairie Division of the Canadian Association of Geographers was held in Devils Lake, North Dakota, on the evening of 29 September 2001 through midday of 1 October 2001. Selection of this venue was specifically to encourage Canadian and American geographers to examine the impact, both physical and human, of the continued flooding in the Devils Lake Basin. This is a problem with ramifications to people in Manitoba and Saskatchewan as well as Minnesota, South Dakota, and North Dakota. The program consisted of a Friday evening social, 23 papers and four posters presented on Saturday morning, a soup and sandwich luncheon, a choice of field trips on Saturday afternoon (one on natural hazards, especially flooding, in the Devils Lake Basin adjacent to the lake in Benson and Ramsey counties and the other on urban geography of the city of Devils Lake), the annual banquet with Dr. Paul Simpson-Housley of York University as the speaker, and the traditional slide contest which was highly spirited as usual.

Such a program would not have been possible without a number of persons helping me in my role as program coordinator. Thanks needs to be extended again to faculty colleagues at the University of North Dakota's Department of Geography for helping with the natural hazards field trip (Dr. Paul Todhunter) and the urban geography field trip (Dr. Devon Hansen) plus chairing sessions (Dr. Mohammad Hemmasi and Dr. Bradley Rundquist). A special thanks is due to Dr. Alec Paul of the University of Regina for helping to arrange for the banquet speaker to be contacted and to come from Ontario. That person, Dr. Paul Simpson-Housley, also found ways to obtain support from York University to help defray much of the cost of his travel, and I am grateful to him and the administrators there for having done this favor. Because of grants

from Encyclopedia Britannica and from John Wiley and Sons, Inc., student fees were minimal, so appreciation for this largesse is extended to the people from those two publishing houses. A measure of support was provided in travel money from the College of Arts and Sciences of the University of North Dakota, and the instrumental role of Interim Dean Al Fivizzani needs to be acknowledged once more. Finally, the Association of North Dakota Geographers personnel, notably Ms. Laura B. Munski, worked with me to handle part of the logistics as well as to secure funding from the state's oldest society of professional geographers, so even though she could not be there in person, the fruits of her labor were at the conference hotel.

The papers in this volume of *Prairie Perspectives* reflect the diversity of interests of the geographers from the Prairie Division of the Canadian Association of Geographers and the Association of North Dakota Geographers. The mix of papers is almost evenly split between physical geography and human geography. There is a strong thread of historical geography and geographic techniques present among these articles as well. The production of this volume would not have been possible without substantial technical and production assistance from Mr. Weldon Hiebert, staff cartographer of the University of Winnipeg. Special words of thanks are due to Mr. Hiebert's colleagues at the University of Winnipeg, Dr. Bill Rannie and Dr. John Lehr, for assisting me over early hurdles in the editorial process. Reviews of various manuscripts were provided by University of North Dakota Geographers Dr. Paul Todhunter, Dr. Bradley Rundquist, and Dr. Robert Seidel. Also helping with reviews of assorted manuscripts were Ms. Virginia George of Bismarck State College, Dr. Paul Meartz of Mayville State University, and Mr. Robert Kulack of Red River High School, Grand Forks, North Dakota. The constant encouragement of Dr. John Selwood, president of the Prairie Division of the Canadian Association of Geographers, is especially appreciated because he frequently took time from his daily routine while on sabbatical in Australia to help me deal with the minor as well as major problems I faced as general editor of these proceedings. If I have failed to recognize anybody else who was instrumental in the preparation

and production of this volume of *Prairie Perspectives*, my sincere apologies.

As the members of the Prairie Division of the Canadian Association of Geographers look forward to the division's 25th anniversary meeting which will be held in Moose Jaw, Saskatchewan, on 28-30 September 2001, I trust that they will be pleased to have this volume of *Prairie Perspectives* in their possession. Many people have made substantial effort to have a successful publication of the proceedings of the 2000 division meeting, and whatever flaws exist in this journal, I take responsibility for it. So, because the 30th annual meeting of the Prairie Division of the Canadian Association of Geographers is planned to be hosted again by the Association of North Dakota Geographers and the Department of Geography of the University of North Dakota, I promise to do an even better job as the general editor of that meeting's proceedings. It will take me that long to recover from this effort and to learn from my mistakes, eh?

Dr. Douglas C. Munski
University of North Dakota

The 'Grass Fire Era' on the southeastern Canadian Prairies

W. F. Rannie, University of Winnipeg

Abstract: Fire, of both lightning and human origin, was a normal component of the prairie ecosystem which maintained the productivity of the grasslands and defended them against invasion by woody species from the Parkland Belt. Throughout the 19th Century, however, 'scientific' opinion was unanimous that woodlands had been formerly more extensive and that because of fire the grasslands had replaced forest over large areas of the Prairies. It is proposed here that an 'Era' of substantially greater fire frequency and extent occurred from the late 18th to the late 19th Century. The increase was initially related to an increase in bison hunting to supply the burgeoning food requirements of the fur trade, and later to carelessness in burning of hay meadows near settlements and to the growing traffic on the Carlton and Red River Trails. With the demise of the bison in the 1870's and the spread of agriculture from the 1880's onward, fires gradually became less frequent and smaller in extent.

Introduction

Perhaps no other aspect of grassland ecology has ignited as much debate as has the role of fire. Indeed, the heat of these debates has rivalled that of the fires themselves. That fires should occur in grasslands is not surprising, given the annual production of abundant combustible material, the relative dryness of the climate, and the uniformity of the topography. The disagreements have arisen over the effects of fire on the ecosystem (now broadly accepted as generally beneficial), the role of lightning versus human ignition (still controversial), and the importance of fire in maintaining

grasslands against the persistent encroachment of woodlands on the humid margins. The latter has not been settled to the general satisfaction of grassland ecologists - the extreme position, taken by ecologists and anthropologists such as Sauer and Stewart, asserted that grasslands are anthropogenic features, maintained and perhaps even created by fires of human origin.

In this paper, observations of grass fires in historical materials from the southeastern Canadian prairies are used to argue that an 'Era' of much enhanced grass fires of human origin occurred from the latter 18th Century to the latter 19th Century.

The Historical Record of Fire

More than 200 observations of fire from 1796 to 1870 were compiled from documents in the Hudson's Bay and Manitoba Archives and other published historical sources, mostly from the vicinities of Red River Settlement, Pembina, Brandon House, and Fort Pelly (Figure 1). A small sample of these accounts is given in Table 1 to provide an appreciation of the nature of the observations and of the fires themselves.

A detailed discussion of the historic record, with extensive quotation, is given in Rannie (2001) and the interested reader is referred to that paper. Some of its principal conclusions which are relevant here can be summarized as follows.

- Grass fires were predominantly a fall (September-November) phenomenon, both in number and extent. A much smaller secondary spring peak occurred in April-May and few fires occurred in winter and summer.
- The common portrayal of fire as a nearly annual phenomenon by many commentators was not greatly exaggerated.
- The duration of individual fires ranged from days to a week or even longer. In an extreme example, Alexander Henry reported fire in the vicinity of Pembina for 26 consecutive days in October-November, 1807.
- The limited perspective of most observers makes it difficult to determine the spatial extent of the fires but many comments

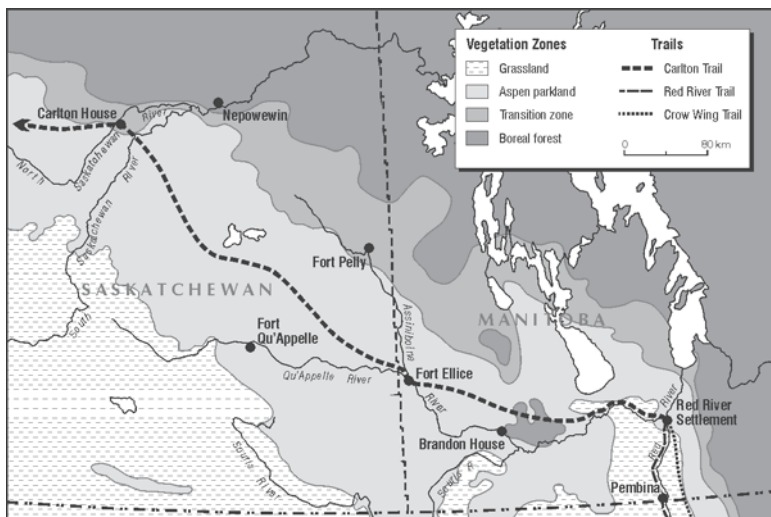


Figure 1: General location map.

suggest that fires covered broad areas in the vicinity of the posts, at least, and in some years there is evidence for burning of quite vast areas.

The question of the extent of fires merits further commentary. In a region with few topographic or hydrographic barriers and a continuous uniform fuel supply, individual fires had the potential to spread rapidly over a large area. In 1910, a fire advanced across 200 km of central Nebraska in a single day (Wells, 1970) and in 1893 and 1894, fires in southern Saskatchewan burned 13,000 and 15,500 km² respectively (Raby, 1966). In October, 1901, a fire near Queenstown, Alberta, “travelled at the rate of some forty or even sixty miles an hour” (Canada, Sessional Papers, quoted in Raby, 1966, p. 88). Many historical descriptions referred to fire “in every direction”, or “in every point of the compass”, or to the plains “being all on fire”, suggesting extensive burning, at least within the region of the observer. Other comments provide more detail about the size of the burned area.

The country between Pembina and the Scratching [Morris] River is burnt literally black. Scarcely a blade has escaped the devouring element. (Nor' Wester, October 29, 1860).

The following journal entry by Alexander Henry at Pembina on December 1, 1800, provides both a graphic description of a large fire and an indication of its minimum extent:

At sunset I saw a thick smoke rising at the foot of the Mountain toward the Indians Camp and soon after perceived the plains on fire...the wind blew strong from the North. This caused the flames to make a rapid progress, and at 10 O'clock it had extended as far as the Salt River to the South West. The weather was now obscure and dark, which gave the fire a most dismal and gloomy appearance. We could very plainly distinguish the flames, which at intervals rose to an extraordinary height, as the fire passed through low spots of long grass or marshes and reeds. They then would cease their ravages for a few moments, and soon after rise again with redoubled fury, and again die away to their usual height. The sight was awful indeed, but as the wind was in a contrary direction from us, we had nothing to dread for the present, and the fire was on the S. side of Park river. This fire was a disagreeable affair for us at this season on the year, for should it continue its progress all over the Country we shall be hard put to for provisions as there will be no Buffalo and nothing can stop its fury but Snow or Rain. Next morning we had a slight fall of snow, but it had no effect on the fire. It still appeared to rage to the Southward...the Crows came in...and informed us the fire was lighted at their Tents by accident. (Alexander Henry, in Gough, 1988, p. 100).

In some years, extensive burning was reported simultaneously at locations several hundred kilometers apart, as in 1804 when large fires occurred in October-November at Pembina (reported by Alexander Henry), along the Souris River south of Brandon (reported by both Charles Mackenzie and F.A.Larocque), and on the Missouri (reported by William Clark). The fire near Pembina in 1804 produced the best-known description of the disastrous effect fire could have on bison (a description of a similar bison disaster observed by Mackenzie along the Souris in the same season is given in Table 1).

Plains burnt in every direction. Blind Buffalo to be seen wandering about every moment. The poor beasts have all their hair singed off to the Skin, and even the skin in many places is shrivelled up and burnt in many places

in a most terrible manner, their Eyes swollen and closed fast. It was really pitiful to see them walking about, sometimes running foul of a large stone, at other times tumbling down hill and falling into Creeks that were not yet frozen over. In one spot we found a whole herd laying all dead near each other, the Fire having passed here only yesterday. Those animals were all still good and fresh and many of them exceedingly fat...At sunset we arrived at the Indian Camp after having performed an extraordinary days ride and seen an uncredable number of Roasted, Dead and Dying, Blind, Lame and Singed Buffalo the whole day. Saw the fire still raging all night towards the South West. (Henry, in Gough, 1988, p. 166-167)

The two largest conflagrations appear to have occurred in 1822 and 1857. In 1822, large fires were observed at the Red River Settlement and at Fort Ellice and both sources stated that virtually the entire area between the Red and Saskatchewan Rivers had been burned.

Red River Settlement Vicinity: Sept. 23, 1822: The plains have caught fire on the south side of the river, and the flames are spreading in every direction; **Sept. 25:** fire still raging in the plains; **Sept. 26:** The fire still running in the plains; **Sept. 27:** ...the sky is so obscured by smoke that day is changed almost into night; **Sept. 28:** The fire still raging in the Plains (Red River Journal, HBCA B.235/a/5, 1822/23); **Nov. 29:** The season has been so dry that the prairies are burned almost completely, a condition which will probably cause us to experience famine, at least as far as meat is concerned... The fire not only traversed the Red River area, but also all the prairies as far as Fort des Prairies [on the North Saskatchewan River], whence the company gets its supplies. (Bishop Provencher to Bishop Plessis, in Nute, 1942, p. 379)

Western Manitoba: Sept. 25, 1822: The Plains are all on fire...which has run almost thro the whole Country hereabouts; **Oct. 9:** Here [at Rapid River north of Brandon] we are happy to find the plains not burnt. Nearly the whole way between this and the Forks has presented a black dismal prospect and we have scarcely found wherewith for our horses; **Oct. 31:** Fire still raging in the plains, and the Country burnt in every direction; **Nov. 1:** [some Stone Indians] inform us that the whole way between this and the Saskatchewan River is burnt (Fort Ellice Journal, HBCA B.63/a/3 1822/23).

In 1857, Dawson and Palliser encountered great areas of burned ground in south-central Saskatchewan; when Hind visited the same region a year later, he reported that

Table 1: *Selected accounts of grass fires from archival sources.*

1797, Brandon House Vicinity:	May 23: The plains has been on fire these 8 days & is now approaching the House, a gale of wind at South; May 24: The fire very near the House; May 25: the Woods on fire all round the House. (HBCA, Brandon House Journal, B.22.a.4 1796/97)
1801, Pembina Vicinity :	Oct. 17: The Plains on fire in every direction; Oct. 22: Terrible fires all over the Plains. (Alexander Henry, in Gough, 1988)
1803, Pembina Vicinity:	Oct. 1: Fire in the Plains in every direction; Oct. 4: Fire raging in every point of the Compass, and the thick clouds of smoke, nearly deprive us of the sight of the sun, and at night the view from the top of my house is awful indeed. In every direction flames are to be seen, some running to prodigious height as the fire rushed through low dried willows and long grass or long places covered with Reeds and Rushes. We apprehended no danger, as the fire had already passed near the Fort; Oct. 24: The Plains are burnt almost every where, only a few small spots have escaped the fury of the flames; Nov. 15: A great fire to the South West although the ground covered with snow. (Alexander Henry, in Gough, 1988)
1804, South of Brandon House:	Oct. 11-24: [We travelled] through many extensive plains, most of which were in flames, as is generally the case at this season of the year. In the course of a few days, we observed whole herds of buffaloes with their hair singed; some were blind, and half roasted carcasses strewn our way. (Charles Mackenzie, in Masson, 1960)
1821, Red River Settlement Vicinity:	May 10: The plains have been on fire to a considerable extent for several days past, and the awful spectacle is seen this evening through the whole of the northern, and western horizon. (West, 1966)
1828, Brandon House Vicinity:	Oct. 8: Plains burning in all directions.. Smoke suffocating; Oct. 10: Dry windy Weather by which the conflagration of the Plains is increased to a furious degree; Oct. 11: ...fires as yesterday; Oct. 21: Plains and woods blazing and smoking tremendously in all directions; Oct. 29: Smoke abating, every thing having been burned, in the neighbourhood; Nov. 6: The first snow of the season fell last night, by which the surrounding fires have been entirely extinguished. (New Brandon House Journal, HBCA B.22/a/22)
1829, Fort Pelly Vicinity:	Apr. 27: The Country all in a blaze around us and from the dry state of the grass threatens our Establishment; Apr. 29: fire still raging in the woods at no great distance; May 1: The fire Still raging round us; May 2: The Fire this morning wore an alarming appearance and threatened the destruction of the Establishment; May 4: The Country all in a blaze. (Fort Pelly Journal, HBCA B.159/a/10 1828-29)
1832, Fort Pelly Vicinity:	Oct. 5: plains on fire in all directions; Oct. 23: disagreeable weather with snow which I hope will extinguish the fire in the plains that has been raging for some time past; Oct. 26: plains still on fire; Oct. 28: enveloped in smoke from the plains which still continues to burn; Nov. 2: Snowing the whole of the day which will no doubt put an end to the fires. (Fort Pelly Journal, HBCA B.159/a/14 1832-33)

Table 1: continued

1836, West of Red River Settlement:	Fall: The country traversed was studded with a few copses of poplar and dwarf oak; but a great part of it having been swept by the running fires, so frequent and terrible in the prairies, presented a blackened and dismal aspect. (Simpson, 1970)
1848, Red River Settlement Vicinity:	Oct. 13: Our neighbourhood was thrown into a state of great excitement this Evg. By the approach of a terrible fire to the hay grounds. The ground was very dry. (Journal of Robert James, MA MG7 B2 CMS A92)
1853, Red River Settlement Vicinity:	Oct. 12: hazy all around from the smoke of fires in the plains; Oct. 15: From the quantity of smoke all around there must be large fires in the prairie; Oct. 30: extensive fires in the Plains; Oct. 31: it appears that the fires have done a great deal of damage. (Winnipeg Journal, HBCA B.235/a/15 1851-54)
1859, Pembina Vicinity:	Fall: ... we passed over miles of blackened prairie which had been burnt in the course of the autumn by some numerous fires which are so constantly raging on the plains when the grass is dry. Once or twice we were in such disagreeable proximity to these conflagrations that driving through them became a necessity, and on other occasions we camped for the night on prairies, where we were encircled by the flames- taking care, however, that a wide stretch of burnt plain lay between us and them. The smoke of these fires frequently darkened the heavens for days together. (Anonymous traveller, Nor' Wester newspaper, Mar. 14, 1860)
1865, Pembina Vicinity:	November: The prairie fires were raging in the country through which we travelled. At first we caught sight of a fiery line faintly illuminating the far horizon on our front. Gradually as we advanced, the line expanded into a crescent, extending to the right and left, and instead of one line, a vast number of blazing arcs broke on the sight. As we reached the heart of the conflagration the entire horizon about us was luminous with low burning zones, whence the dark smoke curled aloft into the night. After some time our track passed away from the fires which had been burning in some spots quite close to the wayside, and after a few more miles had been got over, the whole country again assumed the appearance of one crescent and long line of fire which ultimately disappeared in our rear. (Hargrave, 1871)
1866-67, Southern Saskatchewan:	Fall: In this region [south of Fort Qu'Appelle] prairie fires have burned off the grass to such an extent that it was necessary to travel one hundred and sixty miles to the more distant hills before we sighted the first band of buffalo. Usually three days travel is enough to get all the meat that is needed... In two days we rode one hundred and sixty miles over a burned prairie [between Fort Ellice and Fort Pelly] without seeing a track until we came to the Old Fort... This has been a very hard winter [1866-67] for food owing to the great fires on the Plains last summer and fall [1866]... The buffalo remained scarce and far off. (Walter Traill, in Atwood, 1970).
1867, Brandon House Vicinity:	Oct. 16: ... no notable sight was seen until the 16 th when big prairie fires rose ahead, in which we were soon enveloped... That night the grandeur and magnificence of the display of fireworks extending on every side over the rolling prairies far exceeded the conception formed from the printed descriptions which I had so often devoured. (Cowie, 1913)
1870, Red River Settlement Vicinity:	October: ... the horizon glowed at night with the red light of moving prairie fires. (Butler, 1923)

From beyond the South Branch of the Saskatchewan to Red River all the prairies were burned last autumn [1857], a vast conflagration extended for one thousand miles in length and several hundreds in breadth. The dry season had so withered the grass that the whole country of the Saskatchewan was in flames. The Rev. Henry Budd, a native Missionary at the Nepowewin, on the North Branch of the Saskatchewan, told me that in whatever direction he turned in September last the country seemed to be in blaze; we traced the fire from the 49th parallel to the 53rd, and from the 98th to the 107th degree of longitude. It extended, no doubt, to the Rocky Mountains. (Hind, 1860, Vol. 1, p. 292)

Destruction of Forest

Much of the commentary on fire by scientific parties was directed to its effects on the extent of woodland on the prairies. Although this was noted by early travellers such as David Thompson in 1798 and William Keating in 1823, the greatest concerns were expressed by Henry Youle Hind and John Palliser in 1857-58 (in the immediate aftermath of the great fires of 1857), and by John Macoun and others in the 1870's. These observers were unanimously of the opinion that extensive tracts of grassland, particularly in central Saskatchewan, had formerly been wooded and thus had been part of the "parkland" belt. The following extracts are representative of this large body of commentary.

The northern forests, which in former times descended more nearly to the frontier of this central desert [the "Palliser Triangle"], have been greatly encroached upon and, as it were, pushed backwards to the north through the effect of frequent fires ... Thus large tracts of country now prairie lands have at one time grown valuable forests, and their present absence is the result of the repeated ravages of fire. Where a scattered and stunted growth of willows is found, as a general rule, was ancient forest land ... The northern part of Saskatchewan is a partially wooded country, having at one time been covered by an extension of the great pine forests of the north, which have been removed by successive fires. (Palliser, in Spry, 1968).

An old Indian...born in this part of the country [region of the Qu'Appelle River], told us that he remembered the time when the whole of the prairie through which we had passed since leaving Fort Ellice was one continuous forest, broken only by two or three narrow intervals of barren ground...A portion of the old forest alluded to by the Indian still exists [on the edge of

the Qu'Appelle Valley]. It consists of aspen of large growth and very thickly set... The annual extension of the prairie from [fire] is very remarkable. The limits of the wooded country are becoming less year by year, and from the almost universal prevalence of small aspen woods it appears that in former times the wooded country extended beyond the Qu'Appelle, or three or four degrees of latitude south of its present limit. (Hind, 1860, Vol. I)

The rapidity with which some tracts between Portage la Prairie and Fort Ellice were stated to me to have been converted from forest to prairie is almost incredible. (Bell, 1876, quoted in Nelson and England, 1971)

The real cause of the absence of wood on every part of the region under consideration is undoubtedly prairie fires which sweep over almost every part of it year after year, destroying the seedling trees as long as there are any seeds left to germinate, and year by year killing the bushes until the capacity of the root to send up shoots dies out, and then even willows cease to grow. (Macoun, 1882)

Aboriginal Use of Fire

The members of the Palliser and Hind Expeditions attributed virtually all fires (and the consequent destruction of woodland) to aboriginals whom they portrayed as “congenital arsonists” (Rowe, 1969). Their writing was laden with condemnation - the fires were “deplorable”, “wonton” and “lamentable”, the aboriginals’ reasons for setting them were “trivial” and “mischievous”, and the fires’ effects were “disastrous” and “deplorable”. Perhaps the most blunt expressions of this calumny were those of John Sullivan (of the Palliser Expedition) and Henry Youle Hind.

It is most lamentable to see so often such masses of valuable timber destroyed, almost invariably by wonton carelessness and mischief. The most trivial signal of one Indian to another has often lost hundreds of acres of forest trees which might have brought wealth and comfort to the future settler, while it has brought starvation and misery to the Indian tribes themselves by spoiling their hunting grounds. The Indians, however, never taught by experience, still use “signal fires” to the same extent as in former years, driving the animals from their retreats and marring the fair face of nature for the future colonist...Unfortunately the Indians have a most disastrous habit of setting the prairie on fire for the most trivial and worse than useless reasons. (Sullivan, in Spry, 1968)

It appears to be beyond human power to arrest the annual conflagrations as long as the Indians hold the prairies and plains as their hunting grounds. Their pretexts for “putting out [setting] fire” are so numerous, and their characteristic indifference to the results which may follow a conflagration in driving away or destroying the wild animals, so thoroughly a part of their nature, that the annual burning of the prairie may be looked for as a matter of course as long as wild Indians live in the country. (Hind, 1860, Vol. I)

Of course, these expeditions were assessing the suitability of the region for agricultural settlement and from their narrow viewpoint, the “lamentable destruction of forests” may have been “a great drawback to the country, and a serious obstacle to progress” (Hind, 1860, vol. I, 405). In fact, however, the aboriginals’ reasons for deliberately setting these fires were usually far from trivial or capricious. Furthermore, they had little reason to be concerned about the “destruction” of wooded areas, or to be especially careful, other than for their own safety.

Certainly some aboriginal fires (including the large one described by Henry in 1800 cited above) were accidental or caused by the carelessness decried by Hind and others. Aboriginal people, however, had a great many rational uses for deliberately setting fire to the prairies, including signalling, control of insects, as defensive or offensive tactics during warfare, etc. The largest category of uses involved the bison. Fire was used to drive bison to predetermined hunting locations, to encircle them during hunting, to direct migrations, and particularly as a range management technique to improve forage in subsequent growing seasons. Modern studies have demonstrated that post-burn growth is normally more productive, more tender, more nutritious, and thus more attractive to grazing animals such as bison, a feature of grassland ecology that was well-understood by aboriginal people. By burning a region of prairie (normally in the fall but occasionally in the spring), they were able to attract bison to pre-determined locations (Arthur, 1975). Far from being “trivial” or “obstacles to progress”, then, aboriginal use of fire was a sound range management technique by which they could exercise some control over their most important resource.

The 'Great Fire Era'

The equilibrium which must have existed between the human use of fire and the grassland/parkland ecosystem was permanently disrupted late in the 18th Century by the formation of the North West Company and the advent of the fur trade as an organized force on the prairies. With its large fur brigades, long supply lines, and the establishment of permanent posts, the fur trade food requirements escalated rapidly. As local resources were depleted or proved insufficient, bison became the staple food of the trade-Colpitts (1997) noted the increased prominence of bison in the provisions of Cumberland House after 1780. So important was provisioning to the fur trade that it determined the location of the posts on the prairies, as Governor Dallas clearly stated much later in 1862.

The [Hudson Bay] Company's posts between Red River and Edmonton are placed on the dividing line between the wooded country and the prairies, as close to the latter as good positions for wood and water can be found...The main business of the Saskatchewan posts lies in procuring food for the other districts. (Governor Dallas to E. Ellice, Fort Garry, October 18, 1862, in Gordon, 1979, p. 48)

Aboriginal people were quick to take advantage of this economic opportunity by increasing their exploitation of bison in the grasslands and parklands, as Ray (1972, 1974) has described in detail.

... as the number of posts multiplied (there were 21 in operation on the Assiniboine River alone in 1795) and the lines of communication lengthened, the provision requirements of the fur trade mushroomed... [This favoured] an increasing dependence on the resources of the plains environment. This shift in emphasis took place most rapidly among certain bands of Assiniboine...[who] were quick to recognize the growing importance of food supplies for the fur traders and attempted to capitalize on it at a very early date...It was this...economic flexibility that these groups possessed which enabled them to move out of the forests into the grasslands at a relatively rapid pace during the [late] eighteenth and early nineteenth centuries (Ray, 1972 p. 115-116)

As the importance of bison increased, it is reasonable to assume that fire would have continued to be employed but with greater intensity. To these traditional uses was added the tactic of burning the forage in the vicinity of the posts to keep the bison at a distance and thereby increase the traders' dependence on aboriginal supplies (Ray, 1974; Pyne, 1983). According to Ray (1974),

... fire was the chief weapon which the tribes used to apply economic pressure. Numerous references showed that it became common practice for the Indians to burn the prairies around the post in late autumn to prevent the bison from approaching them during the winter season. (Ray, 1974, p. 134).

Early accounts of this strategy include the following from Hudson House (1780) and Fort George (1794) on the North Saskatchewan River and Carlton House (1797) on the upper Assiniboine River:

...we are very like to be in a very bad situation for provisions [in the coming months]...the Ground is all burnt, and no Buffalo, the Natives burnt it as they [the buffalo] was nigh [at] hand in the fall and far from the Beaver Country, [they did this on] purpose that they might get a great price for provisions, but great part of them has payed for it since, by Hunger and [being] obliged to go far off. (R. Longmoor at Hudson House to W. Tomison, Jan. 17, 1781, in Rich, 1952, p. 175)

The Plains around us are all on fire. We hear that the animals fly away in every direction to save themselves from the flames, an attempt which is often rendered abortive when the fire is cherished by a breeze of wind, which drives it along with such fury that the fleetest horse can scarcely outrun it. The Indians often make use of this method to frighten away the animals in order to enhance the value of their own provisions. (Duncan M'Gillivray, in Morton, A.S., 1929. *The Journal of Duncan M'Gillivray of the North West Company at Fort George on the Saskatchewan, 1794-5*, The Macmillian Company of Canada, Toronto, p. 33)

The Indians has set the Ground on fire all around us to keep the Buffaloes far off. (Carlton House [Assiniboine] Journal, October 9, 1797, HBCA B.28/a/4)

In 1822, the year of the vast fire noted above, George Simpson saw a further, more vindictive, motive - the adoption of an aboriginal 'scorched earth policy' in revenge for the amalgamation of the North West and Hudson's Bay Companies.

The Company's establishment from [Fort Garry] to the source of the Assiniboine have even been at times in a state of Famine...The failure of the buffalo may be attributed to two causes, one is that the plain Indians finding the coalition had taken place conceived that the sole object was as they express it "to render them pitiful", and by way of having revenge determined on Starving the Traders by keeping the Buffalo off in the Summer and Fall, which was easily effected by obstructing them at their usual passes to the Northward, setting fire to the Plains, etc. (Simpson to A. Colville, in Merk, 1931, p. 180)

When the Métis entered the provisioning business with their large organized brigades of Red River carts moving into the grasslands from rendezvous points, the scale of the enterprise escalated again. The number of carts in these brigades grew from 540 in 1820 to 820 in 1830 (Ray, 1974). According to Ross (1856), 1210 carts and 1630 people gathered at Pembina for the summer hunt in 1840, and Woods (1850) reported that 1200 carts "went in a body south of Devil's Lake" in 1849. With this much hunting activity on the grasslands, the possibility for deliberate or inadvertent fire must have increased greatly.

As the posts evolved into settlement loci, with agricultural experimentation, fire was used to improve the growth of hay, frequently with undesirable consequences for adjacent woodlots when the fires ran out of control as they apparently often did. (Ironically, this use had much the same purpose as the aboriginal use of fire in range management so criticised by Hind and Palliser). In the Red River Settlement, the problem of careless use of fire in the nearby hay meadows was the very first issue addressed at the very first meeting of the Council of Assiniboia in 1832 which decreed that deliberate fires be banned between March 1 and December 1 and established heavy fines for offenders and rewards for informers (Oliver, 1914). The reiteration of this ordinance in 1841, 1851, and 1862, appears to have done little to arrest the problem. The *Nor' Wester* newspaper, which began publication in

the Red River Settlement in 1859, annually documented and railed against the losses from fires started by the local settlers.

As we write, there is a magnificent line of flame sweeping over the arid plains behind. It is a grand sight on a dark and windy night. The flames roll on with surprising speed and brilliancy, and the heavens overhead are brightly red. These fires are, in many cases set off in order to consume the decaying grasses of the year, and leave the surface of the ground clear for next year's growth. In other instances, however, they are accidental - the grass being so dry that it is scarcely safe even to fire off a gun...[Stacked] hay runs a great risk if left out till the 1st October, and not unfrequently we hear of such misfortunes as a person losing in one hour the results of a month's hard labour. Whatever may be the advantage of prairie fires, they have one very palpable disadvantage - they destroy an immense quantity of wood. This is a serious matter, for the country is naturally poor enough in this respect. One feels sorry to see our few forests disappearing year by year in this way. (Nor' Wester, October 29, 1860).

During the past fortnight, fires have been running on both sides of the river. Who let them off, and whether designedly or accidentally, are questions as yet unresolved. In any case, mischief is being done, and the guilty parties ought, if possible, to be brought to justice. (Nor' Wester, August 6, 1862)

The losses by prairie fires this year have been very great. Hardly a day has passed but conflagrations have been seen sweeping over the plains on either side of the river, and the farmer who has not lost some hay in this way counts himself very fortunate, indeed. It is said that some of these fires were let go on Sundays, designedly; but we would hope this is not the case. The person who would do such a dastardly act merits the severest punishment. If one or two such were informed against, and put in jail to await trial for the offence, there would be less of this wonton destruction of property by prairie fires. (Nor' Wester, September 30, 1863).

Can no remedy be devised to lessen the evils annually caused by letting fires run in the plains? There is, undoubtedly, a vast amount of property destroyed every year in this way; and the law as it stands at present does not seem to abate the evil in the least. It is much easier however to deplore the prevalence of the evil than to propose a remedy. According to the existing law any person convicted of setting fire to the plains with the intent of causing a fire to run, at this time, is liable to a heavy fine; and in order still further to ensure conviction for the offence a portion of the fine is, we believe, offered to any one who will inform on the person by whom it is committed. It is strange that with numerous fires raging around us, and so many people in the plains, the offenders cannot, except once in

every three or four years be brought to justice. It is the interest of every settler not only to be careful that he lets no fires run in the plains during the Fall, but to endeavor to find out those guilty of this offence and bring them to justice; and we hope that in this and other ways which may, probably, suggest themselves to the Council, some effective steps will be taken to prevent the frequent recurrence of these destructive conflagrations. (Nor' Wester, August 18, 1864).

After about 1830, as the supply lines for the settlements increasingly shifted from the rivers to overland routes such as the Carlton and Red River/Crow Wing Trails (Figure 1), the traffic in carts and people through the region became quite prodigious. Hargrave (1871) estimated that by the early 1860's about 1500 Red River carts were employed on the Red River Trail. With multiple trips, as many as 2500 carts passed over the route in a single season (Green, 1974) and a return cart trip from St. Paul to Carlton House took 70-80 days (Hargrave, 1871). In addition to the cart trains and fur trade traffic, the number of other travellers- military expeditions, scientific parties, missionaries and church officials, adventurers, migrants and tourists- grew dramatically by mid-Century, all following these same routes through the grassland/ parkland transition zone. Even with the greatest care, the opportunities for accidental ignition of the dry accumulation of grass from so many cooking and campfires, pipes, cigars, and gunshots were enormous but the travellers were anything but a careful lot. For example, in 1851 near Pembina, Wesley Bond and a military party, travelling independently, each touched off fires while cooking a few kilometers apart.

To-day we have set fire to the prairies by accident in getting dinner. The dragoons ahead have done the same, and the strong wind bears it back on us with astonishing rapidity; we are enveloped in immense clouds of smoke, through which we travelled all the afternoon- the fire roaring all around and under our feet. (Bond, 1857, p. 298)

Another adventurer, James Southesk, started a large fire near Pembina in May, 1859, while lighting his pipe.

Later in the day we...traversed another considerable prairie, covered all over with long withered herbage of the bygone season. Taking no heed of this

store of inflammable stuff, I carelessly threw away a match with which I had been lighting my meerschau; in an instant the prairie was in a blaze. The wind speedily bore the flames away from us, and ere long the conflagration raged far and wide. I never heard to what extent it spread, but for hours afterwards we could see its lurid glow illuminating the darkness of the distant horizon. (Southesk, 1875, p. 19)

Even James Hector of the Palliser Expedition (whose members were otherwise outraged by what they saw as aboriginal carelessness) described an accidental fire caused by his own inattention.

During the night the great pine tree by which our tent was pitched caught, from a roaring fire we had lighted against its root, and neglected to put out when we turned into our blankets, trusting to its being green. But the fire caught the dry grey lichens which drooped in festoons from the branches, and which, being highly charged with turpentine, gave out a magnificent blaze, the roar of which luckily wakened me up. (Hector, in Spry, 1968, p. 315)

The problem posed by these travellers eventually drew the attention of the *Nor' Wester* which hitherto had focussed its editorial ire on carelessness by local agriculturalists.

We are convinced, and it is very generally believed, that a large number of those fires originate from the various camp-fires left alit on the prairies. Parties camp everywhere in the plains, cook and eat their meals, and then march off; and we venture to say that in ninety-nine cases out of a hundred they never put their fires out before leaving. The consequence is that the smouldering flames, fanned by wind, soon spread themselves, and catching the dry grass or twigs in the vicinity, light up such conflagrations as even the far-famed Red River of the North itself would fail to extinguish, could its water be available for such a purpose. This is, we imagine, one great source of an evil from which nearly every settler suffers more or less heavily, and through the prevalence of which the community at large is impoverished in the items of wood and hay alone, to the extent of thousands of pounds annually. Every remedy which can commend itself as likely to abate this great evil ought, we think, to be adopted... (*Nor' Wester*, September 1, 1864).

The shift in the cause of grass fires from aboriginals to settlers and travellers was noted by a telegraph line contractor.

I do not think that the Indians set fire to the prairies as much as has been represented. The Half-Breeds, who travel in [cart] trains and the white men, are very reckless; they think that it is the last time they will be over the route and that it does not matter. (quoted in Raby, 1966)

Whatever the cause, much of the burden of these fires fell in the sensitive grassland/parkland transition zone where the posts and trails were concentrated and where the “disappearance of forests” made such a forceful impression on visitors, particularly from mid-Century onward. The apparently incendiary state of the region during this period lends support to the oft-expressed claim that fires were not only maintaining the grasslands against encroachment by woodland, but were in fact extending them during most of the 19th Century.

The end of the “Grass Fire Era” came gradually. The virtual disappearance of the bison during the 1870’s eliminated a primary source of fire. From 1880 onward, the spread of agriculture reduced the annual production of combustible material and provided artificial fire breaks with its patterns of ploughed fields, fences, farmsteads and roads. Where fires continued to present a hazard into the early 20th Century, they were countered by organized fire suppression and legislation against carelessness (Raby, 1966). Gradually the grass fires diminished in frequency and extent until the descriptions of the conflagrations of the previous century were but a dim, barely credible, memory.

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Soil conductivity and panchromatic aerial photography as tools for the delineation of soil-water management zones

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Introduction

Precision irrigation may be defined as the placement of water in specific locations in specific amounts, as determined by the irrigator (Sadler and Camp, 1997). The use of precision irrigation allows the producer to lower input costs, thereby creating a larger profit margin. Alternatively, an inadequately managed irrigation system can become costly to operate and can damage the environment. It is impossible, however, to irrigate with precision, without knowledge of the soil-water management zones in a field.

Evans and Schneider (1996) define soil management zones as areas within a field that have been determined to be significantly different from neighboring areas. Once identified, producers can vary inputs such as seed, fertilizer or water in accordance to their yield target for each management zone. Soil-water management zones are management zones where irrigated water is the variable being adjusted.

Management zones represent the integration of detailed information regarding soil types, depth, texture, moisture, conductivity and crop type found in the field. Consequently, a database of soil characteristics becomes fundamental for the identification of the soil-water management zones.

The traditional method of developing a database of soil characteristics involves stratified (grid) soil sampling covering the entire field. Mohamed et al. (1996) suggest that the most efficient grid size is 60 square metres. This methodology has proven to be very successful, however the high laboratory costs make the procedure prohibitive for most producers (Franzen, 1998). More affordable alternatives for identifying management zones include the use of panchromatic aerial photography and soil conductivity.

Panchromatic aerial photography employs differences in tone within a photograph as indications of changes in soil moisture, organic matter content, textural variability and field topography (McCann et al., 1996). Soil-water management units are then operationally defined, based on these tonal differences.

The electrical conductivity of a substance is a measure of the difficulty or ease with which an electrical current can be made to flow through it (McNeill, 1980). Soil porosity, cation exchange capacity, moisture content, and colloid (clay) content affect soil conductivity. When soil is relatively dry, however, hygroscopic soil moisture coats colloidal surfaces and increases cation exchange capacity, thus clay content becomes the dominant factor effecting soil conductivity (McNeill, 1980).

Lund and Christy (1999) have demonstrated the benefits of using electrical conductivity as an index for soil properties. Conductivity measurements are collected and geo-referenced using the global positioning system (GPS). These data can then be displayed using a geographic information system (GIS) and included with other data such as yield maps and aerial photography to form the basis for management zone designation.

Objective

The intent of this study is to develop and evaluate two alternative methodologies for the identification of soil management zones within a field; the first based on measures of soil conductivity, and the second based on remotely sensed panchromatic aerial photography.

Study Area

The study area is located in an agricultural region of Southern Manitoba, approximately four kilometres southwest of the town of Sidney. Specifically, the southeast quarter of section thirty-one, township nine, range twelve west of the principle meridian (31-9-12W). The field is bordered on the north and west by neighboring fields. A road runs past the south and east sides, and there are bushy areas on the northwest, southwest, and southeast corners of the study area (Figure 1). The topography is nearly level, and drainage is classified as good.

The soils are identified as Stockton Fine Sandy Loam, suitable for cultivation, but requiring careful management to prevent severe loss of soil productivity through wind erosion (Ehrlich et. al., 1957). Small grains and potatoes are commercially grown. The Stockton soils are generally low in organic matter reserve, water retention capacity and natural fertility (Ehrlich et. al., 1957).

Methodology

Soil Conductivity:

Soil conductivity data were collected in the spring of 1999 using a truck to pull a Geonics EM-31 attached to a trailer. The EM-31 had a differentially corrected GPS attached to it so that positional data could be collected at each sampling point. Conductivity data were gathered using two different measures, horizontal dipole and vertical dipole. Two thousand six hundred and fifty data points were collected on the quarter section (160 acres) study area (Figure 1). These data were stored in a text file and converted to a database file for import into ArcView 3.1 and ArcInfo 7 geographic information systems.

Yield Data:

The crop was harvested on September 24, 1999. Yield data were collected by a yield weight monitor on the potato harvester and recorded in hundredweight per acre (cwt A⁻¹). These data were stored in a text file and converted to a database file for import to ArcView and ArcInfo GIS.

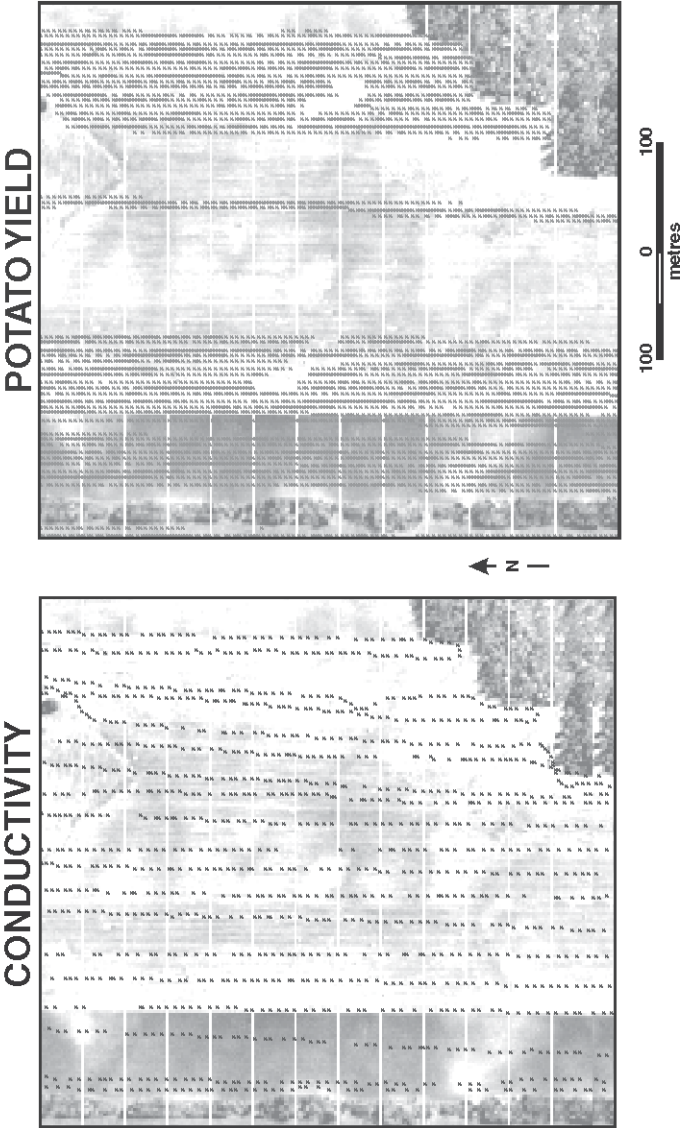


Figure 1: Data collection points.

Mechanical problems led to some yield data not being collected for portions of the study area (Figure 1). In addition, the yield monitor occasionally overestimated potato yield (weight) when large clumps of dirt traveled up the conveyor.

Panchromatic Aerial Photography:

The photograph, obtained from Linnet Geomatics International, was taken in October of 1997. A digital orthorectified image was produced by scanning the standard 1:60,000 contact print at 1000 dots per inch. The image was re-projected in the Universal Transverse Mercator (UTM) map projection, Zone 14, NAD83. The resulting image had a two-metre spatial resolution and eight-bit radiometric resolution. Each pixel was assigned a digital number (DN value) based on tone, ranging from zero (black) to two hundred fifty five (white).

Grid Interpolation:

Yield data and soil conductivity data were imported into ArcView 3.1 and ArcInfo 7 Geographic Information Systems. The inverse distance weighting algorithm (ArcView 3.1) was selected to interpolate grid layers for yield and conductivity since these variables are dependant upon local conditions and are more affected by local values than distant values (DeMers, 2000).

A grid cell of two-metres was selected to conform with the orthophotograph. The digital orthophotograph was converted from a tagged image file format (Tiff) to an ArcView/Info GRID file for comparison to the conductivity and yield values present in the other grids.

Cluster Analysis:

ArcInfo 7.4 and MultiSpec (Version 1.2000, Laboratory for Applied Remote Sensing, Purdue University) image analysis programs were used to create unsupervised clusters of soil conductivity values and panchromatic digital number values. An unsupervised classification was used to search for natural groupings or clusters of pixels having similar conductivity or spectral values, respectively.

The Iterative Self-Organizing Data Analysis Technique (ISODATA) was chosen as the most appropriate means of creating clusters to be evaluated as management zones in this study. The user determines the number of clusters to be created and the limiting convergence level. During the first iteration, cluster centers are arbitrarily defined and each pixel assigned to a cluster. During subsequent iterations, pixels are reassigned to the clusters with a mean DN value nearest to the respective pixel value in Euclidean space and a new mean is calculated for each cluster based on the actual location of the pixels. The algorithm continues until the designated convergence level (percent) is attained. This occurs when fewer than the specified number of pixels switch allegiance to another cluster (Jensen, 1996).

The panchromatic orthophotograph of the study area was classified three times using MultiSpec. The first unsupervised classification of DN values was directed to construct three clusters; the second classification, five clusters; and the final classification, nine clusters. The purpose of producing three different sets of clusters was to evaluate the separability between clusters. MultiSpec's transformed divergence function was used to evaluate the degree of separability of the resulting clusters. Each cluster was compared to every other cluster, generating a score between 0 and 2000. A score of 2000 represents complete separability, and a score of zero indicates no separability between clusters.

The ISODATA algorithm in ArcInfo was used to create unsupervised classifications of similar conductivity values from the conductivity grid. As with the panchromatic image, unsupervised classifications of three, five and nine clusters were constructed.

Analyses

Random File Generation:

ArcInfo was used to generate random sample files from the yield, DN, and conductivity clusters so as to conform to the assumptions of the subsequent statistical analyses.

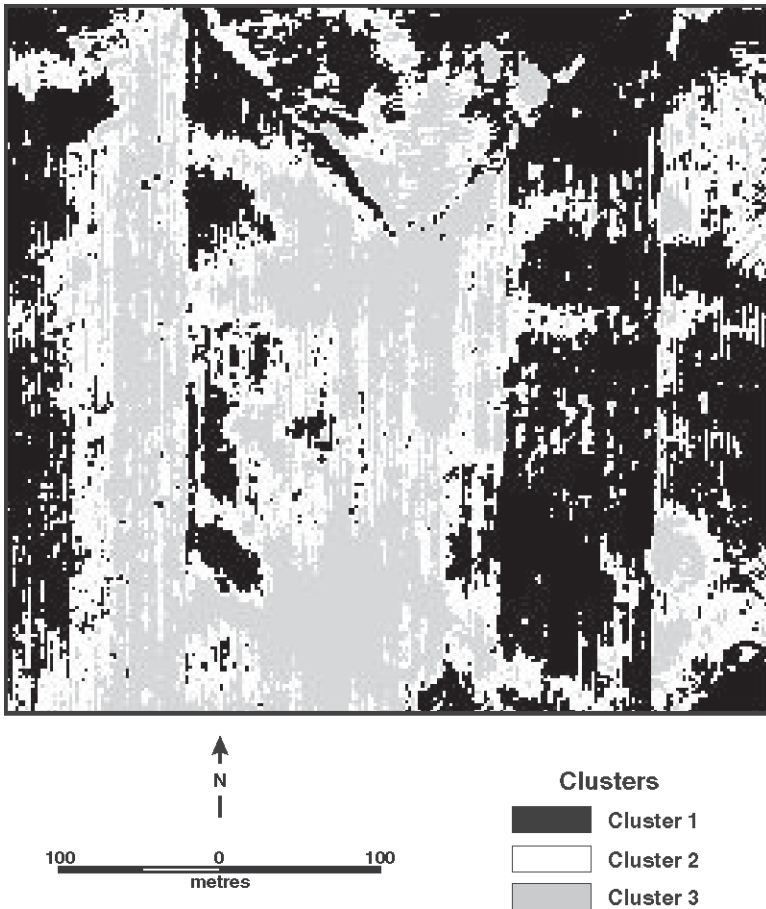


Figure 2: An example of a digital number classification resulting in three clusters.

Statistical Analysis:

The null hypothesis, that cluster means were derived from the same population, was statistically evaluated using the Analysis of Variance procedure (ANOVA) found in the Statistical package for the Social Sciences (SPSS). Random samples of yield and conductivity data, aggregated within the clusters derived from the panchromatic aerial photograph, were statistically evaluated to determine whether or not they came from the same population.

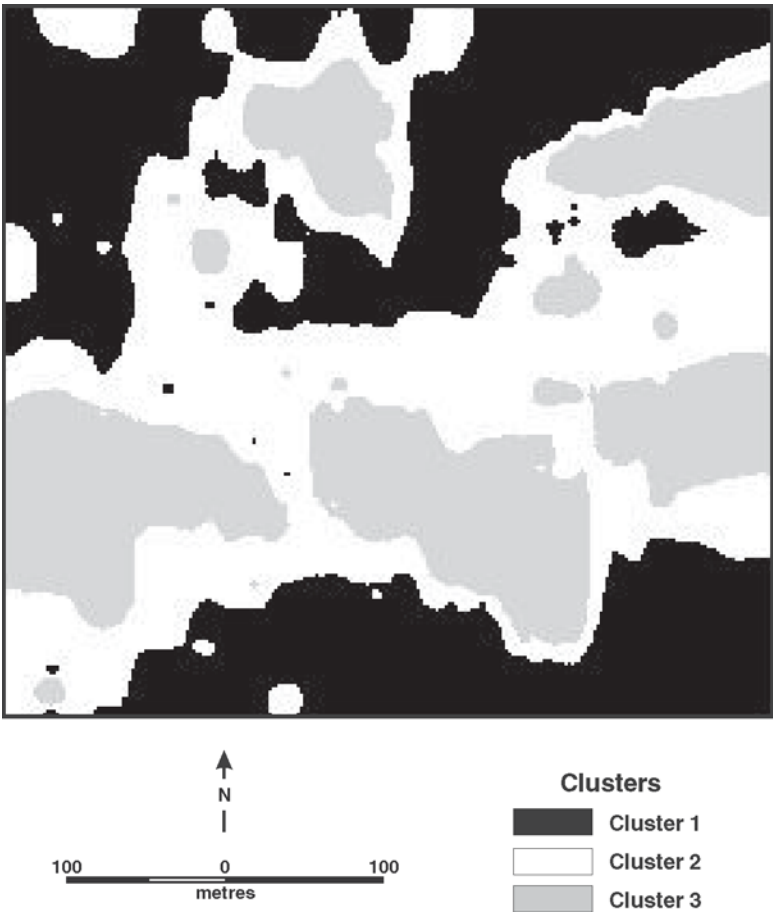


Figure 3: An example of a soil conductivity classification resulting in three clusters.

Next, random samples of yield and DN value, aggregated within the three different sets of conductivity clusters, were tested to determine whether or not they were derived from the same population.

ANOVA was used to test if any of the cluster means were derived from different populations. The ANOVA procedure, however, could not identify which clusters were similar. Tukey’s “honestly significant difference” (HSD) post hoc test was run after

the ANOVA procedure. This test identifies homogeneous subsets of clusters by organizing the cluster means into similar groups. Consequently, the Tukey's HSD test specifies the number of homogeneous subsets or groupings of clusters that are significantly different. It is hypothesized that these homogeneous subsets represent distinct soil-water management zones.

Results and Discussion

Variations in DN Value and Yield Data within Conductivity Clusters:

ANOVA indicated that the DN values aggregated within the three, five and nine conductivity clusters were significantly different. Tukey's HSD Tests suggested that no more than three homogeneous subsets were produced within any of the three, five or nine cluster classifications.

Similar results were reported when comparing yield data aggregated within the same three, five, and nine conductivity clusters. The three cluster conductivity classification produced two homogeneous yield subsets, five cluster classification gave three homogeneous subsets, and the nine cluster conductivity cluster classification resulted in four homogeneous subsets.

These results suggest that as many as four soil-water management zones can be identified based on variations in soil conductivity within the study area.

Variations in Conductivity and Yield Data within DN Value Clusters:

ANOVA indicated that the conductivity and yield values aggregated within the three, five and nine DN value clusters were significantly different. Tukey's HSD Tests indicate that digital number cluster classifications produced more homogeneous subsets than the conductivity cluster classifications. The three DN value cluster classification formed three homogeneous subsets of yield data. The five DN value cluster classification created five homogeneous yield subsets, and four homogeneous subsets were produced from nine DN cluster classification. Three homogeneous conductivity subsets were created from three DN value cluster

classification, and four subsets were derived from the five DN value cluster classification. The nine DN value cluster classification produced five homogeneous conductivity subsets.

These results suggest that as many as five soil-water management zones can be identified based on variations in the spectral characteristics of the study area.

The clusters created using digital numbers produce a larger number of potential soil -water management zones than the conductivity clusters, although the results are similar between the two types of clusters. In neither case does the number of homogeneous subsets indicate that more than five soil-water management zones are present in the study area.

Conclusions

Results of this study suggest that soil conductivity data and panchromatic aerial photography can be incorporated into a GIS to delineate soil-water management zones for the precision application of irrigation water. The methodology proposed in this study represents a cost effective alternative for identifying these soil-water management zones.

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Modelling relationships between moisture availability and soil/vegetation zonation in southern Saskatchewan and Manitoba

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Abstract: Analyses were performed to see how variations in moisture indices (I_m) may be related to both vegetation and soil zonation in southern Saskatchewan and Manitoba. Analogous to the European steppe situation, south-central Saskatchewan moisture indices increase dramatically as one moves north towards boreal forest. Unlike the situation in eastern European, however, the Canadian prairies also exhibit dramatically increasing I_m values as one moves from south-central Saskatchewan to eastern Manitoba. In the case of the south/north transect in south-central Saskatchewan, correlation analysis, between latitude as the independent variable and, each of mean annual precipitation, temperature, potential evapotranspiration and moisture indices (I_m) values as dependent variable, gives r^2 values of .7157, .9237, .9038 and .8830 respectively, confirming that latitude, and therefore temperature variations, play the major role in determining I_m values. By contrast, for the west/east transect from Saskatchewan to eastern Manitoba the equivalent r^2 values, using longitude as the independent variable, are .9170, .3516, .7190 and .9151 respectively, confirming the role played by longitudinal variations in precipitation in I_m values. Similar relationships between I_m values and soils and vegetation zone boundaries are found along both transects, and diagrams are presented to model these relationships.

Introduction

Following the early nineteenth century lead of Humboldt and Bonpland (1805), it became fashionable for vegetation studies to stress the role of climate in explaining regional or continental-scale

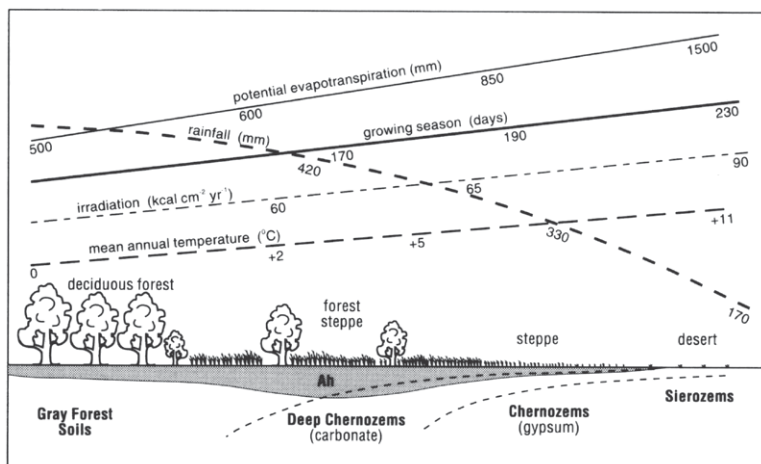


Figure 1: A summary of energy-moisture variables important in the differentiation of vegetation covers and soil types in the east European lowlands (Figure 5.14 in Scott, 1995, which was modified from Walter, 1979, Figure 90).

vegetation and soil patterns. Climate/vegetation relationships were the cornerstone of Dokuchaev's late nineteenth century studies on zonal soils in eastern Europe (Walter 1979), and in Köppen's famous climate classification (1918). More recently Walter (1979) has stressed the role of climate in world vegetation zonation, and the Ecoregions Working Group (1989) has expanded on his approach with its Ecoclimatic Regions system of vegetation zonation in Canadian. For the Canadian prairies, Joel (1933) noted a striking resemblance between the zonal character of Saskatchewan prairie soil profiles and those of eastern Europe, while Looman (1983) demonstrated that extant prairie vegetation type zonation is closely related to seasonal precipitation considerations. This current study is designed to compare moisture indices (the Im of Thornthwaite (1948), and the variables which dictate these indices, with extant vegetation and soils in the southern portions of Saskatchewan and Manitoba, using transects from xeric mixed-grass (short-grass) prairie to boreal forest. This study is also an attempt to adapt Walter's model (1979) for the Russian/Ukrainian steppes to the North American situation (Figure 1), and to see if

there are any similarities between Im and steppe/forest boundaries as have been found in China (Fang and Yoda 1990). The final objective is the representation of this North American model in the form of pedagogically useful diagrams.

While Walter's model incorporates climate variables along a north-northwest to south-southeast transect from the deciduous forests on the cooler, moister side of the steppe, south through the steppe to the Caspian Desert, his model was summarized without the benefit of statistical analyses. The European steppes where Walter's model was developed and the Canadian prairies have some fundamental differences. While only a south-southeast to north-northwest (essentially latitudinal) transect from short-grass steppe to boreal forest is possible in eastern Europe, the Canadian prairies include both south/north latitudinal as well as west/east longitudinal transects from xeric mixed-grass prairie to forest (Figure 2). Differences between the two continents reflect the fact that while in eastern Europe the distribution of steppe and forest types extends latitudinally eastward into Siberia, in North America the moister northern aspen parkland margin only trends longitudinally east from Alberta into Saskatchewan where it then curves southeast into southern Manitoba before finally trending latitudinally due south through southeastern Manitoba into western Minnesota (Figure 2). Definitions for Canadian vegetation terminology are given in the caption to Figure 2.

While differences in climate between prairie and boreal forest seem obvious in explaining the boundary between them, differences within prairie/parkland cover types (i.e., xeric mixed-grass, mixed-grass, and tall-grass plus aspen parkland) appear less obvious due in part to a previous history of ungulate grazing and fire. Hildebrand and Scott (1987) conclude that the relationships between soil moisture deficiencies and tree growth on the pre-agricultural Canadian prairies were insufficient to adequately explain the prairie/parkland boundaries of the 1880's. They suggest that the effects of wildfire and herbivores (especially bison) may well have played a part in altering cover thereby detracting from an expected climate/vegetation correlation. Since the 1880's, however, following the cessation of large scale burning and the extirpation of the large herds of bison, aspen has spread into many of the moister mixed-

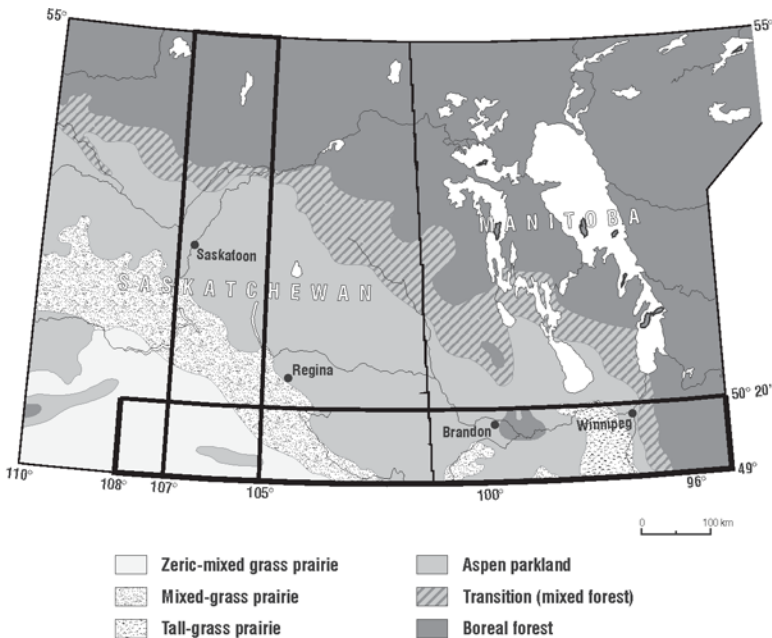


Figure 2. Distribution of vegetation types in the Canadian prairies (modified from Scott, 1995). Added are the south/north latitudinal and west/east longitudinal transects used in the current study. Xeric mixed-grass prairie is synonymous with short-grass prairie in Canada. Aspen parkland can include areas of mixed-grass and tall grass prairie, tall grass prairie (treeless) is restricted edaphically to the Red River basin in Manitoba. Transitional forest represents the transition from aspen parkland to boreal forest (where deciduous hardwood forest includes one-to-three of the four dominant prairie Province boreal forest conifers (following Zoltai, 1975). Mixed woods boreal represents the drier, often hardwood dominated, boreal forest (Rowe, 1972) of the Sub-humid Boreal Ecoclimatic Region, while the more humid boreal forest is generally dominated by conifers.

grass prairie areas forming parklands which better reflect extant climate.

Data Selection and Analysis

To prepare the south/north latitudinal transect data were obtained for climate stations from 49° 00' and 55° 20' north latitude, and between 105° and 107° west longitude (Figure 2). For the

west/east longitudinal transect, data were obtained for climate stations between 108° to 95° west longitude, and from 49° 00' to 50° 20' north latitude. Mean annual precipitation (P) and mean annual temperature data come from the *Canadian Climate Normals 1961-1990* (Environment Canada, 1993). Only climate stations below 1,000 m a.s.l. and with either a complete 30 year record, or an adjusted 25-29 year record were selected. Annual potential evapotranspiration (PE) values were extrapolated from the "Annual PE" map (Figure 1.1 in Agriculture Canada, 1976, and detailed in Sly and Coligado, 1974). Moisture indices were determined using Thornthwaite's (1948) index where $Im = (P/PE - 1)100$. This index gives negative Im values where precipitation (P) is less than PE, Im is zero where P and PE are equal, and positive Im values reflect P exceeding PE. Vegetation cover types and soil great-groups are from maps published by the National Atlas of Canada (1999) and the Soil Research Institute (1972) respectively.

a) South/North Latitudinal Transect: Statistical analysis (using SPSS) of the climate data for this study consisted of four linear regressions, between latitude as the independent variable, and each of the following dependent variables; mean annual temperature, mean annual precipitation, PE, and Im. Twenty-five climate stations in this two-degrees of longitude swath from the U.S. border in south-central Saskatchewan north to La Ronge were used, with twenty one stations providing data on all four dependent variables. In the analysis minutes of latitude were converted to decimals of one degree. The r^2 values for these four regressions are given in Figure 3 together with an indication of soil and vegetation zone boundaries. All r^2 values were found to be significant at the 0.001 level.

b) West/East Longitudinal Transect: Statistical analysis consisted of four linear regressions between longitude as the independent variable, and each of dependent variables, mean annual temperature, mean annual precipitation, PE, and Im. Seventy climate stations from Val Marie in south-central Saskatchewan to the Manitoba-Ontario provincial boundary were used, with fifty one providing data on all four dependent variables. In the analysis

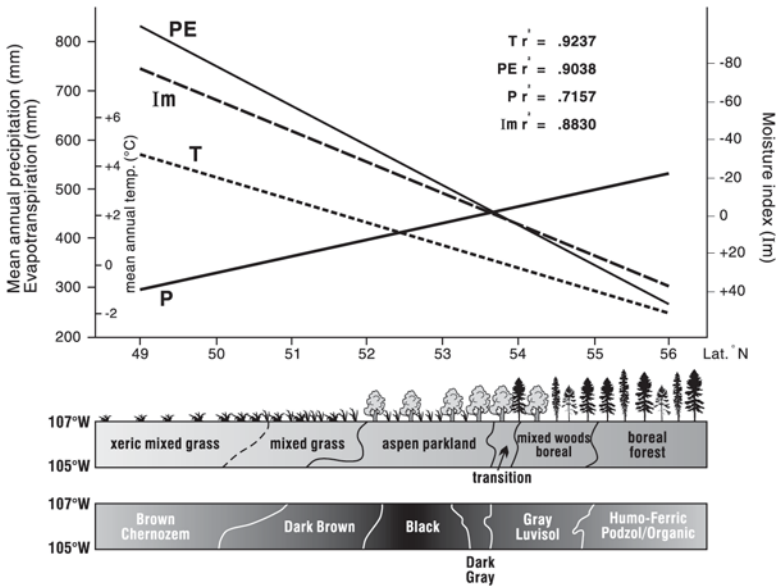


Figure 3: South/north latitudinal transect from xeric mixed-grass prairie to boreal forest. Data from 105° to 107° W longitude, and between 49° and 55° 20' N latitude. Boundaries for vegetation and soil zones in the bars below the graph come directly from the National Atlas of Canada (1999) and the Soil Research Institute (1972).

minutes of longitude were converted to decimals of one degree. The r^2 values for these four regressions are given in Figure 4 together with soil and vegetation data, and were found to be significant at the 0.001 level.

Conclusion

Data for the south/north transect is south-central Saskatchewan (Figure 3) show strong relationships between latitude and the four climate variables. Of interest is a much stronger temperature gradient associated with latitude ($r^2 = .9237$), than was found for precipitation ($r^2 = .7157$). As temperature impacts directly in the determination of both PE and Im, it would appear that the role

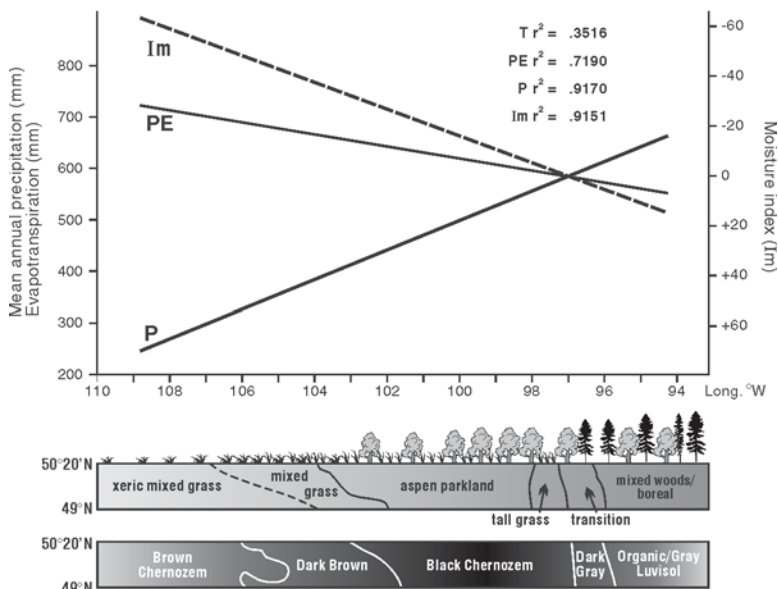


Figure 4: West/east longitudinal transect from xeric mixed-grass prairie to mixed woods boreal forest. Data from 49° - 50° 20' N latitude, and between 108° W and the Manitoba/Ontario provincial boundary (95° W). Boundaries for vegetation and soil zones in the bars below the graph come directly from the National Atlas of Canada (1999) and the Soil Research Institute (1972).

played by latitude in depressing temperatures impacts significantly on both. Im values show a strong dependance upon latitude ($r^2 = .8830$) with the boundary between xeric mixed-grass prairie and mixed-grass prairie being where Im values are approximately -45. The boundary between Canadian mixed grass and aspen parkland is where Im values are -25, while Fang and Yoda (1990) obtained a value of -20 for this same transition in China. The boundaries between aspen parkland and transitional forest in this Canadian study, and in the China and east European studies (where PE and mean annual rainfall cross in Figure 1), are all associated with Im values of zero.

In Canada transitional forest is encountered where Im values range between zero and +5. While mixed woods boreal forest is associated with Im values of at least +5, this forest type is generally

replaced by conifer-dominated boreal forest where Im values exceed + 20. It is not possible to compare the China study with the current one in terms of the transition to boreal forest as Fang and Yoda (1990) selected a northwest to southeast transect from steppe to temperate deciduous and evergreen forests. Not unexpectedly, boundaries between the Canadian Brown, Dark Brown, and Black Chernozems correlate well with grassland vegetation boundaries and Im values (Figure 3), although where Im values are strongly positive the relationship is less clear, probably reflecting other ecosystem modifying factors such as shield parent material, soil drainage, and forest fires.

With the west/east longitudinal transect (Figure 4) longitude produces a much higher r^2 with rainfall (.9170) than it did with temperature (.3516). It is suggested that for this transect it is variations in precipitation rather than temperature which accounts for the very significant association between longitude and Im values ($r^2 = .9151$). Again, boundaries between mixed-grass prairie and aspen parkland have Im values of -20, transitional forest coincides with Im values of zero to +5, and mixed woods boreal is found where Im values are greater than + 5.

This study confirms a high degree of prediction between Im values and both longitude and latitude along transects from xeric mixed-grass prairie to boreal forest. Soil zonal boundaries are also seen to reflect specific degrees of moisture stress or abundance, and there is a high degree of similarity between the Im values associated with Canadian vegetation boundaries and their eastern European and China equivalents.

Acknowledgements

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Wave-transported boulders imbricated near Marquette, Michigan, as indicators of past Lake Superior storm activity

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Introduction

Lake Superior has the largest surface area of any freshwater lake in the world (Swain, 1980). This large surface area helps to produce powerful storms on Lake Superior. According to Eichenlaub (1979), storms that form over the lake tend to be the strongest during the “unstable season” in November and December when the greatest temperature differences exist between the lake surface and the overlying air.

Lake Superior produces large storms that have the power to sink and drive ships ashore. On November 10, 1975, the *Edmund Fitzgerald*, after loading 26,000 tons of taconite at Superior, Wisconsin, sank suddenly to the depths of Lake Superior in the teeth of 60 mile per hour winds and large waves (Marshall, 1997). Ships have been tossed about the lake since navigation of Lake Superior began during the times of the fur traders. Wolff (1990) tells of a ship, the *Western Star*, that was pushed ashore by strong winds during a storm known as the “Big Blow” on November 28, 1905. What becomes evident is the strength of Lake Superior storms in moving massive materials. In a like fashion, materials such as cobbles and boulders are moved by the most violent Lake Superior storms. As lake freighters have been tossed about the lake, it is assumed that the cobbles and boulders within the lake were also moved. The shoreward transport of large boulders, if their age

were to be identified, could reveal possibilities for reconstruction of a storm timeline for Lake Superior. The purpose of this study is to extend further the chronology and lake record of extreme storms over Lake Superior through a lichenometric dating analysis of shoreline boulders near Marquette, Michigan.

Literature Review

Severe storms over Lake Superior are rare, but there is evidence that they do occur. Angel (1995) charted a possible severe storm timeline by noting storm damage such as flooding and erosion for all five of the Great Lakes. This study gives a good storm sequencing for those storms that caused severe erosional damage; although, the data was not collected exclusively for Lake Superior. In addition to the study by Angel, Phillips (1982) investigated cobble ridges for wave-induced formation. He proposed that a former large magnitude storm potentially could account for some of the variations he observed in the cobble ridges. Phillip's paper is unique because it introduced the idea of massive storm waves transporting cobbles and boulders (Philips, 1982).

The biggest waves occur during infrequent storms that ravage the lake and drive the water surface into steep waves. Maximum wave height occurs when extensive fetch combines with high velocity winds of a sustained duration. For example, when northerly winds blow over Lake Superior, these wind currents of 30-50 knots can produce waves that range in height from 4.9 to 9.1 meters (Kotsch, 1983).

The work by Dott (1974) provides the quantitative assessment for wave height needed to move boulders based on paleogeographic studies near Baraboo, Wisconsin. Dott studied an ancient tropical sea that inundated the area that is now Wisconsin. Through this study he discovered that waves of 6.1 to 7.9 meters are necessary to move boulders 1.5 meters in diameter (Dott, 1974).

Erosive Lake Superior storms with northeasterly storm winds affect and erode the southern Lake Superior shores (Johnson and Johnston, 1995). Shoreline erosion and subsequent boulder transport occurs most often when Lake Superior winds blow from

the north, northwest or northeast, the directions of greatest fetch. As storm waves move across the lake, the downwind shore is affected by various erosive events including the transportation and removal of shoreline materials. A similar situation occurs on the southern shore of Lake Michigan. This southern shore is buffeted by large waves when northerly winds blow the length of the lake from north to south. Storms over Lake Michigan from the north have the most concentrated energy during the time period from November through April, (LaMoe and Winters, 1989).

Lichenometry is a surface dating technique that can be used in estimating the age of certain geologic features such as moraines and boulders. Beschel (1973) studied moraines associated with Vernagtferner, a well-known glacier in the Eastern Alps. He found that ice retreated towards the west, thereby indicating older morainic deposits on the eastern side. Lichen dating is typically used for dating moraines, but it is also used for dating boulders. McCarroll (1994) indicates averaging the largest sample from a number of boulders as a good way to determine a lichen growth curve.

Surface exposure dating is possible if the length of lichen growth including colonization time is known. Dorn and Phillips (1991) stated, "if numerical age control can be obtained in an area, it may be possible to calibrate the growth rate of lichens." For this study, the growth rate was established at the two cemeteries. Newton and Newton (1989) support the use of local cemeteries to teach the basic concepts of lichenometry and how to establish a growth curve.

The two lichen genus groups measured for this research both are crustaceous life forms. Crustaceous means that the lichens have a stiff upper thallus, or upper layer. Also, the lichen is firmly attached to the rock across the entire bottom side (Newton and Newton, 1989).

First hand ship accounts provide valuable information that supports the stormy nature of Lake Superior. Many ships over the years have experienced storm-related problems on Lake Superior. One particular account by Holden (1985) chronicles ten shipwrecks near Isle Royale. The wind was blowing out of the northeast as one ship, the *Kamloops*, heading north from Whitefish Bay to Canada, was blown off course and sank on the north coast of Isle

Royale (Holden, 1985). Wind strength and wave height, while not scientifically measured in these historic ship records, are evident from the vivid descriptions of the storms.

Methodology

The dating of shoreline boulders involved one main technique and one auxiliary technique. The main technique involved using lichenometry to identify a possible timeline for storms that helped create the present shoreline. The second technique involved using mariners' accounts of extreme Lake Superior storms.

Field data was collected for individual boulders at the two shoreline sites. Each boulder was measured according to these six parameters: latitude and longitude, rock type, imbrication, relative size, main exposure direction, and lichen size. Latitude and longitude were not used extensively except to confirm in the field the close proximity of many boulder samples. Each shoreline had a different predominant rock type. Rock coloration was also noted. The accurate collection of shoreline data also involved the identification of imbricated boulders.

Imbricated boulders were described as large stones lying on smaller rocks with a definite tilt toward lake level. Signs of imbrication were always checked for and recorded but sometimes were not apparent. Boulders near lake level that did not show signs of imbrication were also measured. It was assumed that the boulders near lake level were transported by waves to the shoreline, while rock areas obviously impacted by mass wasting were avoided.

The boulders next to the shore varied in size according to qualitative criteria. Visual classification of boulder size was done at each of the study sites. The classes were grouped according to rock size with small boulders (< 1 meter), medium boulders (1-2 meters), and large boulders (> 2 meters).

Both shoreline sites in the study area are exposed to the physical and climatological elements of Lake Superior. This characteristic of the study sites was highlighted through the documentation of the main exposure direction. The exposure direction was assumed to be the angle with the most rock frontage flanking the open waters

of Lake Superior. This exposure measurement was collected using a Brunton compass and was expressed in azimuthal degrees (0-360).

Much of this study focused around the concentrated use of lichenometry as a research tool. The first step of the dating procedure was to measure lichens on shoreline boulders. The age of the shoreline lichens was determined using regression analysis where the lichen radius was the independent variable and the boulder age was the dependent variable. The establishment of the regression equation was accomplished by ascertaining lichen growth rates. Lichens of a known age were measured at Park and Holy Cross Cemeteries in Marquette to establish a growth rate. Lichen radius measurements gathered at the two shorelines were subsequently inserted into their respective growth rate equations according to lichen type. From this operation, dates for shoreline boulder placement were gleaned.

Fifty-six boulders were studied at the two shorelines. Of these boulders, 11 (20 percent) were located at Presque Isle. The other 45 (80 percent) were studied at Freeman's Landing. At these two sites, the lichens with the most clearly defined edges were measured. Sometimes the largest lichens were not measured due to overlapping edges and their generally poor condition (part of the lichen was rubbed off a particular boulder). The actual shoreline measurements were carried out using a 150-millimeter ruler. Radius measurements were recorded for two lichen genus types: *Caloplaca* and *Parmelia*.

A complete analysis regarding boulder placement on the two shorelines required obtaining data that would provide information regarding the individual lichen growth rates. Using the date from the cemetery markers enabled the specific growth rate of each lichen type *Caloplaca* and *Parmelia* to be determined. This information was gleaned at two local cemeteries, Park Cemetery and Holy Cross Cemetery in Marquette, Michigan. The lichen radii were recorded according to type and cemetery. This grouping of lichens according to type and cemetery allowed any anomalies to become evident.

The actual growth rate calculation for *Caloplaca* and *Parmelia* per the two cemeteries required a simple mathematical calculation where lichen radius was divided by growth period in years. The end result of this was its growth rate in millimeters per year. The

lichen growth rates provided required data that was necessary to perform regression analysis on the shoreline boulders. The lichens measured on shoreline boulders acted as the independent variable (x value) in the regression routine. By analysis of the boulder lichens (*Caloplaca* and *Parmelia*) according to the regression equation, an approximate date (the dependent variable) of shoreline boulder placement becomes available, and Lake Superior's storm history can be studied.

Regression analysis provided data indicating historic periods of strong storms on Lake Superior. This data was cross-referenced with shipwreck records that provided qualitative information from sailors and traders actually on the lake during some of these vast storm events. Their testimony was used as supporting evidence regarding timing and actual occurrence of some of the storms. Assuming that boulder placement coincides with large storms over Lake Superior, the records of mariners as experienced by survivors help to confirm the Lake Superior storm timeline as indicated by regression analysis.

Study Area

Presque Isle and Freeman's Landing are two regions of Lake Superior shoreline located near Marquette, Michigan. Presque Isle is a city park within Marquette proper, while Freeman's Landing is a section of shoreline about five miles northwest of the city. Figure 1 shows the locations of these two study sites. These two locations vary according to rock type, number of imbricated boulders, relative sizes of boulders, and main exposure direction.

Presque Isle:

Presque Isle is a rocky headland that juts out into Lake Superior on the north end of Marquette, Michigan. The tip of this headland, especially on the north and northeastern sides, is very rugged. The main exposure directions on Presque Isle were direct. The peninsula was entirely exposed to water, waves, and the full brunt of Lake Superior storms due to its orientation to the lake and the lake's energy. With the peninsula thrusting out into the lake, the pounding

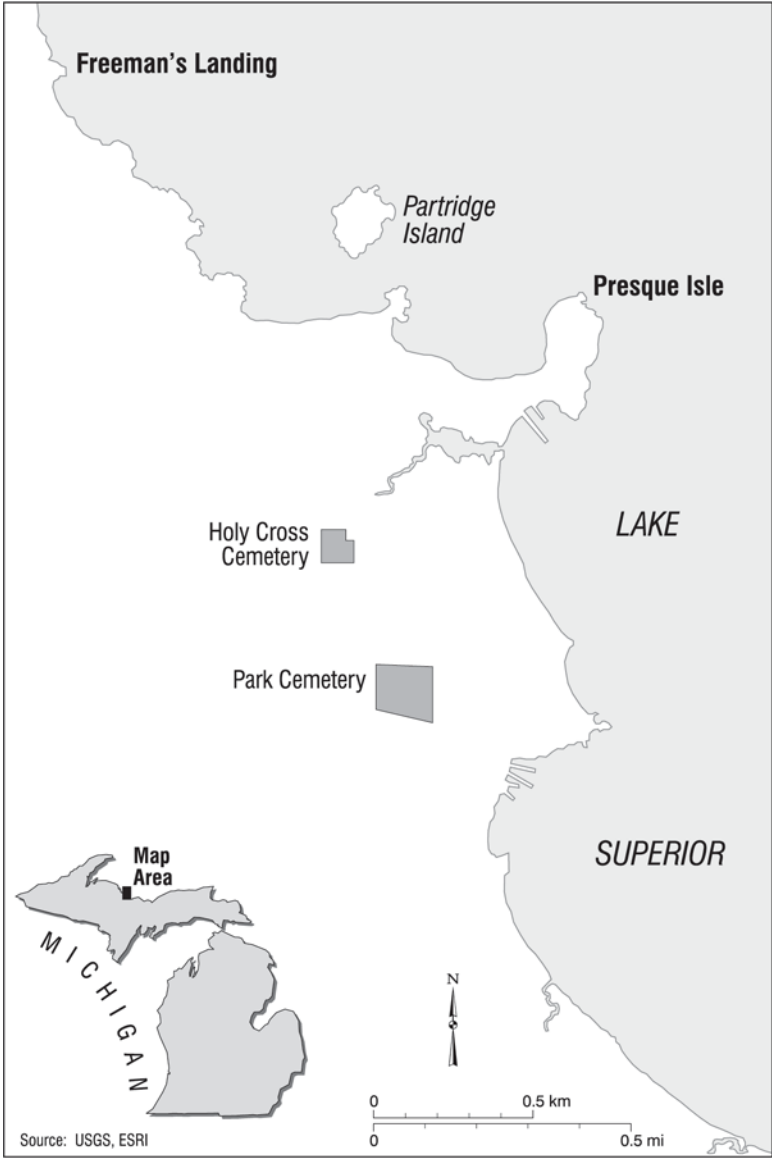


Figure 1: Location of study area.

water and wave energy would be most pronounced at the tip of the headland (Pethick, 1984).

Periodite, a form of metamorphosed sandstone, composes the bedrock in these areas and was laid down in the Upper Precambrian (Bennison, 1978). Most (82 percent) of the boulders on this peninsula are imbricated. Many are perched as stark monoliths of past storm events although most of the boulders there were classed as small or medium sized. Twenty percent of the total number of boulders examined for lichens were found at Presque Isle.

Freeman's Landing:

The second shoreline data collection site was Freeman's Landing, a remote shoreline site about five miles northwest of Marquette, Michigan. This study site forms a series of small headlands and bays composed of extremely rugged cobbles and boulders. The shoreline is not as wide as the Presque Isle site, and in a number places cobbles thrust into nearby undergrowth are evidence of past storms. This series of rocky headlands is composed of granitic gneiss, an ancient rock of extreme solidity from the Lower Precambrian (Bennison, 1978).

The Freeman's Landing site had more boulders than the Presque Isle site. At this site, 45 boulders were measured. This is 80 percent of the total number of boulders studied. These boulders were carefully checked for signs of imbrication because there was evidence of mass wasting due to gravity and frost wedging in the vicinity. No boulders near the upper beach slope were measured. Many of the boulders measured were located on smaller stones with a downward tilt that is characteristic of imbrication. Of all the boulders at Freeman's Landing, 40 (89 percent) were considered imbricated with 13 (29 percent) small, 13 (29 percent) medium, and 19 (42 percent) large. Freeman's Landing contained the largest imbricated boulders in the study, and these large stones were located at or close to water level.

Compared to Presque Isle, Freeman's Landing had fewer primary exposure directions. Figure 2 shows a high frequency of main exposure directions ranging from the north to the east. Sixty-seven percent of the exposure directions ranged from 46 to 90 degrees. This fact seems to indicate a high potential for the strongest

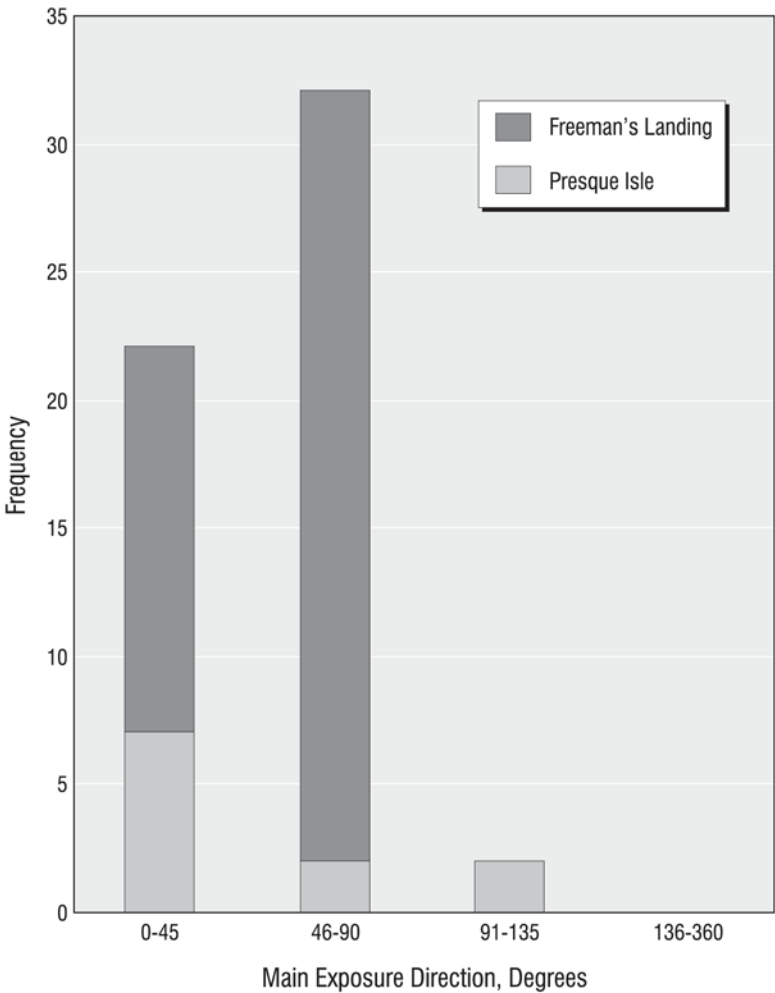


Figure 2: Frequency distribution of main exposure direction for imbricated boulders at Presque Isle and Freeman's Landing.

storms and the largest waves to roll inland from a northeasterly direction. Fewer storms come from the north because Little Presque Isle partially blocks that orientation to Lake Superior.

Holy Cross and Park Cemeteries:

Holy Cross and Park Cemeteries are both located in Marquette, Michigan. The differences between the two lie in their relative locations within the city and their contrasting topographic characteristics. Forty-eight samples of *Caloplaca* and 70 samples of *Parmelia* came from Holy Cross and Park Cemeteries.

Holy Cross Cemetery is located closer to Lake Superior on relatively flat ground. Twenty-eight (58 percent) of the *Caloplaca*, while 36 (51 percent) of the *Parmelia* were represented by this cemetery. The actual elevation of the cemetery varies less than five feet (USGS Marquette Quadrangle, 1975).

Park Cemetery is located on higher terrain within Marquette. Twenty (42 percent) of the *Caloplaca*, while 34 (49 percent) of the *Parmelia* were represented by this cemetery. The actual topography of the cemetery is quite varied with knolls and low areas common. The elevation of the cemetery varies between 720 and 820 feet (USGS Marquette Quadrangle, 1975).

Results

Different characteristics became evident by studying Presque Isle and Freeman's Landing comparatively. The different characteristics varied according to shoreline, imbrication, and relative boulder size. Nine (82 percent) of boulders on Presque Isle were imbricated compared to 40 (89 percent) on Freeman's Landing. Of all boulders measured at Presque Isle, two (18 percent) were small-sized, six (55 percent) were medium-sized, and three (27 percent) were large-sized. Freeman's Landing showed these size characteristics. Of the 45 boulders measured there, 13 (29 percent) were small-sized, 13 (29 percent) were medium-sized, and 19 (42 percent) were large-sized.

Main Exposure Direction:

Figure 2 shows the frequency distribution of main exposure direction for the boulders at Presque Isle and Freeman's Landing. The graph showing frequency versus wind direction suggests the

most probable storm winds that would affect either shoreline site. The graph shows that Presque Isle varied more with exposure directions ranging from 0 to 135 degrees. This graphic indicates that Presque Isle is more apt to be open and exposed to the full onslaught of Lake Superior storms, especially those that harbor a northerly, northeasterly, or southeasterly fetch.

In contrast, the main exposure at Freeman's Landing is similar but not as broad. The exposure at Freeman's Landing ranges from 0 to 90 degrees, due mainly to land obstructions to the north and east. The most probable unobstructed wind route to these shores seems to be a northeast to east-northeasterly route. The presence of massive boulders at the Freeman's Landing site indicates that severe storms have occurred in the past, but the paths of clear fetch seem to be somewhat less when compared to Presque Isle.

Shoreline Boulder Data:

The lichen radius measurements that were obtained at Presque Isle and Freeman's Landing were highly varied. Large ranges in actual size were recorded at both sites for *Caloplaca* and *Parmelia*. The average radii for *Caloplaca* and *Parmelia* were similar for the two sites, but this fact is coincidence more than anything of statistical value.

At Presque Isle, the lichen radius measurements ranged from 3 to 76 mm. The *Caloplaca* sizes varied from 7 to 76 mm with an average radius of 26.9 mm. In comparison, the *Parmelia*, with a smaller spread in actual sizes at 3 to 55 mm, were smaller overall, with a 16.8 mm average. The *Caloplaca* and *Parmelia* data sets collected at Freeman's Landing varied more in terms of actual minimum and maximum sizes. *Caloplaca* ranged from 5 to 130 mm, while *Parmelia* ranged from 2 to 75 mm. The average size increased for *Caloplaca* (29.0 mm) and decreased for *Parmelia* (15.7 mm).

Cemetery Data:

The cemetery data is divided according to cemetery and lichen type, *Caloplaca* and *Parmelia*. This fact indicates four data sets in this section: Holy Cross – *Caloplaca*; Holy Cross – *Parmelia*;

Park – *Caloplaca*; and, Park – *Parmelia*. Each set of information is recorded according to lichen size, average radius, and growth rate (mm/yr).

Caloplaca at Holy Cross Cemetery ranged in size from 9 to 47 mm with an average radius of 23.2 mm. The growth rate for *Caloplaca* at Holy Cross was 0.31 mm/yr. *Caloplaca* lichens at Park Cemetery were similar to those at Holy Cross. The growth period for *Caloplaca* at Park Cemetery was similar to that recorded at Holy Cross Cemetery (72 versus 71 years). In contrast to Holy Cross Cemetery, *Caloplaca* at Park Cemetery were larger on average (26.2 versus 23.2 mm) but were slower growing at 0.27 mm/yr.

Parmelia at Holy Cross Cemetery ranged in size from 10 to 72 mm with an average radius of 24.8 mm. *Parmelia* at Holy Cross actually were larger both in terms of actual size and average size even though *Caloplaca* grew at a faster rate (0.31 versus 0.26 mm/yr). *Parmelia* at Park Cemetery were less varied than those at Holy Cross Cemetery (16-41 mm versus 10-72 mm). The average radius for *Parmelia* at Park Cemetery is also larger at 27.4 mm. Also, the growth rate for *Parmelia* at Park Cemetery is slower than at Holy Cross Cemetery (0.24 mm/yr versus 0.26 mm/yr).

Regression Analysis:

Mathematical analysis of the *Caloplaca* and *Parmelia* data collected at Holy Cross Cemetery and Park Cemetery indicated extremely low correlation values. The calculations showed extremely poor data that could not be used for any serious analysis. This fact was supported by the low R-squared values evident for *Caloplaca* (0.05) and *Parmelia* (0.00).

Discussion

The graphs indicating the poor success of the regression analyses indicate that the derived lichen data show no strong correlation between lichen size and lichen growth rate. Essentially, the mathematics indicate that the data is weak and should not be relied on for accurate analysis of shoreline boulder placement.

Shoreline boulder placement also subsequently indicates those years of storm events over Lake Superior. For *Caloplaca*, this regression formula indicated storms occurring between 82 and 107 years ago. For *Parmelia*, the same equation indicated storms occurring 108 to 111 years ago. Since the data was collected in 1999, this would indicate storms capable of transporting boulders occurring between 1888 and 1917. Clearly, this data is not reliable, and it is only an indicator of severe storms that did occur on the lake during that time period. In no way can this data be considered an absolute in terms of pinpointing specific times of actual storm events. This data is poor and should not be used for any type of analysis, although it does still provide evidence of violent Lake Superior storms on a broad scale.

Potentially, the worst storm in the recorded history of Lake Superior was the November 28th storm of 1905. This storm claimed 78 lives and 21 ships in the worst navigational seasons on the lake (Wolff, 1990). This violent storm is documented well, and it acts as a permanent warning to brave sailors and other folk who embark on Lake Superior during the fall. The 1905 storm on Lake Superior is similar to a Lake Huron example of huge waves and extremely strong winds. On November 10, 1913, a gale on that lake was recorded at 145 kilometers per hour with waves running 12.2 meters (Harrington 1998).

Limitations of Lichenometry:

One problem with studying lichens is knowing and properly identifying all the different genus types and species. Different lichen species can grow at different rates based on many factors: colonization time of the lichen, climatic factors, exposure direction, height above the ground, and parent rock material.

Colonization time of the lichen refers to the initial time that a particular lichen attached to a boulder. It can be difficult to ascertain colonization time. For this study, it was assumed that colonization time was immediately after shoreline boulder placement occurred. This assumption was used for convenience, but Goudie highlights the problem with this by indicating that even if colonization is immediate, the initial growth can be non-linear (Goudie, 1990).

Another source of error in this study was the climatic factors and lichen interaction with those factors. All lichens are different, and the climatic requirements for different species are as complex as the plants themselves. Knowing this, it is assumed that different species require different amounts of moisture for ideal growing conditions.

As the *Caloplaca* seemed larger near the shoreline, it appeared that they desired more moisture for optimum growth. If this was true, it would follow that *Caloplaca* should grow larger in Holy Cross Cemetery and smaller in Park Cemetery (located on a hill further south in the city). This suggestion was not supported by the average lichen sizes in the cemeteries. It was assumed that the close proximity of Holy Cross Cemetery to the lake would enhance the lichen growth pattern because fog and moisture would be more apt to linger here than on a hill further south in the city (at the location of Park Cemetery).

Another factor that may affect lichen growth patterns is the exposure direction. Some lichens may not thrive in area buffeted by wind. This exposure force may affect the creatures enough that they seek shelter in a more protected area of the boulder or cemetery marker. Some of the cemetery markers showed areas where no lichens existed, but in other areas on the same stone, lichens thrived. This spatial distribution may be due to exposure.

Another climatic factor that may influence lichen growth is height above the ground. If microclimate is a factor in lichen growth rates, this simple idea of elevation could be very important. Within a cemetery or other area, cold air can sink into low areas. Also, air cools through radiational cooling. Fog forms first near the earth's surface. These may be minor in the whole realm of macro or mesoscale climate, but these seemingly small factors could mean the difference between impossible odds and lichen survival.

Additionally, lichens may also favor a certain type of boulder/marker or base material. The lichens also could favor a certain chemical composition in the minerals that make up the boulders and the cemetery markers. For example, some lichens may prefer a sandy base material such as sandstone, while others may prefer the solid foothold provided by granite outcrops. It all could depend on parent material.

Each of these unique factors was real and potentially could be considered. Every factor could have led to errors regarding the accuracy of dates for shoreline boulder placement and the subsequent storm timeline for Lake Superior.

Conclusions

Lichenometry is a very complex geographic application that needs to be designed very carefully based on the purpose of the research and the desired result. Many factors must be considered to accurately use lichen data. The first priority is to design a strategy for collection that is consistent and accurate and is designed to deal with problems such as lichen overlap and poor lichen samples. After the basic collection principles are in place, there are myriad other factors to consider. Further lichenometric research in this region will require more stringent sampling controls and awareness of other factors that influence the growth rates of certain lichens.

Some of the limitations of lichenometry that were discovered in this study include, but are not limited to, lichen colonization time, climatic factors that could affect the lichen's growth, lichen proximity to sources of moisture, lichen exposure direction, threshold height requirements for lichens, and lichen preference regarding chemical composition of parent surfaces. All of these factors potentially can create errors in data results.

The specific reconstruction of extreme storms over Lake Superior was not an outcome of this study. The data was too broad; and, based on the poor regression correlation parameters, it was not reliable or useful for an accurate reconstruction. The shipwreck data that was studied did indicate the experiences of many a poor navigator that faced the fury of Lake Superior at specific times in the past. Two of the more violent tempests over the lake occurred in November, both in 1905 and 1913. What this study cannot do in a specific sense, it can do in a general sense. This study failed to pinpoint single, extreme storms over the lake, but it has the potential to scope regional Lake Superior storms on a broad, decadal scale.

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Nutrient loading in the winter snowfalls over the Clear Lake watershed

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Introduction

The Clear Lake watershed is centrally located on the Riding Mountain Uplands in southwestern Manitoba. The watershed drains an area of 142.18 km² of which over 65 percent is located in Riding Mountain National Park (Figure 1). Clear Lake represents approximately 20.7% of the watershed area.

Clear Lake is the focus of summer recreational activity in Riding Mountain National Park, Manitoba. Consequently water quality in Clear Lake is a fundamental concern identified in both the Park Management Plan and the Ecosystem Conservation Plan (Dubois et al., 1997). Parks Canada regulates human activities within Riding Mountain National Park in order to minimize pollution of the natural environment. Snowmelt accounts for an annual runoff inflow of approximately 27,000.00 dm³ or a 9.0 cm rise in lake levels (McGinn et al., 1997). This value represents twenty three percent of the estimated average annual runoff into Clear Lake. For the Park staff, monitoring the water quality of the snowmelt runoff from the Clear Lake watershed is seen as necessary in order to determine whether airborne pollutants are entering the Clear Lake system.

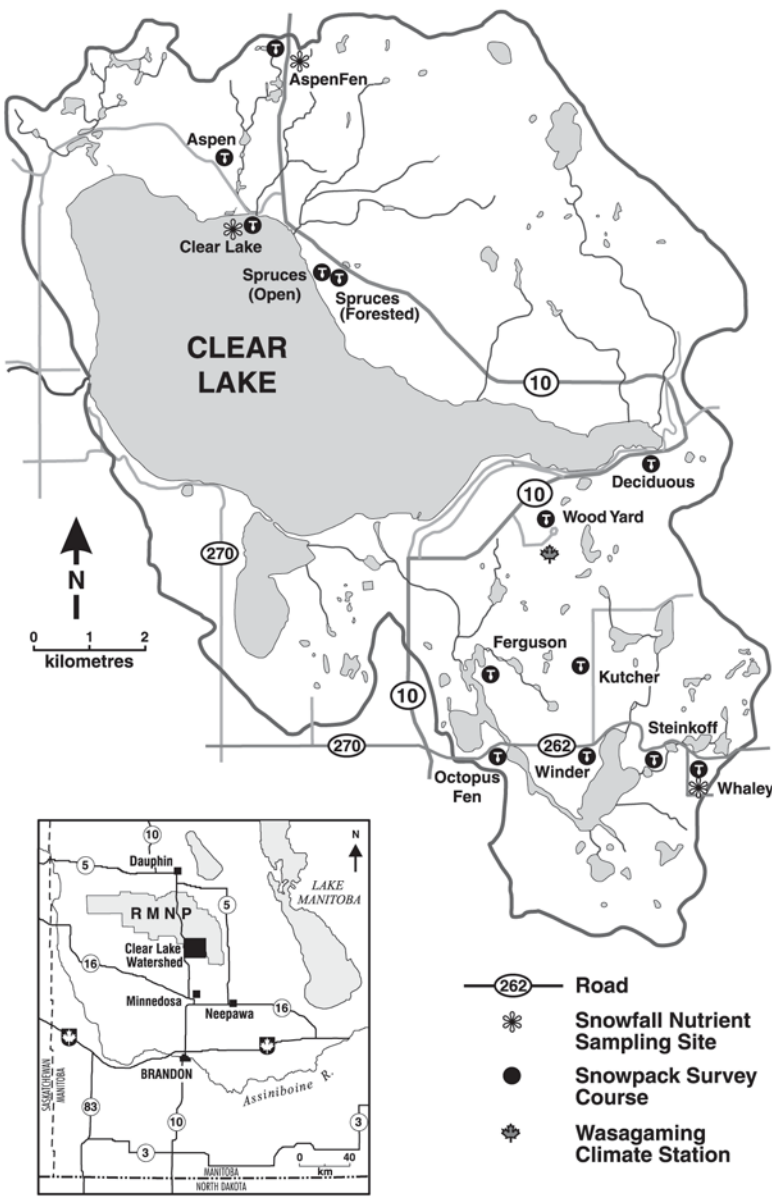


Figure 1: Location of study area.

Objective

Two objectives were identified at the onset of this pilot study:

- 1) To estimate the nitrogen and phosphorus loading in the annual winter snowfall over the Clear Lake watershed.
- 2) To evaluate the pilot study and make recommendations regarding the continuance of an atmospheric nutrient monitoring programme.

Theoretical Considerations

Carbon, potassium, nitrogen, and phosphorus are the common macronutrients for aquatic plant life. In most lakes either nitrogen or phosphorus is the limiting factor in plant growth (Hammer and MacKichan, 1981). Nitrogen and phosphorus nutrient loading of surface runoff accelerates natural eutrophication in streams, lakes and other aquatic systems (Reid and Wood, 1989). Allochthonous or outside sources of these nutrients include atmospheric concentrations of ammonia, ammonium, nitrates, nitrites, and phosphates, which can be directly deposited (dry deposition) on to water/ice surfaces. Furthermore, these nutrient aerosols can form nuclei of condensation and washout as precipitation; some falling onto lakes and wetlands.

Ammonia:

Ammonia is a colourless gaseous alkaline compound of nitrogen and hydrogen. It is an inorganic form of nitrogen that is very soluble in water and can be used directly by plants. Natural sources of ammonia in surface waters include the decomposition of plant material and animal waste, weathering of clays, nitrogen fixation by clays and gas exchange with the atmosphere (pure ammonia being a gas present in air). Ammonia is found in water as NH_3 (free ammonia or dissolved un-ionized ammonia gas), and as NH_4^+ (ammonium ions). In water the two forms (NH_3 and NH_4^+) exist in equilibrium and their combined concentration is referred to as total ammonia. Analytical methods are not readily available for the

measurement of free ammonia. Consequently, measures of ammonium ion concentration and equilibrium relationships are used to determine total ammonia ($\text{NH}_3 + \text{NH}_4^+$) concentration. Ammonium is a major component in fertilizers and significant amounts can enter water bodies in runoff from cultivated fields. During application and post application, under the right conditions, volatilization significantly increases the ammonia concentration in the atmosphere.

The toxicity to aquatic organisms of ammonia in an aqueous solution is attributed to the un-ionized NH_3 component of total ammonia (Williamson, 1988). Since it is difficult to measure free (un-ionized) ammonia concentrations in a solution, equilibrium relationships are used to estimate the free ammonia concentration from total ammonia measurements. Water temperature and pH regulate this equilibrium. As temperature and or pH increases the percentage of free ammonia in total ammonia increases.

In unpolluted waters free ammonia and ammonium occur in small quantities usually less than 1.0 mg L^{-1} (Reid and Wood, 1976) and pose little or no risk to aquatic organisms. Health Canada has no guidelines for a Maximum Allowable Concentration (MAC) of ammonia for drinking water. However, the Water Encyclopedia, Table 6-51: Guidelines for Evaluating Quality for Aquatic Life, recommends that free ammonia (NH_3) should not exceed 0.5 mg L^{-1} (Van der leeden et al., 1990). Manitoba Environment has set the free (un-ionized) ammonia concentration in unpolluted water objective an order of magnitude lower, at the 0.020 mg L^{-1} (Williamson, 1988).

Emerson et al., 1975, employ a formula to calculate the percentage of free (un-ionized) ammonia in a total ammonia solution. Using a melting temperature for snow of 0°C and the mean recorded pH of the snowfalls in the Riding Mountain area of 6.4 pH units, the maximum allowable concentration of free ammonia in snowfall should not exceed 0.0264 percent of the total ammonia concentration.

If the concentration of toxic free ammonia in snowfall should not be greater than 0.03 percent of the total ammonia concentration, the maximum total ammonia concentration in snowfall allowable

by Manitoba Environment is calculated to be 0.67 mg L^{-1} . This standard will be used as the benchmark for this study.

Nitrates and Nitrites:

Nitrate (NO_3^-) and nitrite (NO_2^-) are two inorganic forms of nitrogen found in water. Along with ammonia they are an important source of nitrogen for aquatic plants. Nitrates are used extensively as an ingredient in nitrogen fertilizers; thus runoff from cultivated land is a common source of anthropogenic nitrate. Nitrates can also form from sewage, animal waste, plant and animal decay as well as leachate from igneous rock.

Generally nitrate ion concentrations in water bodies in western Canada rarely exceed 5.0 mg L^{-1} of nitrogen in nitrate form and are usually below 1.0 mg L^{-1} of nitrate nitrogen (Williamson, 1988 and The Water Encyclopedia, Table 6-4: Principal Chemical Constituents in Water). Nitrate nitrogen ($\text{NO}_3^- \text{-N}$) refers to the mass of nitrogen in the nitrate form. According to Health Canada the Maximum Allowable Concentration (MAC) for nitrates should not exceed 45.0 mg L^{-1} (Health Canada, 1996). This corresponds to maximum allowable nitrate nitrogen ($\text{NO}_3^- \text{-N}$) concentration of 10.0 mg L^{-1} (Williamson, 1988 and The Water Encyclopedia Table 6-22: Canadian Guidelines for Drinking Water Quality). The nitrate nitrogen concentration in unpolluted waters rarely exceeds 0.300 mg L^{-1} (Reid and Wood, 1976).

Nitrite nitrogen ($\text{NO}_2^- \text{-N}$) is found at lower concentrations than nitrate nitrogen, approximately 0.001 mg L^{-1} in unpolluted waters (Reid and Wood, 1976). Sources for nitrite include industrial effluent, sewage and animal waste. The MAC for nitrite is 3.2 mg L^{-1} of NO_3^- or 1.0 mg L^{-1} for nitrite nitrogen (Williamson, 1988 and The Water Encyclopedia Table 6-22: Canadian Guidelines for Drinking Water Quality).

Phosphorus:

Phosphorus is an essential mineral nutrient for plant and animal life. In a freshwater aquatic setting it is considered to be the most important nutrient in determining the overall productivity in an ecosystem. Phosphorus in natural waters commonly occurs as

phosphate, which is classified as; orthophosphate (PO_4^{--}), polyphosphates, and organically bound phosphates (Hammer and MacKichan, 1981). These phosphate forms exist as filterable (dissolved) and non-filterable (particulate) forms. Filterable orthophosphate concentrations tend to be low in natural water bodies because living organisms assimilate phosphorus. In general hydrological/limnological studies the term "total phosphorus" and "phosphate content" are identical.

Total mean phosphorus content of most lakes ranges from 0.010 - 0.030 mg L^{-1} (Reid and Wood 1976). Total phosphorus (soluble phosphate phosphorus) content should not exceed 0.025 mg L^{-1} in any reservoir, lake, pond or in a tributary at the point where it enters such bodies of water (Williamson, 1988).

Airborne Phosphate (PO_4^{--}):

Atmospheric contributions of phosphorus can be very significant in lakes with small drainage basins (Schindler et al., 1976). In the Experimental Lakes Area near Kenora, Ontario, Schindler et al. (1978) estimate an atmospheric phosphorus loading of 24.0 - 53.0 $\text{mg m}^2 \text{yr}^{-1}$. Bennett (1985) provides an estimate of aeolian phosphate concentrations in the Brandon, Manitoba area ranging from 0.01 - 0.04 mg m^3 with a geometric mean value 0.2 mg m^3 , and suggests an atmospheric loading rate of 82.0 $\text{mg m}^2 \text{yr}^{-1}$. The distribution of airborne phosphate is lognormal; therefore a geometric mean is appropriate. Beck (1985) rationalizes a slightly more conservative atmospheric contribution rate of 41.0 $\text{mg m}^2 \text{yr}^{-1}$ in his study of twelve lakes in the south Riding Mountain Planning District.

Methodology

Sampling Sites:

In the Clear Lake watershed, three snowfall sampling sites were established. Two sites are located in Riding Mountain National Park and a third sampling site is situated outside the park over an

agricultural field (Figure 1). The *Clear Lake* site is representative of the lake surface and lowest elevation (615 m) in the Clear Lake Watershed. The *Aspen Fen* site is located in a wetland area, 39 m above lake level. The site is described as standing water, with rushes, sedges, dwarf birch, willows and alder. The *Whaley* site is a cultivated agricultural field of uncut alfalfa, 640 m in elevation.

Both the *Aspen Fen* and *Whaley* sites represent highland areas located near the watershed divide, the former in the north and the latter in the south.

Sampling Procedures and Instruments:

Samples were collected using a rectangular funneling instrument measuring 9.0 cm square at the mouth by 25.0 cm in length and tapering to 5.0 cm square at the rear. The funnel was swept across the fresh snow surface, collecting approximately 1200 cm³ of snow into a large plastic bag attached to the rear end of the instrument. Three or four sweeps were required to collect approximately 1 kg of snow (1.0 litres water equivalent) at each snowfall sampling site.

Water Quality Instruments:

The nutrient testing employed portable Ion Specific Meters (with LCD screen) made by Hanna Instruments. Samples were tested for total ammonium, nitrate and nitrite ion concentrations and soluble phosphate ion concentration. Electrical conductivity was estimated using a conductivity pen made by Hanna Instruments, model Commet 2 and a Fisher pH meter, model Acumet 600, measured pH in each sample.

Laboratory Procedures:

Each snowfall sample was melted at room temperature into a 1000 ml glass beaker. The melted sample was split into an A and B sub-sample. Both the A and B sub-samples were analyzed for ammonia (ammonium), nitrate, nitrite, and phosphate ion concentration, pH and electrical conductivity.

Ammonia, nitrate, nitrite and phosphate ion concentrations are estimated using the procedures specified in the Hanna Instruments:

Ion Specific Meters Instruction Manual. These instruments employ a colorimetric analysis based on the principle that the specific components react with others and form a colour. The colour intensity is proportional to the concentration of the substance being measured. A light emitting diode emits radiation at a single wavelength intensity and a photoelectric cell collects the radiation, converting it to an electrical current. A microprocessor employing the Lambert-Beer Law equality converts the electrical potential to concentration.

Phosphate occurred in the snowfall samples in both a soluble and insoluble form. The insoluble particulate was removed by filtration. A given volume (10.0 mL) of supernatant (sample solution plus precipitate) is placed into a 0.45 micron (mm) filter and drawn through the filter by a suction device. The phosphate ion concentration of the filtrate is measured using the Hanna Instruments. The amount of particulate phosphate retained in the filter is determined by subtracting the total available phosphate ion concentration measured in the free sample (supernatant) from the total available phosphate ion concentration recorded for the filtered sample (filtrate).

Approximately 25 percent of the phosphate ion concentration was removed following the 0.45 mm filtration. Consequently, additional filtration was employed. The 0.25 mm filter successfully removed most of the remaining phosphate reducing mean sample values to approximately 0.015 mg L^{-1} .

Significant Precipitation Events over the Clear lake Watershed, December 1999 - March 2000

Snowfall data were collected from the Environment Canada Wasagaming Climate Station located in Riding Mountain National Park at the Warden Stores Compound (Figure 1). Significant snowfall events are operationally defined as a precipitation event depositing at least 3.0 mm water equivalent depth during a 24 hour period. Using the 10:1 snowfall/water ratio, that would be a snowfall exceeding 3.0 cm in depth.

Two precipitation events occurred during the first 17 days of December resulting in a total of 1.1 mm water equivalent snowfall. The first significant winter snowfall (6.2 mm water equivalent depth) occurred on December 17-19, 1999 (Figure 2). The first nutrient sample survey was conducted during a light snowfall, two days later, on December 22. The results of the nutrient analyses are summarized in Table 1.

Four snowfall events took place during the last two days of December and in January 2000 (Figure 2). Total January snowfall is estimated to be 30.0 mm water equivalent depth. The late December - early January snowfall occurred over a 7-day period from December 30 to January 5 and could be sub-divided into two closely timed events. Total snowfall was estimated to be 14.0 mm water equivalent depth. Sampling was conducted six days into the event on January 4, 2000. The results of the nutrient analyses are summarized in Table 1.

On January 7 and 8, 3.3 mm water equivalent depth of snowfall was recorded at the Wasagaming Climate Station. This snowfall event was not sampled for nitrogen and phosphorus nutrients. The third significant January snowfall occurred from the 14-17,

Table 1: Nutrient concentrations in snowfall, Clear Lake watershed.

	N03- N mg L-1	PO4--- P mg L-1	N02- N mg L-1	NH3 + NH4+ mg L-1	NH3 mg L-1	K+ mg L-1	Temperature oC	Conductivity mS cm-1	pH
Dec 22/99									
Aspen Fen	0.00	0.08	0.05	0.32	0.01	NA	20.1	0.010	8.30
Whaley	0.01	1.89	0.01	0.14	0.00	NA	20.1	0.015	6.20
Clear Lake	0.00	1.75	0.05	0.42	0.01	NA	20.1	0.010	8.14
Watershed	0.003	1.238	0.033	0.292	0.008	NA	20.1	0.120	7.55
Jan 04/00									
Aspen Fen	0.00	0.54	0.06	0.06	0.00	0.10	20.1	0.150	6.30
Whaley	0.00	0.87	0.24	0.69	0.02	0.12	20.1	0.010	6.20
Clear Lake	0.00	1.27	0.08	0.32	0.01	0.16	20.1	0.010	6.80
Watershed	0.000	0.893	0.123	0.353	0.009	0.123	20.1	0.012	6.43
Jan 18/00									
Aspen Fen	0.00	0.73	0.08	0.16	0.00	NA	19.9	0.010	5.70
Whaley	0.00	1.88	0.06	0.24	0.01	NA	19.9	0.010	5.80
Clear Lake	0.00	1.77	0.05	0.33	0.01	NA	19.9	0.010	5.30
Watershed	0.000	1.458	0.060	0.240	0.006	NA	19.9	0.010	5.80
*Feb 29/00									
Aspen Fen	0.00	0.07	0.02	0.20	0.01	0.05	20.1	0.010	6.30
Whaley	0.00	0.34	0.02	0.07	0.00	0.02	20.1	0.010	5.90
Clear Lake	0.00	0.25	0.06	0.04	0.00	0.02	20.1	0.010	5.40
Watershed	0.000	0.217	0.050	0.098	0.003	0.027	20.1	0.010	5.87
Mar 17/00									
Aspen Fen	0.00	0.91	0.02	0.12	0.00	0.04	20.1	0.010	6.70
Whaley	0.00	1.95	0.03	0.26	0.01	0.02	20.1	0.010	5.80
Clear Lake	0.00	1.82	0.01	0.30	0.01	0.02	20.1	0.010	5.60
Watershed	0.000	1.557	0.018	0.227	0.006	0.022	20.1	0.010	6.03

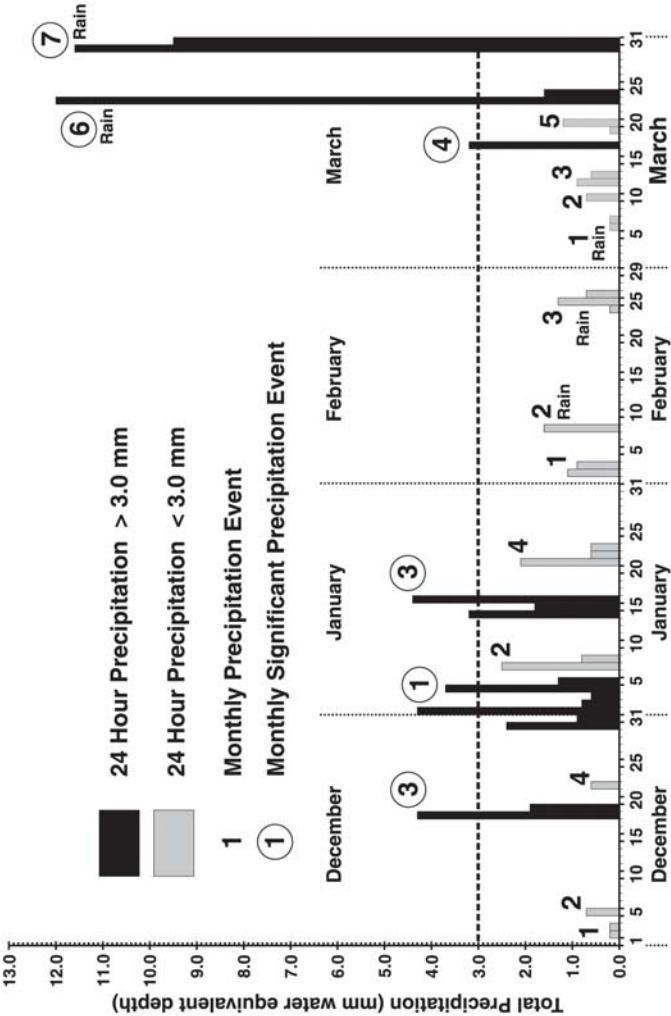


Figure 2: Wasagaming Climate Station, Riding Mountain National Park December 1999 - March 2000 precipitation.

depositing 9.4 mm water equivalent depth of snowfall (Figure 2). Sampling was conducted the following day (January 18). The results of the nutrient analyses are summarized in Table 1. A fourth significant snowfall event occurred on January 21-23 recording 3.3 mm water equivalent depth of precipitation (Figure 2). This snowfall event was not sampled for nitrogen and phosphorus nutrients.

Three precipitation events occurred in February 2000 (Figure 2). None were considered to be significant (greater than 3.0 mm water equivalent depth). During the last 10 days of February, maximum daily temperatures were above 0°C and the mean daily temperatures were 10.8°C above normal. This warming resulted in significant sublimation and melting of the snowpack. Consequently, the nutrient sampling survey conducted on February 29 collected samples from a ripe snowpack and not a fresh snowfall. A ripe snowpack is operationally defined as an isothermal body of settled snow at 0°C, which is saturated with respect to its liquid water content (LWC). In the Riding Mountain Uplands a ripe snowpack has a density greater than 300 kg m⁻³ and a LWC of approximately 35 percent. An Environment Canada ESC-30 Snow Sampler (61.804 mm diameter bore with an area of 30 cm²) was used to extract a vertical core of the snowpack, normal to the collecting surface, at each sampling site. The results of the nutrient analyses are summarized in Table 1.

One significant snowfall (3.2 mm water equivalent depth) and two other snowfall events occurred during the first 17 days of March (Figure 2). Four rainfall events occurred in March, two defined as significant, March 23-24 (13.6 mm) and March 30-31 (21.6), respectively (Figure 2). Following these rainfall events, the snowpack completely ablated. The final snowfall nutrient sampling was conducted on March 17, 2000 during the last significant snowfall event of the winter period. The results of the nutrient analyses are summarized in Table 1.

Nutrients in the Clear Lake Watershed

In the Clear Lake Watershed the 1999-2000 winter snowfall nutrient sampling survey was conducted at three established sampling sites: Aspen Fen, Clear Lake and Whaley (Figure 1). Sampling began on December 22, 1999 and continued following significant snowfall events throughout the winter accumulation period. The final snowfall nutrient survey was conducted on March 17, 2000. Snowfall nutrient concentrations for the three sampling sites located in the Clear Lake Watershed are recorded in Table 1.

Total Ammonia:

Total ammonia concentrations measured at the three sampling sites during the 1999-2000 winter are illustrated in Figure 3. The mean total ammonia concentration ($\text{NH}_3 + \text{NH}_4^+$) in the snowfall samples was 0.278 mg L^{-1} with a standard deviation of 0.168 mg L^{-1} . The coefficient of variation ($C = s / m$) was 0.60 or 60 percent. Total ammonia concentration in snowfall was less than Reid and Wood's observation for total ammonia concentration of 1.0 mg L^{-1} and less than the study objective of 0.667 mg L^{-1} .

The maximum mean total ammonia of 0.690 mg L^{-1} was recorded at the Whaley site on January 4, 2000. Employing the Emerson et al. formula for calculating percentage of free ammonia (NH_3), the maximum concentration of free ammonia was 0.018 mg L^{-1} , a value less than the Manitoba Environment standard of 0.020 mg L^{-1} (Williamson, 1988). The minimum concentration of total ammonia was recorded at Aspen Fen (0.06 mg L^{-1}) on January 4, 2000.

Nitrate Ion (NO_3^-):

Nitrate ion (NO_3^- N) concentrations were undetected except at the Whaley sampling site on December 22, 1999. The recorded value of 0.01 mg L^{-1} was less than the specifications of the instrument and considered undetected. During the winter, nitrate and nitrite concentrations are not expected to be significant since nitrification is dependent on temperature (Paton, personal communication).

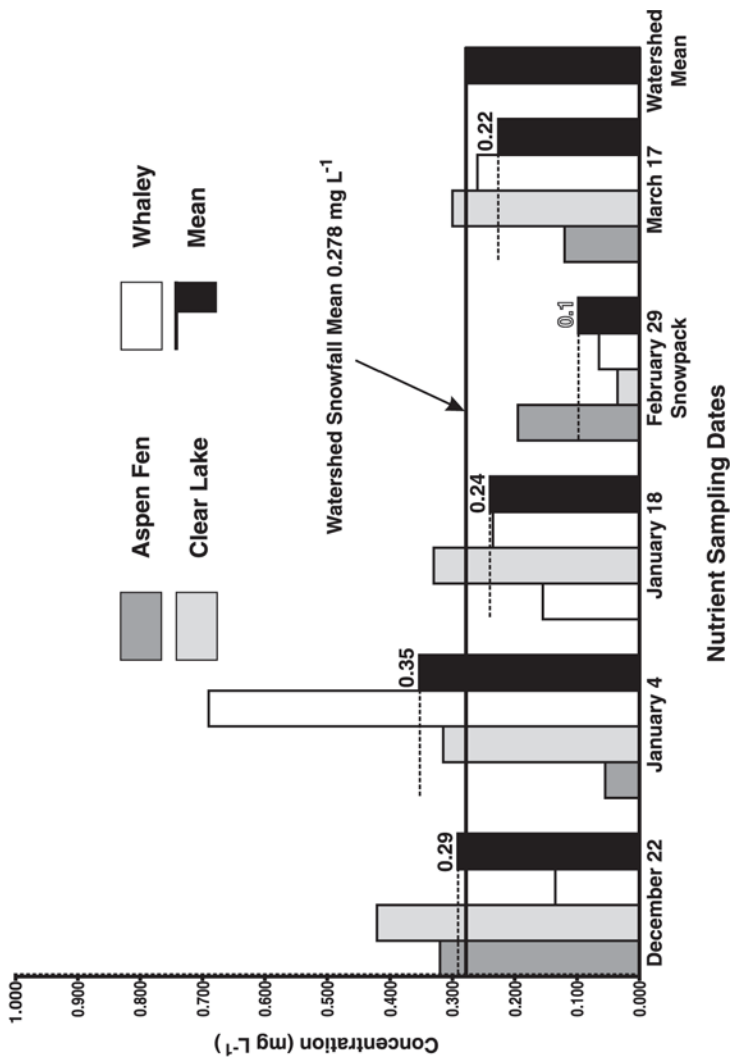


Figure 3: Total ammonia (NH_3 -N+ NH_4^+ -N) concentration in snowfall, Clear Lake watershed.

Nitrite Ion (NO_2^-):

The mean nitrite ion concentration recorded for the sampled snowfalls (0.059 mg L^{-1}) was significantly less than the Manitoba Environment standard of 1.000 mg L^{-1} , but greater than Reid and Wood's observation of 0.001 mg L^{-1} in unpolluted waters. Nitrite ion concentrations were variable with a standard deviation 0.060 mg L^{-1} and a coefficient of variation equal to 1.02 or 102 percent. A maximum nitrite ion concentration of 0.235 mg L^{-1} was recorded at the Whaley sampling site on January 4, 2000. The maximum concentration for the watershed was recorded on the same date. Interestingly, the maximum total ammonia concentration also was recorded during the January 4 sampling.

Phosphate (PO_4^{3-}):

The mean phosphate ion concentration (PO_4^{3-}P) in the snowfall samples was 1.280 mg L^{-1} with a standard deviation of 0.634 mg L^{-1} (Figure 4). The coefficient of variation was 0.50. Comparatively, the mean phosphate concentration of 1.073 mg L^{-1} recorded for all samples, snowfalls and the February 29 snowpack, was less than the snowfall mean concentration. The variance and standard deviation (0.722 mg L^{-1}) were greater, a statistic reflected in a 67 percent coefficient of variation.

The maximum mean phosphate ion concentration of 1.945 mg L^{-1} was recorded at the Whaley site on March 17, 2000 (Figure 4). The minimum concentration of phosphate ion was recorded at Aspen Fen (0.080 mg L^{-1}) on December 22, 1999. Phosphate concentrations were consistently lower at the Aspen Fen highland sampling site. The mean phosphate ion concentration in the winter snowfalls on the Clear Lake watershed were significantly greater than expected and at least two orders of magnitude greater than Manitoba Environment objective of 0.025 mg L^{-1} .

It was hypothesized that the unusually high phosphate ion concentrations in the snowfalls could be attributed to particulate phosphate acting as a nuclei of condensation. Particulate phosphate occurs in both a soluble and insoluble form. The insoluble particulate can be removed by filtration. The 0.45 micron (mm) filter collects the particulate insoluble phosphate while a 0.25 mm

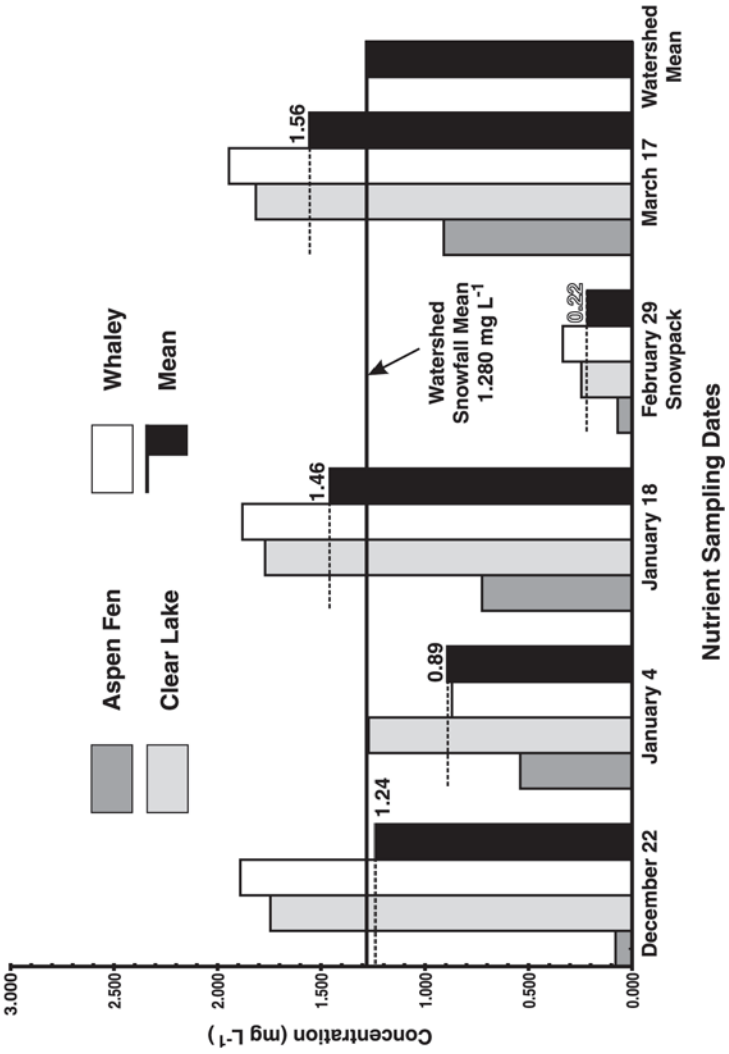


Figure 4: Phosphate ($PO_4^{--}P$) concentration in snowfall, Clear Lake watershed.

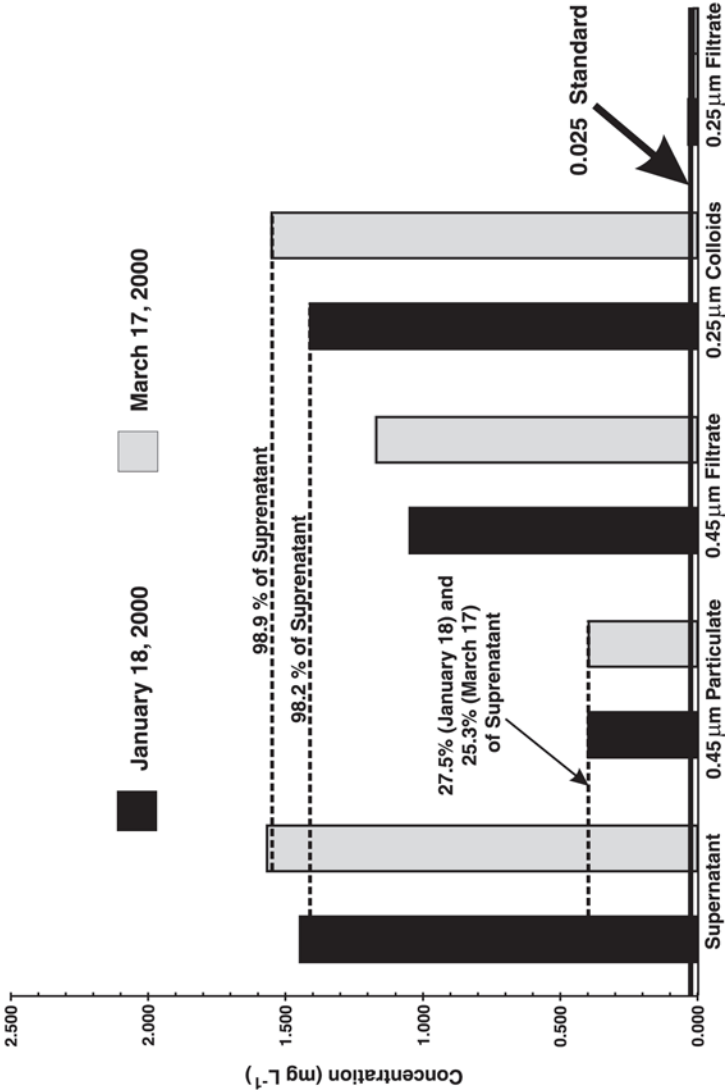


Figure 5: Particulate and colloidal filtration: total available phosphate, Clear Lake watershed.

filter can remove soluble phosphate bonded to colloidal particles. The two step filtration procedure for two snowfall events and the February snowpack sample is summarized in Figure 5.

The phosphate ion concentration was not significantly reduced following the 0.45 mm filtration (Figure 5). Mean concentrations in the snowfall samples remained greater than 1.0 mg L^{-1} .

The 0.25 mm filter successfully removed the particulate phosphate reducing mean sample values to expect values; approximately 0.015 mg L^{-1} (Figure 5). This suggests that the unusually high phosphate concentration found in the Riding Mountain Uplands snowfalls were being deposited in association with colloidal particles.

Conclusion

An unusually high concentration of airborne phosphate is being deposited in snowfall on the Clear Lake Watershed. Approximately 75 percent of this particulate phosphate is soluble and bonded to colloidal particles (Figure 5). The remaining 25 percent is insoluble particulate.

The concentrations of other macronutrients (nitrogen and potassium) do not exceed the recommended guidelines. However the number of snowfalls sampled and the number of sampling site are too few for a proper scientific study. Further studies are required to evaluate the phosphate depositional loading during the winter on the lake surface.

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No shovel needed: a theoretical approach to determining the sensitivity of the PECOS Project study area

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Abstract: These are the musings of a novice process geomorphologist who delved headfirst into the world of theoretical geomorphology in order to carry out the necessary research and writing of “The Thesis”. Personal experiences and tribulations are related, including the difficulties of “Believing is Seeing” and the important mantra of “Time, Space, Space-Time, Scale”. Finally Sensitivity is defined and the idea of “Resistance verses Disturbance” is revealed.

Introduction

Geomorphologists are generally thought to be the adventurous sort when it comes to research. What geomorphologist worth their salt would not gladly pack up the truck and run off to do fieldwork? During their ever so mandatory fieldwork investigations, geomorphologists are obsessed with the observation and measurement of landforms and processes, with detailed analysis and interpretation of the collected data occurring afterwards for months on end. This interest in “getting out there” extends to fledgling geomorphology students, who lace up their hiking boots and cram into vans full of equipment and baggage to venture forth on field trips. It can be argued that fieldwork (and by extension field trips) are both necessary and enjoyable pursuits for geomorphologists. Somehow it just isn’t geomorphology unless you romp about and get your boots muddy.

With the quantitative revolution in science occurring during the latter half of the 20th century, geomorphology has taken to the collection of thorough numeric data of landform and process variables, resulting in a lot of number crunching to obtain results. Since it is important that geomorphologists accumulate as much accurate and precise data from the piece of land they are studying, the focus usually ends up being very localized and quite specific over a brief period of time. It is a matter of practicality; it is hard to measure and analyze too many variables like slope angles, soil horizon depths, grain size compositions, pH levels, fluvial sediment loads, vegetation density, precipitation amounts, etc., etc., for a large area over a long time period.

With the intense focus on data collection, most budding geomorphologists learn all about the techniques of geomorphology, such as using field equipment correctly and the proper gathering and processing of samples. The analysis and interpretation of data that follows is often in quantifiable results; for example, the average slope angle is whatever degrees, the average rate of erosion is this per year, the deviation is this much, etc. It seems that data and results are somehow not valid unless there's a number attached to it. Woe be it the geomorphologist who needs to use theory and ideas to solve a problem at hand, and are sorely lacking in the philosophical and methodological tools needed.

What? I Don't Need a Shovel?

The scenario of a novice process geomorphologist running headfirst into a theoretically based topic, and getting horribly confused as a result, became reality for the author with a beastly thesis dealing with determining the sensitivity of the geomorphic systems within the PECOS project study area. In the process of investigating and researching a solution to this thesis problem, a number of very "alarming" issues (alarming in the sense they were issues that seemed difficult, if not impossible, to overcome) kept cropping up. Little did I know that the major problem was not the thesis, per se, but the investigator; I was looking at it all wrong...

The first “alarming” aspect of the thesis was the fact the study area chosen by the PECOS (Prairie Ecosystem Study) people was a very large, very geomorphologically diverse area in south western Saskatchewan (Appendix 1). The second “alarming” aspect was that it was expected that the entire study area was to be investigated, with no exceptions. The third “alarming” aspect was that I personally did not know what exactly sensitivity was! The root cause of all this anguish was a personal lack of understanding of the theoretical background and strategy needed to approach the problem.

The thesis was not going to be completed through the “normal” route of gathering data of specific physical/process variables from sample points during fieldwork and then the statistical analysis to obtain results. Instead, the thesis research was going to be conducted by following spatial and conceptual paradigms that see landscapes holistically over long time spans and large areas. The reasoning behind this was that since the study area was very large, strategically its size should be used to our advantage. The variables to be examined must not be specific at all, and in fact all the variables and possibilities should be very basic, whittled down to the lowest common denominator (the forthcoming mantra is a good example).

Very simple questioning form the basis of the research, and should start with: “what is this place like?” and “what is going on?”, and ultimately ending with “why is this place the way it is?”. Ideally the focus should NOT be on the actual gathering of data (although it is “fun” during fieldwork), but the interpretation of data; what does it all mean? The first conflicting encounter with this change in approach (and a very annoying and alarming experience) was a visit the study area in order to conduct fieldwork and data gathering, without a shovel in sight...

The Mantra of “Space, Time, Space-Time, Scale”

Going off on a philosophical tangent here, my main problem was that my idea of what geomorphology was supposed to be was all wrong for this thesis. I was still thinking like a process geomorphologist, so my view of things was too narrow and too

technical, so as “advice” my supervisor suggested I chant this mantra to “broaden my horizons:”

“Space, Time, Space-Time, Scale.”

“It is the key to your thesis” he said. Oh yah, right, thanks Dave. But believe it or not, it has helped in keeping my focus on the essential basics of geomorphology. It is all about understanding the true nature of Space, Time and Scale. The rest is superfluous. So all of the information (data, ideas, paradigms, etc.) gathered about the PECOS study area must fit into at least one of mantra categories, and must be seen from this context.

Getting back to more tangible issues, the most difficult mantra concept to grasp was the idea of Scale. While understanding Space and Time (and Space-Time) can be thought of as making thorough investigations and inventories as to What, How and Why a place is like it is, Scale is more abstract. Scale includes both Space and Time, together and separately, plus the factors of size, resolution and complexity. Scale deals with the quality and quantity of available information and variables. Unfortunately for me, Scale is a very important issue since at different scales the same geomorphic system could have different sensitivities because of the changes in its important dependant and independent variables.

Believing is Seeing

Although having said that the research for this thesis would be theoretical and for the most part qualitative and interpretive, I was certainly not going to be an armchair geomorphologist. The call of fieldwork was so overwhelming that I ventured forth to visit the study area, not quite sure what to do once I got there. When I did get there, armed with only a notebook, pen, camera and maps of all sorts, the advice that I received from my advisor certainly struck terror into my heart. After a few sentences, I realized the gist of his speech: go out and OBSERVE. Observe?? Observe what? What

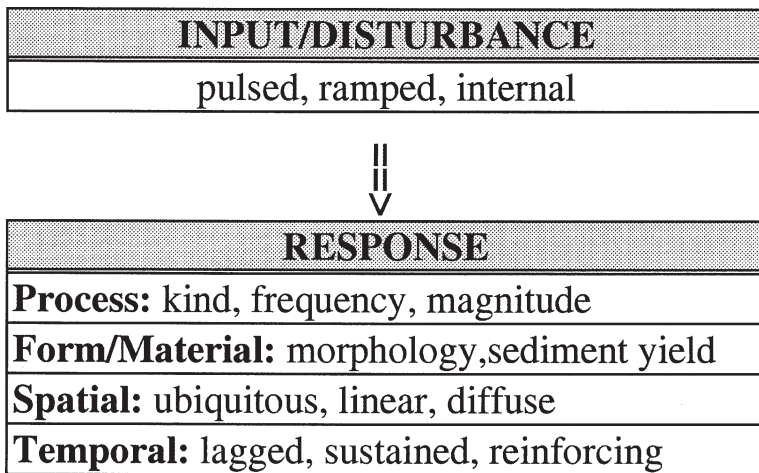


Figure 1: Conceptual framework of geomorphic responses to climatic inputs and internal disturbances (Brunsden and Thornes 1979, from Sauchyn 1993).

am I supposed to be looking for? Should I be seeing something important out there?

The cause of my distress was the fact that I was not well versed in the skill of interpretation of geomorphic observations. It's not exactly something you learn in school. So while I could plainly see landforms and process phenomena occurring everywhere, I realized that my task was beyond just looking around. I was supposed to critically interpret what I was seeing. So, what was I supposed to be looking for? What should I see? Moreover, what did I have to believe and understand in order to see it? It's true what they say: "Knowledge is power!"

Sensitivity Explained!

Since the thesis topic was about determining the Sensitivity of the PECOS study area, it was safe to assume that during my "fieldwork" I was supposed to be looking for "sensitivity clues" out in the landscape. Landscape sensitivity describes the nature of landscape response across time and space. It is expressed "as the

likelihood that a given change in the controls of a system will produce a sensible, recognizable and persistent response” (Brunsden and Thornes 1979). So, I was supposed to be looking out for “landscape response”, but what exactly is THAT supposed to be?

Brunsden and Thornes’ (1979) conceptual framework for the study of responses to inputs and internal thresholds outlined the different categories of both inputs and “response” (Figure 1 from Sauchyn 1993). It should be noted that response is both a spatial and temporal phenomena. An expanded explanation of both inputs and responses is seen in Table 1.

Table 1: Details of Brunsden and Thornes’ (1979) conceptual framework of inputs and reponses.

INPUT/DISTURBANCE
Pulsed: external; extreme episodic event; "brief" Ramped: external; changes sustained at new level Internal: exceeding threshold limits, transitional
RESPONSE
<u>Process:</u> kind- change/shift in dominant type frequency- timing of occurrences magnitude- "force" or "strength" of event
<u>Form/Material:</u> morphology- the actual "shape" sediment yield- measurable level of process "effectiveness"
<u>Spatial:</u> ubiquitous- everywhere! widely distributed response linear- along sensitive erosional axes eg rivers diffuse- waves of aggression away from linear axes
<u>Temporal:</u> lagged- negative feedback; restored to previous state sustained- adjustment to a new level/characteristic state reinforcing- positive feedback; initiation of change

Barriers to Change (RESISTANCE)

Energy for Change (DISTURBANCE)

The three possible outcomes are:

- <1 unstable, since disturbance is greater
- =1 meta-stable, since both are equal
- >1 stable, since resistance is greater

Figure 2: Landscape change safety factor (from Brunsden and Thornes 1979 and Brunsden 1993).

It quickly became obvious to me in the field that response (and therefore Sensitivity) is definitely not consistent over Space, or through Time for that matter. The reasons for this are because the variables are not the same everywhere you go. Different responses occur due to variations in the spatial and temporal distribution of the incoming “disturbing” forces and the “resisting” forces present in the landscape (Brunsden and Thornes 1979). So how do you “rate” or determine what an area’s Sensitivity is?

Resistance Versus Disturbance

As the sensitivity definition states, landscape response is triggered by a change in the controls of the “system”, and in this case it would be a geomorphic system. A geomorphic system is comprised of both landforms and processes and the interactions occurring between them. One approach to understanding and assessing the sensitivity of an area is to use a ratio of the resisting and disturbing forces that are present within geomorphic systems. This ratio, which is called a “landscape change safety factor” (Brunsden 1993), is the ratio of the mean magnitude of barriers to change versus the mean magnitudes of the disturbing forces (Figure 2).

The application of this ratio will result in a continuum where at one end there are “stable” landscapes (>1) where the controlling

Table 2: *Categories of resistance (Brunsden 1993).*

BARRIERS TO CHANGE
Strength resistance properties of the rock/surficial materials
Morphological resistance shape of things: slope, relief, elevation; level of available potential energy
Structural resistance design of the geomorphic system: locational resistance, proximity to processes; transmission resistance, ability to transmit impulse of change; coupling configurations, relationship between system components and process domains
Filter resistance how kinetic energy is transmitted: absorption by dissipation; utilization by adjustment of form; deflection by armouring; filtering across sub-system boundaries; diffusion across space
System-state resistance uniqueness of history, predisposition along the path of time

resistances are such that they either 1) prevent a disturbance from having any noticeable effect (a very “resistant” landscape) or 2) arranged as to restore the system to its previous state (negative feedback; lagged response). At the other end are “unstable” landscapes where the disturbance is stronger than the resistance (>1), and there is either reinforcing response (positive feedback) or a transitional adjustment to a new level of input (sustained response) (Brunsden 1993). In the middle are “meta stable” landscapes that appear to be stable but are near a threshold ($=1$) and therefore have a higher propensity to become an unstable area.

Brunsden (1993) categorized and listed five types of resistance present in the landscape (Table 2). It was while reading this excellent

paper that my advisor asked “Could you recognize resistance in the landscape if you had to?”. It was not a hypothetical question since it is vital that resistance is identified in the landscape. So not only was I looking for “response” in the PECOS area, I was also looking for, and had to believe in, “resistance”.

Final Musings

To further my “burden”, I realized that resistance, response and ultimately sensitivity could be seen and interpreted not only during fieldwork, but also through the study of variables expressed in maps, air photos, remotely sensed images, etc. It is a question of knowing what you should be looking for and what it all means. Hopefully, there will be a sequel to this paper that lists the findings of this (successful?) approach.

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Appendix 1: The Beast which is PECOS

The Prairie Ecosystem Study (PECOS) was a multidisciplinary research project supported by the Eco-research Program of Environment Canada’s Green Plan. Originally named “Sustainability of the Semi-arid Prairie Ecosystem”, the overall objective of the project was “to evaluate the sustainability of the semi-arid prairie ecosystem in terms of the health of the land and

the well being of the people and their communities, and to explore the prospects for a way of life that does not jeopardize these.”

Agricultural Region 3B-N (as defined by the 1993 Agricultural Census of Canada) was chosen to be the PECOS project study area because it is characterized by a dry climate, contains a representative range of land use and communities and has a wide variety of landforms and soil types. However, from an earth science perspective, 3B-N is a rather inconvenient study area because it is a purely political entity with arbitrary borders (Figure A1). The study area does not restrict itself to areas with similar physical characteristics or common drainage basins, and does not conform to the Canadian NTS map sheet system. As a result, different physiographic, geomorphic and soil areas are represented within the PPSA as segments severed from the whole, and parts of five NTS map sheets (72-F, J, K, N and O) are needed to cover the entire study area. The PPSA is an agglomeration of several different geographic/ geomorphic areas (Figure A2). The total area of the PECOS study area is over 15,500 square kilometres.

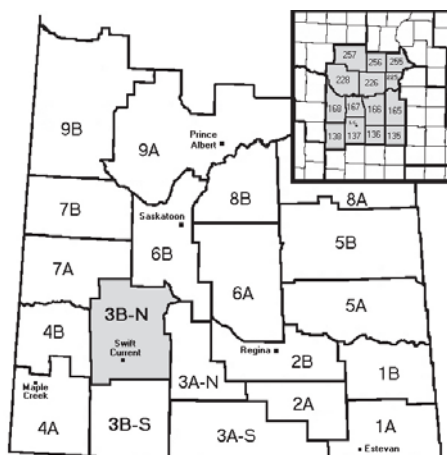


Figure A1: Location of Agricultural Region 3B-N.

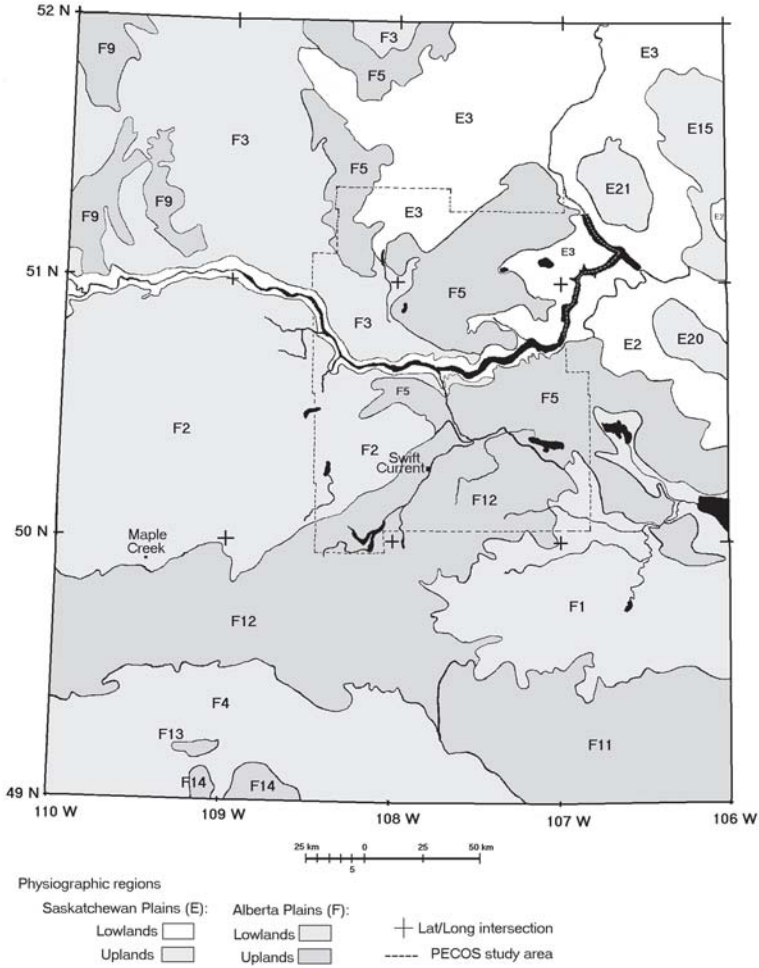


Figure A2: Physiographic areas of Agricultural Region 3B-N.

Institutional assistance for flood-disaster recovery and its impact on resilience in the Red River Basin

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Abstract: Flood resilience refers to the capacity of a community to ‘bounce back’ quickly during the post flood period without permanent, intolerable damage, or disruption, and without large amounts of outside assistance. The recovery period after a major flood is a time to focus attention on enhancing such resilience. This study assesses the extent to which recovery assistance provided by Canada and the United States to selected localities after the 1997 floods on the Red River of the North did or did not actually contribute to flood resilience. Only the structures that include residences, commercial and business buildings, public facilities, and infrastructure such as roads, bridges, and treatment plants are examined.

In both countries, some forms of assistance did contribute somewhat to providing a higher level of protection for at least some structures; helped increase the local stock of flood-free buildings to some extent; and helped build local self-sufficiency in some ways. For other type of assistance, the impacts varied. In Canada, removal of structures and the promotion of repairs that would reduce future damage did not occur programmatically. In the United States, recovery assistance was used to permanently remove hundreds of structures from floodplains; to encourage the purchase of flood insurance; and to fund some mitigation measures. In neither country did recovery assistance strongly foster individual responsibility or self-sufficiency, or taking steps to prepare for a future flood that may exceed the design levels of the structural flood control works.

The research concluded that there was more opportunity for using recovery assistance to foster flood resiliency in the Red River Basin than was used after the 1997 floods. A key area for future research is the impact of recovery assistance on the other aspects of resilience, since the narrow

focus of this study is but one influence on the long-term flood resilience of communities.

Key words: flood resilience, recovery, mitigation, institutional assistance, Red River

Introduction

From the initial advice that the spring flood of 1997 in the Red River Valley was likely to be an unusual event until the period when the flood waters crested, the focus of attention of various government and non-government organizations was on fighting the flood waters and taking steps to protect people and property. As the magnitude of the disaster became manifest, first in North Dakota and Minnesota, USA, and then in Manitoba, Canada, attention shifted to the process of recovery. The desire of people whose property has been flooded and whose lives have been at risk is to see things returned to normal in the first place as rapidly as possible. This implies putting their place of residence, their family, their social involvement, and their economic livelihood back as they were before. More serious reflection may reveal that this is rarely if ever possible, and that recovery from disaster inevitably involves adaptation to new circumstances, both in the community and in individuals' personal lives.

The institutional and organizational actions taken in the short term to respond to suffering and hardship, and measures taken to help restore *status quo* can have long-term effects with different outcomes. Such measures can make both individual households and entire community more resilient and better able to cope with and recover from future events of a similar magnitude. They can also help to recreate situations of similar or greater vulnerability by supporting and facilitating inappropriate and often short-sighted actions. The rise in losses due to disasters in both Canada and the United States indicates that the recurrence of extreme events is often associated with a net increase in property and personal loss in spite of the well-intentioned efforts at recovery and reconstruction that have made before. Formulating and implementing a recovery assistance program by the government and non-government agencies that will reduce longer-term vulnerability while

simultaneously providing quick relief from the disaster impacts appears to be extremely difficult.

This research addressed both disaster mitigation and long run social resilience to study the above stated issues. Mitigation refers to those applied measures that can be taken to reduce vulnerability to future events, for example, removing building from flood prone areas. Beyond those well-defined mitigation measures lies a wider array of possible actions that can help to strengthen the resilience of individuals, communities, states/provinces, and regions. Resilience is a much broader concept than mitigation and numerous factors enter into successful resilience. The scope and focus of this study was kept limited to a few selected components of resilience and mitigation, namely that of building structures, including residences, public facilities, commercial buildings and major infrastructure such as roads, bridges, and treatment plants. Specifically, this study assesses the extent to which recovery assistance provided by Canada and the United States to selected localities after the 1997 floods on the Red River did or did not actually contribute to one category of flood resilience – that of structures. It addresses the following questions: could the citizens of the Basin and their institutions and organizations cope better with another flood of similar or even greater magnitude? Would the losses to structures be greater or less? Has the ability of the region to bounce back – its resilience- been increased or decreased?

Conceptual Considerations

Determining how recovery assistance can help build flood-resilient communities in the Red River Basin requires exploration of both the concepts and measures of resilience, and of the linkages between recovery assistance and resilience. Conceptually, resilience is the ability to change and rehabilitate a system to a sustainable and persistent order (Blaikie *et al.* 1994). In the context of natural disasters, it is the quality of being able to ‘bounce back’ quickly from an extreme natural event – a flood – without permanent, intolerable damage to, or disruption to, or disruption in, social, structural, economic, or biophysical systems, and without large amounts of outside assistance (Mileti 1999; Smith 1996).

Many possible activities, techniques, and measures can be employed to promote flood resilience. Warnings, flood control measures, maintenance of flood-prone areas as open spaces, property insurance against flood damage, installation of flood-resistant construction, and management of stormwater all are included. Virtually any mitigation measure that minimizes future flood losses or impacts can contribute to flood resilience. When these activities, methods, and measures are comprehensively combined for a specified area, and when they do not detract from then other precepts of sustainable development, then the area can be termed 'flood resilient'.

The Long-term Recovery Task Force, established by the American President during the wake of the Red River flood of 1997, has listed components for a sustainable Red River Basin that are similar to the sustainability precepts defined by the well-known 1987 World Commission on Environment and Development. The components include: a healthy environment, a vital workforce, a vital economic base, sound infrastructure, and adequate housing (FEMA 1977a; 1977b). Transforming that 'sustainable Red River Basin' into a flood-resilient Basin involves ensuring that every possible element of these components can withstand, and quickly recover from, a future flood; some of the elements of a disaster-resilient, sustainable river basin are depicted in Figure 1. A flood-resilient river basin, for example, could be one in which there are riparian areas in natural or restored condition. Infrastructure and critical facilities are resilient to flood damage by virtue of location, floodproofing, or other techniques. A flood-resilient economy requires that local business premises are not at direct risk from waters and that the economy is sufficiently diversified so that not all the local business is destroyed. Flood-resilient residents, essential to providing a vital workforce, are those that understand and have adopted acceptable levels of risk, are adequately insured, and know what to do when flood threatens.

Identification of the characteristic elements of flood resilience is required to assess and enhance basin and community resilience. One effective way is to parallel these categories used to inventory flood impacts. For instance, impacts are often expressed as number of people evacuated; damaged residential structures; number of

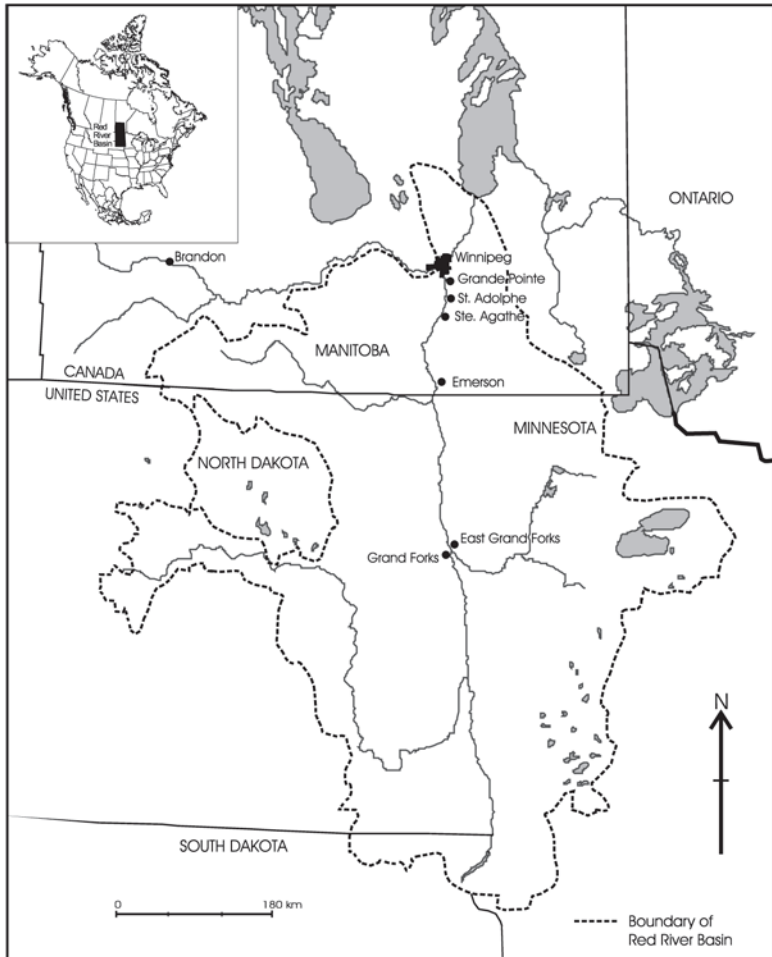


Figure 1: Drainage basin of the Red River.

deaths and injuries; weeks of business interruption or dollar cost of local business; days of disruption to transportation; quantity of soil eroded and acreage of lost habitat. With this approach, achieving a resilience measurement depends on the adoption of one or more of these loss categories, in a temporal framework, as a category of resilience.

Study Area and Methodology

Considering the available time and resources, the study area of this research in the United States was limited to two hardest-hit communities: Grand Forks, North Dakota, and East Grand Forks, Minnesota. In Canada, the study focused on selected areas of Manitoba affected by the flood: the Rural Municipality (RM) of Ritchot (including the communities of St. Agathe and Grand Pointe), and the St. Norbert area within Winnipeg. The RM of Ritchot is located immediately south of Winnipeg, consists of an area of 144 square miles, and has a population size of 5,300. St. Norbert – a suburb of Winnipeg – is located immediately north of Ritchot; more than 9,000 people live here. The La Salle River flows through the southern part of St. Norbert and enters the Red River north of the Floodway that protects the City of Winnipeg. While there are a few homes south of the Floodway, most of St. Norbert is protected by it.

This study is intended to determine the extent to which various streams of assistance for structures did or did not foster various means of either reducing future flood losses to one dimension of human occupancy of the floodplain or enhancing other aspects of resilience in the Red River Basin. In order to attain its goals, it attempted, first, to characterize the recovery assistance programs provided to all pertinent groups including individuals, businesses, and public entities such as cities, RMs, school districts, and counties. This characterization consists of a summary of the types and extent of both financial and technical assistance provided to assist in recovery from the flood, and was based on an extensive literature review of secondary-source materials. The information was supplemented by the semi-structured interviews of the pertinent federal, state/provincial agencies; local governments; and private sector groups.

Review of the various types of assistance and determination of how effective each was in promoting future flood-resilient communities in the Basin were then attempted. Only the flood resilience of building structures was examined. The ultimate question for this category of flood resilience was to determine if the number of at-risk structures was minimized, and to what extent,

as a result of the recovery assistance provided. In order to investigate whether recovery assistance influenced flood resilience by its effects on the structures affected, or threatened, by the 1997 flood, a total of nine criteria were used. If a type of recovery assistance met any one of these criteria, it was considered to have contributed to resilience in the Basin. The nine criteria were structured in the following manner: did the recovery assistance provided for the structure(s): (i) result in the permanent removal of residential or commercial structures from the floodplain; (ii) result in a level of flood protection greater than that existing before the 1997 flood or reduce exposure to future damage; (iii) supplement housing or other building stock outside of the floodplain; (iv) promote insuring structures against flood damage; (v) facilitate recovery from future events; (vi) foster self-sufficiency and responsibility; (vii) operate without significant gaps in delivery or coordination that would have detracted from victim recovery; (viii) provide for mitigation approaches, either with specific policies, funding, or other means; (ix) promote community livelihood, quality of life, or environmental quality?

Recovery Assistance in Manitoba, Canada

During the 1997 flood, residents of both the RM of Ritchot and St. Norbert were evacuated – the former because of the high water on the Red River; the latter because of the threat that the floodwaters might by-pass the Floodway and enter the City of Winnipeg through the La Salle river system. As a result, both of these entities were faced with problems associated with evacuation, re-entry, and recovery. At the peak of the flood in early May, 132 square miles (92 percent of its total area) of the RM of Ritchot were flooded, and by then, more than 4,000 people from over 800 homes were evacuated. The RM processed, after the flood, over 1,100 claims related flood damage; temporary housing (apartments or trailers that were placed on their properties) was needed for about 480 families (Figure 2). After the recession of the floodwater, about 115 homes were condemned. Most were rebuilt to the new standards declared by the Province of Manitoba.

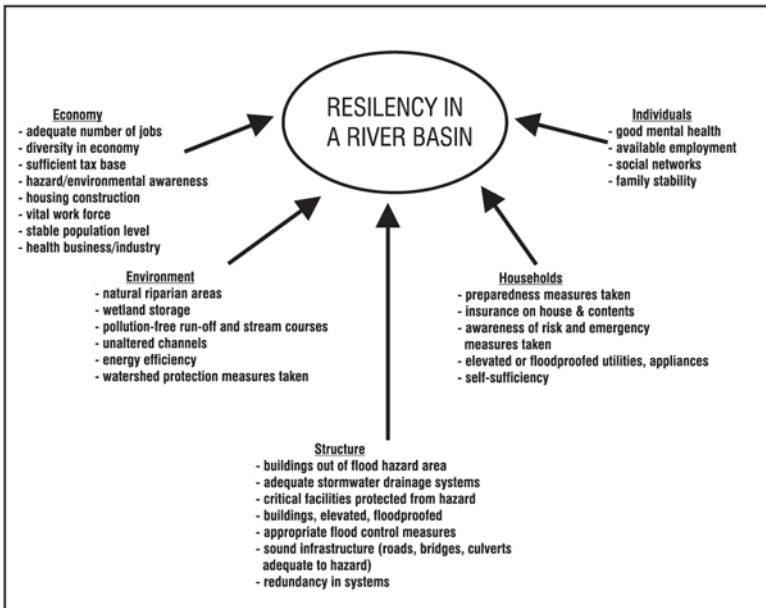


Figure 2: Elements and components of resilience in a river basin (adopted after Myers, M.F. et al., 1999).

Contrary to these perspectives, there was little structural damage in St. Norbert. Thirty-two homes, many of these either south of the Floodway or immediately north of it, were damaged. Some homes had water damage; others had structural problems from flood-induced ground motion. The variation between the extent of damage in St. Norbert and the adjacent RMs is attributable to protection provided by the operation of the Floodway, which, at peak flows during the flood, diverted a flow that exceeded its design capacity.

On April 23, the Provincial government called for a mandatory evacuation, and the RM of Ritchot proceeded to advise its residents of the evacuation. Subsequent to the evacuation, Ste. Agathe and Grande Pointe flooded from unexpected overland flooding. One of the responsibilities of MEMO, as specified in the 1996 Emergency Measures Act, is to deliver the disaster financial assistance (DFA) program. The magnitude of the program was established in federal-provincial agreements that were reached during the early stages of the flood. Table 1 provides a summary of

Table 1: Private claims awards per rural municipality south of Winnipeg (as of February 5, 1999).

Rural Municipality	Amount of Award		% of Total Award \$	Number of Claims	% Total Claims	% Claims Closed
	Total \$	Average \$				
De Salaberry	2,067,026	9,938	2.6	208	3.8	84
Franklin	1,655,213	12,171	2.1	136	2.5	75
Hanover	240,131	11,435	0.3	21	0.4	71
MacDonald	3,305,977	9,209	4.1	359	6.6	78
Montcalm	6,014,929	19,217	7.5	313	5.8	60
Morris	11,294,127	18,014	14.1	627	11.6	65
Morris (Town)	90,555	1,927	0.1	47	0.9	98
Rhineland	1,394,534	8,012	1.7	190	3.5	64
Ritchot	36,627,388	32,791	45.7	1117	20.6	59
Roseau River	1,281,997	8,012	1.6	160	2.9	99
Tache	1,406,201	7,211	1.8	195	3.6	84
Winnipeg	8,780,463	8,191	10.9	1072	19.7	87
Manitoba Total	80,201,922	14,776		5428		75

Source: MEMO, 2000.

the claims made to the MEMO by individuals in the rural municipalities south of Winnipeg as of February 5, 1999. It appears that both the RM of Ritchot and the City of Winnipeg accounted for about 20 percent of the claims. However, Ritchot had the largest average per claim award and over 45 percent of the total dollars awarded. The data confirms that the impact of the flood was greatest in Ritchot. One important feature was that almost two years after the flood, a large number of the residents of Ritchot have not completed their recovery based on the criteria used by the federal and provincial assistance programs.

The concerns with dissatisfaction with the initial delivery system for post-flood assistance, that required residents to deal with compensation claims in Winnipeg, were reported to the Manitoba Emergency Management Organization (MEMO) by the municipal authorities (Rahman and Tait 1997). Subsequently, MEMO opened three regional offices in the valley (at Letellier, Rosenort and St. Adolphe) in August 1997. Residents were provided “one stop shopping” for recovery assistance in this way (Figure 2). This initiative not only enhanced inter-agency communication, but also improved communication between the municipal office and the provincial agencies. Figure 2 in no way represents the situation faced by flood victims in St. Norbert. Once re-entry occurred, the victims received little guidance from the City authority; the latter focussed on its infrastructure issues such as stabilizing the river

bank, and planning and establishing permanent dikes. What emerged during the initial part of the flood recovery process was a case management approach to dealing with flood victims. The strengths of this approach have been recognized by MEMO and it has modified its emergency plan (MEMO 1999). When executed properly, the approach minimizes the irritation of claimants, provides them a continuity that desperately needs to be reestablished in their lives, and provides an opportunity to identify early signs of psychological difficulties. The processes leading to its establishment during the flood of 1997 resulted, in the unintentional opposite effects. Although the post flood institutional assistance consisted of financial, social and structural programs, due to the limited scope of this paper only structural assistance is examined in the remainder of this section.

The recovery phase happened in two stages, with the stages corresponding to the two different financial assistance programs of the provincial and federal governments. In the first stage, rebuilding to pre-flood standards occurred; in the second stage, floodproofing, as defined by the provincial government, occurred. Often the two occurred together, but the homeowners found themselves doing it in stages because of the uncertainty of the financing.

Once the conditions for re-entry had been met, homeowners and communities faced the dual tasks of cleaning up flood debris and damage, and rebuilding their homes and other structures. The City of Winnipeg, MEMO, and the Mennonite Disaster Services engaged in an active program of public education. On August 5, 1997 the Red Cross announced *Operation Homecoming* to help people begin rebuilding. For those whose homes needed major repairs to become habitable (estimated to be 650 at that time), the Red Cross provided a grant of \$6,000.

In initiating its floodproofing program, the provincial government had setup the following minimum criteria for flood damage reduction construction (Water Resources Branch, 1997) with the intention to rebuild and create new building standards:

- House with a basement*: main floor equal to the 1997 level plus 3 feet; fill elevation equal to the 1997 level plus 2 feet.
- House without a basement*: main floor equal to the 1997 level plus 2 feet; fill elevation at the 1997 level plus 1 foot.

- House raised on posts or piles:* main floor equal to the 1997 level plus 5 feet; finished grade at the foundation not lower than 3.5 feet below the 1997 level.

- Ring dikes:* 1997 level plus two feet.

- Attached garages:* floor elevation equal to the 1997 plus 1 foot; fill at the 1997 level.

- Detached garages:* floor may be up to 3 feet below the 1997 level, but the structure should be waterproof up to the 1997 level.

To qualify for floodproofing assistance, both homeowners and rural municipalities had to choose procedures that would hold back water to these levels. The provincial and federal governments have proposed the creation of a co-funded buyout program as a measure of last resort.

The federal and provincial governments had committed \$130 million to a Flood Proofing Program for Manitoba under a 50:50 cost sharing agreement. The program had two components: one for individuals, the other for communities. Assistance for individuals, which included homeowners, farms, and small business, is provided up to a maximum of \$60,000, to raise foundations, construct dikes, or relocate to a protected community. Once the project has been approved, the work must be completed within five years. As an incentive, individuals who commit to an approved floodproofing project will have their 20% share of their disaster financial assistance claim waived (Manitoba Natural Resources 1999). As of January 1999, about 800 homes had been protected under the program with another 300 residences expected to be included over the subsequent years. For a homeowner, floodproofing typically meant employing one of the two procedures: either surround buildings with a ring dike built to the required level, or construct a mound to this height and then place the domicile on top of it. A small number of homeowners chose to relocate to protected communities.

The other component of the program is to assist communities in the construction of protective ring dikes. Potentially more than 20 communities may participate, including Ste. Agathe and Grande Pointe. The cost sharing arrangements for construction costs are proportioned 45% for the federal government, 45% for the provincial

government, and 10% for municipal governments. For the communities in the rural municipality, the only option was to construct dikes or to raise the existing dikes (e.g., St. Adolphe). Responsibility of the incurred costs of construction and subsequent costs of dike maintenance are the focus of discussions between the provincial and the municipal governments.

Recovery Assistance in Grand Forks and East Grand Forks, USA

In April 1997, the cities of Grand Forks, North Dakota, and East Grand Forks, Minnesota, USA, experienced one of the most devastating floods in their history on the heels of a long and severe winter that featured eight blizzards and record-breaking snowfall. Between April 4 and mid-April, 1997, floodwaters continuously rose, and dykes began to fail or overtop, resulting in orders to evacuate both cities. By the time the Red River crested at 54.11 feet on April 21, 1997, 90 percent of Grand Forks' 52,000 residents and virtually all of the 9,000 residents of East Grand Forks had evacuated. Seventy-five percent of Grand Forks homes (approximately 7,800) and all but 27 of the 2,300 homes in East Grand Forks were flooded with polluted waters. Both the cities' downtown business districts were heavily impacted by the floods. As an example, all of the 315 firms in downtown Grand Forks, employing nearly 3,800 workers, were flooded. The worst damage was suffered by 11 commercial buildings that were destroyed by fire during the peak of the flooding. The Corps of Engineers estimated the total flood-related damage in the Grand Forks and East Grand Forks area to be between \$ 1 and \$1.5 billion. In all, it was the worst disaster per capita in the United States.

There were a wide variety of types of assistance provided to the Greater Grand Forks area to help in the recovery efforts. Individuals, businesses, municipalities, and groups of all kind received financial assistance in the form of grants; loans with a variety of generous provisions including no interest, low interest, deferred payments, and potential for forgiveness; claims payments both from general landowners' and business insurance and from flood insurance. Some of the recovery funds came with conditions

attached: either they were to be used only for a specific purpose, or applied only to certain categories of structures, or were only available upon agreement by the recipient to take additional actions, such as agreeing not to sell the building for a certain period, or purchasing flood insurance.

Technical assistance likewise came in many forms and from many sources. At a minimum, federal and state agencies who provided funds typically also provided guidance on the administrative aspects of applying for and utilizing those funds, and on using them to meet the goals for which they were intended. Many federal and state agencies assigned numerous personnel the specific tasks of helping the communities and individuals recover and mitigate future losses. These personnel included specialists in engineering, law, housing, code enforcement, building practices, planning, economic development, and environmental issues, to name a few. Both the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (a 75/25 federal/local cost share) and the U.S. Department of Housing and Urban Development's (HUD) Community Development Block Grant program provided large contracts with outside consultants to bring them into the area to make expert advice available. Few if any conditions were attached to the technical assistance that was provided to the area.

A third type of recovery assistance was provided by the many non-profit entities, charitable organizations, church groups, and others. For the buildings examined during this research project, this assistance mostly took the form of cash, volunteer labor, and donated materials for repair and rebuilding.

In general efforts to avoid duplication of recovery assistance were fairly widespread. No doubt some instances of taking advantage of the situation could be uncovered, but the government agencies, private entities, and nonprofit groups had a systematic means of coordinating their programs both to provide people with the widest range of help available and also to prevent misuse of the opportunities. The voluntary agencies also took steps to avoid, for instance, providing free building materials to a homeowner who already received an insurance claim to cover the damage.

Recovery Assistance in Contributing to Long-Term Flood Resilience

The types of recovery assistance provided in both Canada and the United States after the 1997 floods varied widely in their contribution to overall resilience of the Basin. Efforts and effectiveness to promote resilience through such assistance is summarized in Table 2. Both Canada and the United States have programs and policies to assist localities and individuals during the period of recovery after a major flood. In an ideal world, the recovery period should be a time to focus attention on advancing flood resilience. Influx of additional funds into flooded localities, technical assistance, various types of additional expertise, and political attention all combine to make the post-flood period one in which many things temporarily become possible that would otherwise be out of reach. An excellent opportunity to advance flood resilience, instead of returning to status quo, resides in this post-flood recovery period. Governments and other institutions can improve resilience in the Red River Basin by ensuring that recovery policies and programs foster ability to adapt to change and recover in a way that is sustainable.

Based on the nine criteria stated above, a comparative analysis of recovery assistance and resilience, primarily in terms of structures, between Canada and the United States is attempted. While some structures on the floodplain in Manitoba were removed, it is not possible to attribute this to either the intent or the actions of the recovery assistance programs. The purpose of the Disaster Financial Assistance Arrangements is to restore dwellings to pre-flood conditions; this encourages fixing or rebuilding structures, not removing them. Neither the City of Winnipeg nor the Rural Municipality has regulations that determine whether a structure should be removed and under what conditions this should occur. Even when structures are threatened by river bank instability there appears to be no great urgency to remove it.

The voluntary buyout programs in the Greater Grand Forks, USA, area funded with recovery assistance monies included the actual purchase of the buildings and their lots, demolishing or relocating the houses, and incentives to hundred of homeowners to

Table 2: Efforts to promote resilience: summary and comparisons across the border.

Does the Recovery Policy, Program, or Assistance:	In Canada	In the United States
Result in permanent removal of structures from floodplain?	X	✓
Provide increased protection of structures from flood? (floodproofing, etc.)	✓	✓
Supplement flood-free building stock?	Q✓	✓
Promote insuring structures?	X	Q✓
Facilitate recovery in the future (a) from an equal-to or less than 1997 event, (b) from a greater than 1997 event?	Q✓ QX	✓/X ?
Foster responsibility/self sufficiency (a) at the community level, (b) at the individual level?	Q✓ X	✓/X ✓/X
Operate without significant gaps in delivery or coordination that direct from victims' recovery?	X	✓
Provide specifically for mitigation?	QX	✓
Promote community livelihood?	Q✓	✓
✓ = X = no ? = not clear from study Q✓ = qualified yes QX = qualified no		

sell their flood-prone houses. Although approximately 1,300 residential structures were purchased through the buyout programs, only about 800 of them, or about 8% of all those damaged in the flood, were permanently removed from the 100-year floodplain and adjacent flood-prone areas. The land vacated by the remaining 500 flood-prone houses may or may not be redeveloped. The recovery assistance, overall, for the buyout program contributed to resilience by removing some structures from the flood-prone areas, and by allowing the cities to maintain that area as open space to that future flood damage will be minimized.

Conclusions and Policy Recommendations

The types of recovery assistance provided both in the United States and Canada after the 1997 floods on the Red River of the North varied widely in their contribution to overall resilience of

the Basin. They included financial assistance consisting of grants, loans, cost-sharing, and gifts; technical assistance; and contributions of services, materials, and other needed goods. Although it is not possible after a flood of this magnitude to put things back just the way they were before, it is fair to suggest that the recovery effort was effective in restoring the buildings and other structures in the Basin. This study focussed on structures, but the collateral evidence indicates that economic restoration also was facilitated by the recovery activities. Less success was registered at the household and individual level, particularly in Canada, where problems were identified during the recovery period.

In Canada, recovery assistance focused on restoring structures. The opportunity to take major mitigative action was missed. Removal of structures, buyouts, and the promotion of repairs that would reduce future damage did not occur programmatically. Only the narrowly defined floodproofing program was activated. The term “floodproofing” could be misleading, particularly when relatively low levels of protection are being advocated. To the uninformed, it means that if the standard is met, they should be safe, that is, the risk is zero. Consequently, when the inevitable large flood occurs, they will feel betrayed and be angry, the same emotion expressed during the flood of 1997. The false sense of safety generated by this flood protection program works against the long-term resiliency of the residents.

The 1997 Flood Proofing Program in Manitoba was designed to provide increased levels of flood protection. When the current projects are completed, all the communities in the province will have better flood protection than they had before the 1997 flood, and with due vigilance and diligence during a flood episode, should be able to survive a flood of similar magnitude. In 1997, St. Norbert was protected by the Floodway. Under the conditions envisaged by Booy (1998), the Floodway would be inadequate, and St. Norbert will be inundated. Expanding the capacity of the Floodway is being examined as a possible solution to the scenarios.

The recovery effort restored a high level of functioning to Grand Forks and East Grand Forks. In some ways the communities were improved as a result of recovery assistance they received. In other ways the recovery assistance fell short of fostering long term

resilience. Although hundreds of residences were permanently removed from the 100-year floodplain in Greater Grand Forks, the 100-year and 500-year floodplains are still heavily developed. The expected protected dike (i.e., levee) will certainly relieve flood worries, probably for many years, but there is still potential for damage when river discharges overtop the dike, or if the dike is breached. This is particularly true in light of the local perception that the dike “solves” the flood problem and takes away the risk. This idea, and the fact that the flood hazard area designation on the regulatory maps would be removed from the true 100-year floodplain area after the dike is built, will doubtless act to discourage any backup mitigation. There is little doubt that the flood insurance purchase requirement and the building regulations currently in place for the flood hazard area will be dropped at that time. Further, a large majority of the housing in the area consists of homes built on basements, and these were repaired and refurbished en masse with recovery assistance received. There they sit, at risk and mostly uninsured.

This study finally puts forward the following recommendations that, if enacted, will increase resilience in the Red River Basin. Some of the recommendations are jurisdiction-specific, others apply Basin-wide. Recommendations for Canada include: (i) review and improvement of the delivery of assistance programs are required; (ii) consideration should be given to the establishment of an insurance scheme that would make affordable flood policies available; and (iii) a national mitigation strategy, accompanying broadly defined mitigation program, should be established. Recommendations for the United States are: (i) different ways to increase policy coverage under the National Flood Insurance Program should be considered; and (ii) a more thoroughly integrated approach to mitigation activities should be developed and adopted. Red River Basin-wide recommendations that stemmed from the analyses of this study are: (i) policies and programs that permanently remove structures from floodplains should be promoted; (ii) recovery, rebuilding, and mitigation expertise and information should be shared across the border; (iii) an ongoing monitoring system for resilience levels should be established in the Basin; (iv) the way in which currently defined levels of acceptable flood risk relate to long-term

resilience needs to be examined; (v) non-governmental organizations involved in recovery operations should be encouraged to consider how their practices affect resilience and modify them accordingly.

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Thunderstorm 'disasters' in Saskatchewan

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Abstract: In Canada, Alberta and southern Ontario rank as the places most noted for intense hailstorms and ferocious tornadoes. In less populous areas these thunderstorm hazards receive limited media/public attention. Thus, the severity of the hazard becomes downplayed in part from a lack of awareness. However, studies in Saskatchewan – The Saskatchewan Hail Project (or SHAP) and the Saskatchewan Tornado Project (or STP) – have documented thunderstorm events and suggest that severe thunderstorm events cause great amounts of damage in less populated regions. This paper cites several cases that demonstrate that thunderstorm 'disasters' do frequent Saskatchewan and that these storms can create more debilitating effects on smaller communities than they would on larger urban centers. In addition, implications relating to preparedness and responses to these events are discussed in order to place Saskatchewan's thunderstorm hazard in a broader perspective.

Introduction

Throughout the past decade or so, there has been an apparent increase in the frequency and severity of thunderstorm disasters. Concern regarding this trend is evident in the literature produced by those involved with risk management (eg. Burton, 1994; Howard, 1995; Pang, 1999a) and by those who study the influence of climate change on thunderstorm weather (eg. Brooks, 1999; Etkin, 1995). Consequently, insurers, bureaucrats, academics, and victims have become motivated to work collaboratively towards mitigation efforts. These efforts resulted in a national mitigation

policy for Canada (Pang, 1999b; Insurance Bureau of Canada, 1999).

In Canada, Alberta and southern Ontario are places best known for severe thunderstorms, largely due to a long research history. However, thunderstorm disasters do occur in the less populated regions but on a smaller monetary scale. In addition, a disastrous thunderstorm has a much more debilitating effect on a small community than a same magnitude storm hitting a metropolitan city. Yet the thunderstorm hazard receives less attention and its severity is downplayed outside these two areas in Canada. Studies in Saskatchewan – The Saskatchewan Hail Project (or SHAP) and the Saskatchewan Tornado Project (or STP) – have documented severe thunderstorms and have suggested that they cause great destruction in the less populated regions. This paper cites several cases that demonstrate that thunderstorm ‘disasters’ do strike Saskatchewan. In addition, the preparedness for, the responses to, and the evaluation of these events are discussed to place Saskatchewan’s thunderstorm hazard in a broader perspective.

Data and Procedure

Although vast amounts of thunderstorm literature do not exist in Saskatchewan, several works have documented thunderstorms over the years and have contributed to our understanding of the hazard. A large hailswath database was created during the Saskatchewan Hail Project (SHAP) for 1979-1995 (Paul and McInnis, 1999). For the same period, McInnis (2000) provided a detailed investigation hailswath characteristics. The Saskatchewan Tornado Project (STP) produced a historical tornado archive from 1906-1991 (Paul, 1995). As well, Blair’s (1983) thesis examined the thunderstorm hazard throughout the decade ending in 1980. Earlier, Paul’s (1980) results from the 1973-1977 Saskatchewan Hail Research Project (SHARP) stand as the first intensive excursion into thunderstorm hazard research in the province. In addition, various reports from the Atmospheric Environment Service (AES) have contributed greatly to the documentation of thunderstorm events. Collectively, these works form a partial

archive of severe thunderstorm events and thus substantial information up to 1995 can be easily obtained in the province.

On the other hand, post-1995 thunderstorm information must be collected manually. Crop-hail insurance records, local newspapers, and severe weather reports are data sources previously used to outline geographical characteristics of individual thunderstorms in Saskatchewan and elsewhere (Côté, 1983; Frisby, 1964; Raddatz *et. al.*, 1983). The information for the Osler (04 July 1996) storm was acquired by these means.

Five good examples of thunderstorm disasters in Saskatchewan were picked for discussion in this paper. By no means is this sample exhaustive, as plenty of disastrous storms have hit the province over the years. Most of the information from four of these examples comes from the existing thunderstorm databases. The severity of the Osler storm became known to the author during the data collection phase of SHAP and the information about this storm was collected during the spring of 2000 specifically for this paper.

Results

A composite map of the five storm tracks appears in Figure 1. The lines represent approximate centerlines of the hailswaths as outlined by crop-hail insurance claims. Although the lines approximate hailswath lengths, swath widths, due to variability along the storm path, they are not indicated on the map. Each swath is labeled with its respective date. Major cities and affected towns are labeled. One may note that four of the five storms are located in southern Saskatchewan. This pattern does not suggest that severe thunderstorms are exclusive to southern Saskatchewan; they may affect most areas of the province. From this map, one can visually appreciate the location, direction, and length of each storm.

As complement to the map, Table 1 offers details about the hailswath, wind, rainfall, and damage characteristics for each storm. All of these examples were multi-event storms and thus are very dangerous and are consequential to the insurance industry (Burton, 1998). That is, every storm recorded a combination of thunderstorm

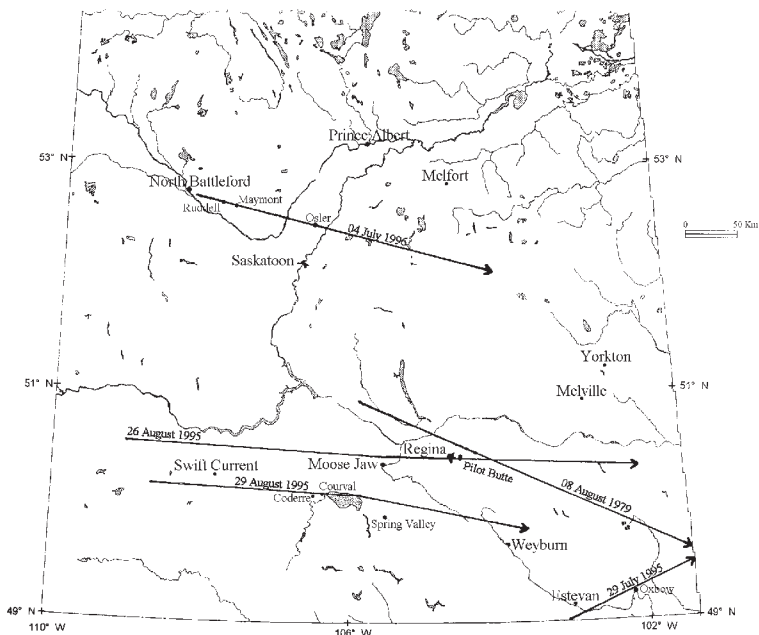


Figure 1: Location of the 5 storm tracks in southern Saskatchewan.

weather including lightning, wind, rain, and hail. Although each storm produced very long hailswaths and damaging hail, wind caused the most havoc. In all cases, moderate and/or heavy rainfall was reported at some point along the path of the storm. Localized flooding resulted from the Pilot Butte and Osler storms. A State of Emergency (SOE) was declared as a result of the Oxbow, Pilot Butte, and Osler storms. The Regina and Oxbow storms tracked from directions other than west. Although two tornadoes were reported in Regina, the storm is not considered a ‘true’ urban disaster because the damages were too localized within the city; in a sense, this storm hit Regina only a glancing blow.

The Five Storms

The following sections describe the dynamics of each storm and explain some of their more outstanding events.

Table 1: Information on five Saskatchewan thunderstorm 'disasters.'

Storm Dates					
	Regina Storm, 08 August 1979	Oxbow Storm, 29 July 1995	Pilot Butte Storm, 26 August 1995	Spring Valley Storm, 29 August 1995	Osler Storm, 04 July 1996
Hailswath: - Length - Width - Direction - Hail stone sizes	L: 347 km (215 mi.) W: mostly 25 km (15 mi.) D: NW (300°)	L: 137 km (85 mi.) W: 10-16 km (6-10 mi.) D: W (250°); more likely SW Small hail at Oxbow	L: 508 km (315 mi.) W: 16-32 km (10-20 mi.) D: W (270°) Golfball and larger, drifts 50 cm deep in Pilot Butte	L: 370 km (230 mi.) W: 16-19 km (10-12 mi.) D: W (280°) >golfball at Coderre	L: 295 km (185 mi.) W: 10-25 km (6-15 mi.) D: W (280°) Loonie size in places Golfball at N. Battleford Softball size at Osler
Wind Events: - Tornadoes: - F-scale - Direction - Dimensions - Other Wind - Microburst or 'Plov' winds	Tornadoes: F1 Regina (18:00) F2 Regina (18:00) D: 280° L: 15 km Wind gusts: up to 120 km/h	'Plov winds': 100-150 km/h microburst hits Oxbow Another storm hits Northgate with a 'plov wind' ~100 km/h at Gull Lake	Tornado: FO N side of Regina? 'Plov wind': >120 km/h at Pilot Butte Wind gusts: 80-100 km/h in Regina ~100 km/h at Gull Lake	Tornadoes: F1 Courval/Coderre area (17:20) F1-F2 30 km S of Moose Jaw (18:10) F2-F3 Spring Valley (18:40) Winds gusts: >100 km/h	2 tornadoes: Funnel clouds sighted at Ruddell (17:00); Maymont (18:00) F2-F3 tornadoes (250-330 km/h) Wind gusts/microburst: 120-150 km/h touchdown E of Saskatoon
Rainfall: - Light - Moderate - Heavy	Moderate to heavy	Heavy rainfall at Oxbow	Flooding: N side of Regina Bible College at Caronport flooded with 20-25 cm rain in 1 hr	Heavy rainfall	43mm in Saskatoon 76mm north of Saskatoon North Battleford flooded
Damages: - Events - Monetary Losses	Regina two areas hit hard: Normanview (NW) & Glencairn (E); roof torn off Exhibition Park Building Minor injuries 5900 claims for about \$4 million (1979) \$10 million (total) approx. \$24 million (2000)	SOE, aid from PDAP; MDS Oxbow water supply tower left leaning Local Inn lost roof Transformer moved 3 minor injuries \$5-10 million	Pilot Butte: SOE declared within 1 hr of event. All trees & buildings suffered damages 9 injuries PDAP for assistance \$16-30 million	Courval 7 grains bins destroyed 3-500 gal. fuel tanks moved S of Moose Jaw 1 farm destroyed Spring Valley 4 farms demolished No injuries \$11-12 million	SOE; MDS; PDAP standby only Wind damages through Maymont, Saskatoon and Osler Widespread power outage (12 towers costing \$1 million) No injuries Saskatoon hit slightly Drive Inn demolished Initial est. > \$8 million

Regina storm, 08 August 1979:

This storm tracked in from the northwest laying down a hailswath nearly 350 km in length and averaging about 25 km in width. It hit Regina late in the afternoon with hail, wind, and heavy rain. Two tornadoes were spotted in the city (18:00), one of which reached a F2 classification (Paul, 1995). In addition to the tornadoes, wind gusts up to 120 km/h were reported in Regina. Normanview in the northwest and Glencairn in the east were the areas of Regina hit hardest by the storm. However, the Exhibition Park Building in the north-central area lost its roof in the storm. Luckily, all reported injuries were minor. Saskatchewan Government Insurance (SGI) estimated that 5900 claims cost close to \$4 million and total damages were estimated at \$10 million (Blair, 1983). This converts to about \$24-25 million in year 2000 dollars.

Oxbow storm, 29 July 1995:

Oxbow was hit very hard by an overnight storm on 29-30 July 1995. The thunderheads came in from the southwest dumping small hailstones and heavy rain in Oxbow. The excessive wind (100-150 km/h) from a microburst was responsible for most of the destruction. A State of Emergency (SOE) was declared and the Mennonite Disaster Service (MDS) and students from Youth Employment Canada oversaw the clean up. Aid from the Provincial Disaster Assistance Program (PDAP) was requested to help with clean up and the non-insurable damages in Oxbow. The total damages from this storm were expected to be around \$10 million.

This storm caused several noteworthy events. First, the gale force winds pushed the massive 690,000 litre water supply tower into a leaning position much like the famous leaning tower of Pisa. Second, a 2000-lb power transformer was moved off its moorings. Last, a local Inn had its roof torn off in the gale. Remarkably, there were only three minor injuries reported!

Pilot Butte, 26 August 1995:

Late on Saturday afternoon 26 August 1995, a massive thunderstorm tracked some 500 km across southern Saskatchewan. It roughly followed the Trans-Canada Highway and lasted more than 10 hours. Heavy rains, unofficially reported at 200-250 mm

in 1 hour (Cripps, 1995), flooded the Briercrest Bible College at Caronport just west of Moose Jaw. At 16:40 the town of Pilot Butte, a small bedroom community a few km east of Regina, was lambasted with rain, hail, and a powerful plow wind (>120 km/h). Golfball and larger hail left drifts 50 cm deep in several places around the town. Much of the damage was typical of wind and hail. For example, tattered siding and shingles on houses, broken windows in buildings, and dented cars were all common in Pilot Butte. The damage was widespread as all the 400 or more dwellings in town experienced damages of some type.

In addition to the typical damage, there was plenty of severe losses caused by the 'plow wind'. The cement factory on the outskirts of town was flattened. The 72-unit trailer park was in total ruin. The Betteridge farmstead, next to the town, was reduced to a pile of rubble. Yet the most heartfelt loss in some ways involved the more than 2400 trees that were marred and subjected to removal.

Within an hour of the event, the mayor declared a State of Emergency (SOE). The town hall was converted into headquarters for the recovery operations, the rink became a temporary hospital, and nine people were treated for injuries. A preliminary estimate suggested that the storm cost at least \$16 million but a more detailed damage assessment set the total close to \$30 million (McInnis, 1998).

Spring Valley, 29 August 1995:

Three days following the destruction in Pilot Butte southern Saskatchewan was visited by another devastating storm. However, this storm tracked several dozen kilometres south of the previous storm. Again, this storm came from the west dumping heavy rain and hailstones from pea to golfball size and larger along its nearly 400 km path. There were at least two tornadoes, possibly three, resulting from the storm. The first, an F1 tornado accompanied by larger than golfball size hail struck the Courval/Coderre area (17:20). In the Courval area, 7 grain bins were destroyed and three 500-gallon fuel tanks were moved a distance. The second, an F1-F2 tornado was spotted 30 km south of Moose Jaw (18:10). It destroyed one farm. The third, an F2-F3 tornado hit the Spring Valley area (18:40) severely damaging four farmsteads in the

process (Cripps, 1997). Due to the closeness of the events in time and space, one may speculate that the third reported tornado might simply be a double spotting of the second tornado. Regardless, there were no injuries reported from the storm and the damages cost \$11-12 million.

Osler storm, 04 July 1996:

Just before 17:00 on 04 July 1996, North Battleford was flooded by heavy rains and hit hard by golfball size hail. This marked the beginning of a storm that laid down a 300 km long hailswath that extended from the North Battleford area eastward to the Watson area. Along the way 2 tornadoes were sighted, one at Ruddell (17:00), the other at Maymont (18:00). At least one of these tornadoes reached F2-F3 status. However, Osler bore the brunt of the storm as it was pounded by ferocious plow winds (120-150 km/h) and hail the size of softballs. Winds were not as strong in Saskatoon. Instead the city experienced heavy rains and power outages. Yet powerful winds crushed the Sundown Drive Inn just east of the city.

In Osler, a State of Emergency (SOE) was declared and the Mennonite Disaster Service (MDS) conducted the majority of the restoration operations. In this case, the Provincial Disaster Assistance Program (PDAP) assumed a standby role only. There were no injuries resulting from this storm. Initial estimates placed storm damages at more than \$8 million.

Discussion

The succeeding sections discuss several topics relating to the preparedness for and responses to these events. As well, comments on the evaluation of disastrous events are presented.

Preparedness for these events:

When atmospheric conditions indicate possible severe weather, the public generally relies on the Atmospheric Environment Service (AES) to forecast dangerous weather. Unfortunately, the five storms exemplify some failings in the official forecast system. In these

cases, the severe weather watches, when issued, were well in advance of the event. However, warnings for these storms were generally poor. For example, a storm warning, with no mention of tornadoes, was issued after the storm hit Regina on 08 August 1979 (Blair, 1983). During the Pilot Butte storm, hail and severe weather warnings were issued for Regina (Last Mountain-Wascana district). However, there was only a 3 minute tornado/wind warning in Regina and no warning was issued specifically for Pilot Butte (Cripps, 1995). Likewise, warnings for the tornadoes during the Spring Valley storm were short; only for the tornado south of Moose Jaw was there sufficient warning time (more than 20 minutes) for people to respond. The situation was similar for the Oxbow and Osler storms; both storms had watches issued, with no subsequent warnings.

Some useful lessons can be learned from these forecast problems. Foremost, an improved delivery method for severe weather warnings by the Atmospheric Environment Service (AES) could be the impetus to increase public preparedness for disastrous events. In addition, weather office closures in recent years exacerbates the forecast problem. Thus, the public, rather than losing faith in the forecaster, must realize that the weather watches may have to be imbued with as much importance as weather warnings until the warning lead times are improved.

Responses to these events:

The most obvious and important response to a disastrous thunderstorm is the initial recovery process. This process involves addressing any problems that require immediate attention including stabilizing downed power lines, caring for injured people, and restoring dwellings to a habitable state. However, these storms can have an enormous impact on the smaller communities. In the Pilot Butte case, the tremendous destruction in the town caught residents off guard and consequently they struggled with their emergency plan to rebuild their town. Thus, several weeks were dedicated to restoring the town. On the other hand, the Mennonite community helped to bring both Oxbow and Osler back to a livable state rather quickly. Thus, the organization and execution of a

plan during a state of emergency is paramount in speeding up the recovery process.

In addition to the five storms described in this paper, the recent thunderstorm flooding of the town of Vanguard early in the summer of 2000 is a good example of the devastation a thunderstorm can create in a small town. The community is still suffering from many problems invoked by the extreme flood. The town's water supply was contaminated for many weeks. In addition, the loss of several businesses and extensive damage to the rail line, most of which will not be rebuilt, leaves many fearful that the result of this storm will be a ghost town.

Evaluation of severe thunderstorm events:

Investigators encounter several problems when assessing thunderstorm damages. Media reports of storm damage are usually preliminary; rarely do follow-up reports provide definitive figures. Because of chronic underestimates, the public awareness of the monetary losses from thunderstorms remains low.

However, detailed damage assessments of Saskatchewan thunderstorms, by McInnis (2000, 1998), reveal several other inherent difficulties one faces when using data from insurance companies. First, one is often uncertain whether all the recorded costs resulted from one storm on one day, due to reporting procedures which may lump several storms together. Second, distinguishing among wind, hail, and rain damage is difficult on site; the insurance records reflect this problem. Thus, the statistics are usually a mixture of wind, hail, and rain losses; seldom, for example, recording only tornado damage. A standardized method of data collection among insurance companies may be useful to those in the business and academic fields interested in monitoring losses from weather associated with thunderstorms.

Conventionally thunderstorm research has predominantly examined the thunderstorm hazards – lightning, rain, wind, and hail – as separate events. However, one would expect a thunderstorm to produce a combination of them. This fact is exemplified by the five storms discussed herein, all of which produced hail, rain, wind, and/or tornadoes. Due to this ability to generate many types of weather, thunderstorms may cause multi-

event disasters. These events are important to the insurance industry because they are extremely destructive and cost large sums of money. Already work has begun in Saskatchewan to investigate relationships among the weather associated with thunderstorms (Paul and McInnis, 2000). Furthermore, the author suggests that the insurance industry consider examining the inter-relationships among thunderstorm hazards.

Saskatchewan has not experienced a thunderstorm 'disaster' in one of its major cities in recent years. The closest recent example of an urban disaster was the Regina storm on 08 August 1979, and, in this case, the storm did not hit with all its potential as only part of the storm track affected the city. However, storm track and settlement patterns in Saskatchewan make it possible that Moose Jaw/Regina or Melville/Yorkton, or North Battleford/Saskatoon could fall victim to the full fury of a single severe thunderstorm. This could easily create losses, in the \$100 million range, comparable to those posted in Alberta (Charlton *et. al.*, 1995). In addition, one could expect large losses (in the order of \$100 million) from a direct hit to either Saskatoon or Regina in light of the enormous losses experienced in the small town of Pilot Butte.

Saskatchewan is generally considered a smaller market and thus receives little attention from those involved in the realm of natural hazards. For example, the Winnipeg Mitigation Workshop on 02 October 1998, aimed at protecting Canadians from natural hazards at a regional level, focussed mostly on the 1997 Winnipeg flood. Saskatchewan's thunderstorm hazard received little attention. Certainly, one may argue that mitigation and research should focus primarily on areas with large populations. But, a bias towards more highly populated regions is unjust, especially since the Saskatchewan hail hazard has been ranked among the worst in North America (Paul, 1982; Paul, 1980). In addition, due to their more fragile economies, smaller markets – especially a poor province like Saskatchewan – are extremely vulnerable to natural hazards and disasters. A small population base results in low capital derived from taxation. Thus, when a town is hit by a storm it can be completely disabled for several days whereas, a similar storm hitting a large centre like Calgary may disable only one neighbourhood. Moreover, the economic situation in Saskatchewan is such that a

single storm disaster could virtually destroy a small town; this point was alluded to during the brief comments about the Vanguard flood. However, the various socioeconomic and cultural impacts of thunderstorms on large markets and small markets, while interesting, are beyond the scope of this paper. Nevertheless, a strong argument can be made that small centres are more easily incapacitated by severe thunderstorms than large urban centres.

Conclusions

In summation, some general observations can be made about the five thunderstorm disasters presented in this paper. First, every storm produced a very long hailswath, with heavy rains. Second, four of the five storms tracked from the west. Third, powerful winds, microbursts, and/or tornadoes were common to the five storms. Fourth, winds caused the most significant damages during these storms. Last, the Regina, Spring Valley, and Osler storms all produced two or more tornadoes. These observations would open many avenues to consider if one were to construct theories about thunderstorms in Saskatchewan. Although this paper has unveiled several possibilities, the sample size is not sufficient to base theory upon. More work is necessary before valid theories can be constructed.

There are several chief points that can be drawn from this paper. First, these five storms exposed some shortcomings in the official forecast system; the weather warnings were generally poor. For the time being, the public may have to give a weather watch as much regard as they would a weather warning. Second, precise monetary assessments of thunderstorm damages are presently an unworkable task. Although detailed attempts produce more realistic figures, they still can only be regarded as best estimates. Third, wind, hail and rain account for most of the thunderstorm damage in Saskatchewan, and thus research is needed to examine the multi-event storms, and those with a vested interest (the insurance industry) are urged to participate fully. Fourth, Saskatchewan has been fortunate that recently an urban centre has not been a directly hit by a major thunderstorm. Last, small centres are less resilient

than large urban centres when hit by a disastrous thunderstorm and thus deserve more attention from those in the discipline of natural hazards.

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On the correlation between strong tornado occurrences and severe hailstorms in Saskatchewan

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Introduction

Tornadoes have once again become a hot topic on the Canadian prairies in the summer of 2000. Pine Lake, Alberta, with its eleven deaths and hundreds of injuries, rekindled the concern that has been smouldering since the Edmonton disaster in 1987 largely faded from the collective memory. The fact that very large hail preceded the Pine Lake tornado by a few minutes was mentioned by several of the survivors. Thus, thunderstorms that produce both tornadoes and damaging hail are dangerous and represent an important aspect of the thunderstorm hazard. In addition to our observations on the Pine Lake storm, we are aware of the concern expressed by the insurance industry and governmental agencies about the increasing monetary losses from severe thunderstorms. Consequently, we decided to investigate the correlation between tornadoes and large, severe hail in Saskatchewan. First, the tornado and hailstorm databases were examined to determine those thunderstorms that produced both tornadoes and hail. These results were compared to information in the Natural Hazards brochure and in the Atlas of Saskatchewan.

Procedure

During the 1990s databases were developed for southern Saskatchewan on tornadoes and hailstorms. Tornadoes for 1906 to 1991 (Paul, 1995) were documented utilizing the 'official' tornado database produced by the Atmospheric Environment Service (or AES), local newspapers, local histories, and other reports. A hailstorm database for 1979 to 1995 (McInnis, 2000; Paul and McInnis, 1999) was created by documenting the geographic trends of major hailswaths utilizing crop-hail insurance claims, local newspapers, and various reports produced by the AES. An initial comparison of the tornado and hailswath databases for 1979-1991 revealed more than 76 tornadoes associated with 62 major hailswaths. Many of the weaker tornadoes ($< F2$) were unconfirmed. All the tornadoes rated as F2 or greater in the database were confirmed. Thus, we selected the strong (F2 or greater) events during 1979-91 from the tornado database and looked at the correlation with the hailstorm database.

Results

Sixteen strong tornadoes (Table 1) are listed for 1979-91 in the Saskatchewan database. Twelve of the 16 were produced by storms known to have generated significant swaths of crop-damaging hail. Of these 12 strong tornadoes, eight were spawned by severe thunderstorms known to have produced hailstones of golfball size or larger. In other cases with strong tornadoes, property damage from hail resulted. This usually indicates that golfball-sized hailstones occurred, and suggests an association of the tornadoes with large hail.

Of the four cases where strong tornadoes were reported but swaths of crop-damaging hail were not, one was associated with reports of some very large hailstones. The three other instances include two from the forest fringe north and east of Prince Albert, where hail was not reported but where storm information and cropland are both limited. These four tornadoes represent cases that may or may not be correlated to hail, using the information in our databases it is unclear.

Table 1: Strong (>F2) tornadoes in Saskatchewan, 1979-91.

ID #	Tornado Data:		Hailswath Data:			W [mi(km)]	Comments
	Storm Date	Tornado Location	F-Scale	Time/Bearing	Direction/Bearing	L [mi(km)]	
	7/27/79	Spruce Home	F2	18:00; 180°	Hailswath Information N/A		Forest Fringe area
15	7/5/79	Killdeer	F2	22:30; 300°	N (340°)	55 (90)	Woodrow; U.S. border T1 R3 W3; signif. Hail damage in Wood Min., Fir Min. & Killdeer; >50 hail; 55 mi in SK; into MT; evening upto 5" rain, houses damaged; F2 Killdeer
28	8/8/79	Regina Torch River	F2	18:00; 200°	NW (300°)	215 (350)	8 mi W of Aylesbury; NB border; T7-T8 line; continues into NB; famous storm; Regina N side hit by tornado; 1700 Chamberlain; 18:00 Regina; 22:00-23:00 into NB; swath very wide; F2 & F1
154	8/11/82	Ponteix	F2	9:00; N/A	N (290°)	55 (90)	Forest Fringe Area
163	8/14/82	Derholm	F2	18:00; 240°	W (250°)	160 (260)	6 mi SW of Ponteix; 5 mi S of Morse; F2 Ponteix tornado 21:00
78/83		Lloydminster	F2	N/A; 225°	Hailswath Information N/A		AB border 3 mi NW of Maclelin; 12 mi W of Macdowall; tornado Ruddled 18:00 continues on to hit P.A. @ 19:00 with lots of rain; no info in AB; F2 Denholm (Ruddled)
190	7/20/83	Pennant	F2	16:35; 240°	SW (240°)	170 (275)	Reports of very large hailstones
295	8/30/85	Okla	F2	19:15; 240°	W (250°)	140 (225)	AB border in T11; 3 mi W of Eyebrow; >= 20 mi in AB; 16:35 F2 Pennant tornado; direction change @ (50° 35' N, 108° 15' W; 250°; 6 mi NW of Kenaston; 8 mi N of Luthow; major storm; F2 Okla tornado
298	6/1/86	Langham	F2	21:10; N/A	NW (300°)	70 (115)	10 mi W of Balgonie; N end of Saskatoon; 22:30 in Saskatoon; hail & lots of wind damage; F2 Langham & F1 Saskatoon
347	6/6/87	Arcola	F2	N/A; N/A	W (280°)	30 (50)	5 mi S of Talmage; Stoughton; F2 Arcola tornado
421	6/30/89	Poundmaker	F2	18:30; 225°	SW (230°)	90 (145)	Sonlac; 6 mi NW of Medstead; F2 Poundmaker tornado; very large hail; \$5.7 million; maybe from Maclelin and Alla.
435	7/28/89	2 in Regina Beach Area	F2 & F2	18:30; N/A	N/A	135 (220)	3 mi E of Chamberlain; Handsworth; ~18:15-22:00; lots of hail; two F2 tornadoes Regina Beach Area; F9 Condit; hits Regina rural areas.
424	7/8/89	Peebles	F3	16:00; 240°	W (270°)	75 (120)	Lajord; 8 mi. N of Kipling; F3 Peebles tornado, etc.; 15:00-17:00
6/11/91		Regina	F2	20:30; N/A	Hailswath Information N/A		Hail reported in vicinity

We suggest therefore that in southern Saskatchewan a correlation exists between strong tornado events and severe thunderstorms with large hail. This correlation is also known to exist in the United States (Agee et al., 1976; Davies-Jones, 1985). Davies-Jones (1985: 204) states that “large hail (golfball size and larger) often falls near the tornado....” Studies in Alberta have documented several cases that suggest a relationship between hail and tornadoes (eg. Charlton *et. al.*, 1998, 1995).

Comparisons for Saskatchewan

We also looked at some other sources of recently published and widely disseminated information on hail and tornadoes in southern Saskatchewan. The 1996 Natural Hazards brochure for Canada published by Emergency Preparedness Canada/Canadian Geographic (EPC/CG) has sections on both phenomena, as does the new *Atlas of Saskatchewan* (Fung, 1999).

The Natural Hazards brochure includes maps of annual number of tornadoes (Figure 1 in this paper highlights the southern Saskatchewan portion of this map) and of annual days with hail (Figure 2 here, again for southern Saskatchewan). These two spatial distribution patterns are somewhat different from one another. The tornado map exhibits a maximum close to Regina which is part of a 100-200 km wide band of high frequency (2.5-4.9 per 10 000 sq km per year) shown extending southeast to northwest across the province of Saskatchewan. Lower numbers are indicated to the southwest of this band and also to its north and east. The hail map does not show this pattern. Instead it displays values of more than 3 days with hail per year in the extreme south-centre and southwest of the province, 1-3 over most of the agricultural belt, and less than 1 in the north and east. Indeed in eastern Saskatchewan this area of low hail frequency is represented as extending as far south as the Kipling-Moosomin district.

The *Atlas of Saskatchewan* also includes maps of annual hail days and tornado numbers, shown in figure 3 and 4 respectively, in the form of representations of three-dimensional surfaces. Again the spatial distributions differ from one another, although they are similar to those of the Natural Hazards brochure. The Atlas places

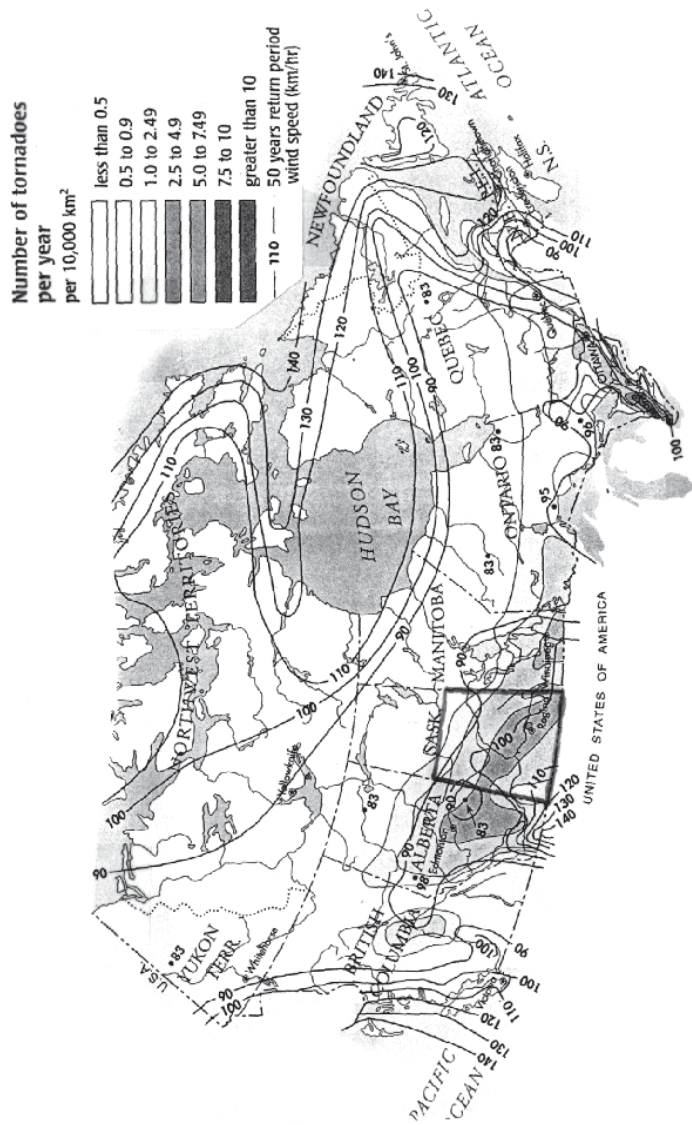


Figure 1: Number of tornadoes per year in Canada (Emergency Preparedness Canada/Canadian Geographic, 1996).

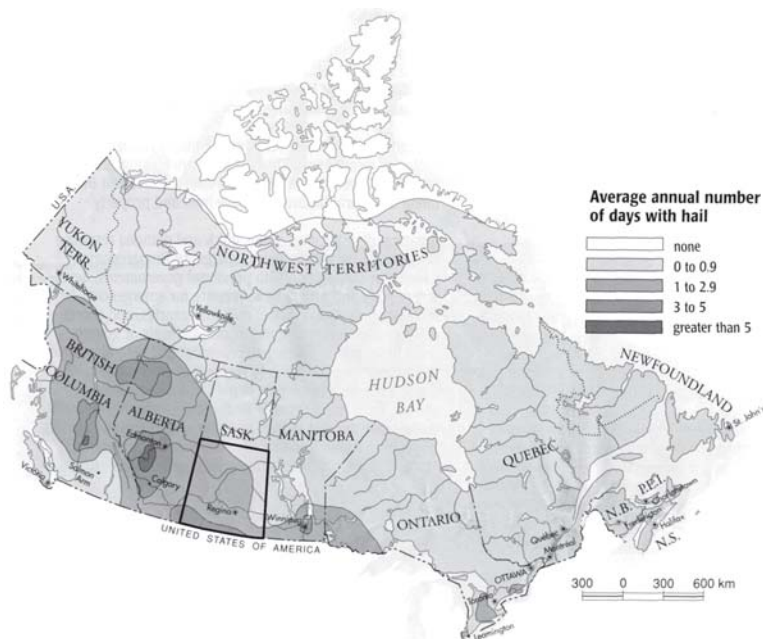


Figure 2: Average annual number of days with hail in Canada (Emergency Preparedness Canada/Canadian Geographic, 1996).

the hail-day maximum at the Alberta border west of Swift Current. This is close to Saskatchewan's southwestern corner, where the Atlas indicates the lowest tornado frequencies in the southern part of the province. Highest values for tornado frequency, exceeding 3 per 10 000 sq km per year, are shown in a southeast to northwest band as in the Natural Hazards brochure.

Discussion

Intuitively we expected to find a correlation between the spatial distribution patterns of hail and tornadoes. As demonstrated earlier, severe hail and tornadoes are correlated in our study. Perhaps "number of days with hail" and "number of days with severe hail" are unrelated in Saskatchewan. This seems unlikely, however, for the two variables are known to be correlated in Alberta, the neighbouring province to the west (Wojtiw, 1975a; 1975b).

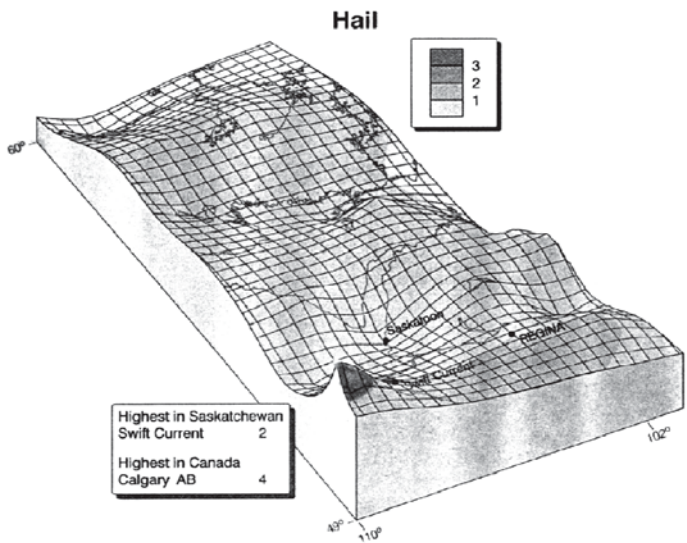


Figure 3: Average annual number of days with hail in Saskatchewan (Fung, 1999).

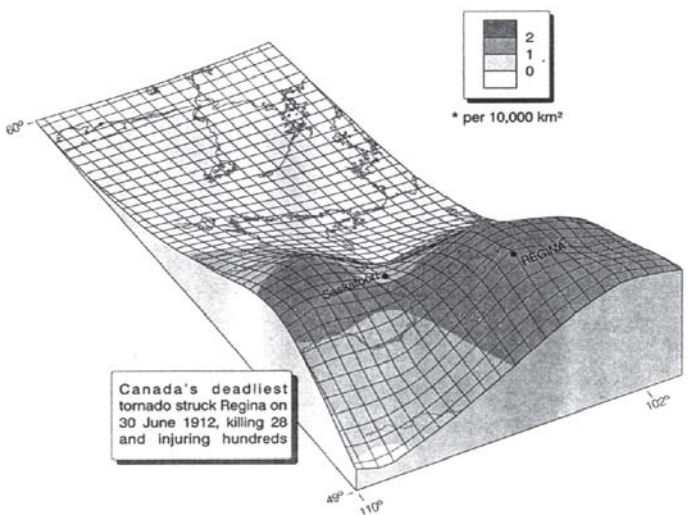


Figure 4: Annual number of days with tornadoes in Saskatchewan (Fung, 1999).

Thus we believe that the geographic distribution pattern of number of tornadoes should approximate that of number of hail days, although the actual frequency of tornadoes is much lower. We are concerned that the Natural Hazards brochure and the Atlas of Saskatchewan, which have been widely disseminated, do not show such a correlation.

Conclusion

Further research examining the relationship between tornadoes and hailstorms in Saskatchewan might be challenging for the thunderstorm seasons beyond 1995. Detailed accounts of tornadoes are not well documented after 1991. Similarly, the hailswath database reports hailstorms up to the 1995 thunderstorm season. Thus, for the 1991-1995 period one can employ the hailswath archive as a basis to chase tornadoes. However, for research beyond 1995 data must be collected. Although this task may be labour intensive the authors suggest more research would be helpful as these storms (those that produce both tornadoes and damaging hail) are capable of causing vast amounts of destruction and even fatalities.

Even though we have some reservations about using annual average point frequencies to develop geographic distributions for a feature as spatially and temporally variable as hail, we believe that the hail-day maps are reasonably realistic (Paul, 1980). Thus the problem most likely lies in the tornado maps. However, the frequency distributions discussed in this paper might be improved with contributions from additional sources of information on hail and tornadoes. We conclude that further work needs to be done to improve our knowledge of tornado hazard in Saskatchewan.

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Say cheese! Or say pies? Building and using ‘place-name’ imagery from the “Rural Heart of England”

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Introduction

In the world of commerce, a major contemporary marketing challenge concerns product differentiation. In this paper we consider product differentiation in the market for food, and in particular the distinction between “mass-produced” and “quality food”. The former are produced in large quantities, often at a variety of locations, and are designed to be marketed at high volume, both nationally and even internationally. The latter are produced in more limited quantities, at a small number of locations, are made from higher quality ingredients, and are designed to be distributed through regional and national niche markets, although such markets are potentially quite large. A quality product may be thus defined as being differentiated in a positive manner by reason of one or more factors from the standard product. It is recognised as such by the consumer, and consequently can command a price premium if effectively marketed (Ilbery and Kneafsey, 2000).

Quality food products can themselves be divided into two groups, with this division also being based upon production techniques, production area, and ingredients used. The first group comprises “true” quality products based upon folk foods and are often hand-made in a traditional manner and from traditional ingredients; they originate from a specific place, the name of which has acquired an “assurance of quality” meaning for consumers, and they carry the name of this place in order to communicate a symbolism to potential customers -- although these customers may

not know where this place is in the “real world”. Marketing is commonly viewed as a weak link in the production of such products, with limitations for the development of the rural areas associated with their production (Jenkins and Parrott, 1997). The second group of quality foods comprises “pretenders”. These foods are marketed using the type of place name association created for “true” quality products, but they are commonly produced away from the “place” with which they claim association, and employ non-traditional methods and non-traditional ingredients. The foods are also aimed at the niche markets of the “true” quality products, rather than mass markets, with the objective of expanding these market niches. These pretenders form a particular challenge to “true” quality foods in an era of economic globalization, when the products of popular culture hold sway, when tastes are constantly changing (or being changed), and when products aimed at a more selective market have to compete with a multitude of opponents. In addition, although the “pretenders” may be produced in greater quantity and at a lower quality, they are often promoted by large corporations with enormous advertising budgets; these corporations can make them appear to be as good as, if not better, than the higher quality, more expensive products, upon which they are based.

The competitive advantage sought by quality foods is based on the observation that popular culture has less spatial variation than does folk culture and consequently cannot easily take advantage of location- or place name association in order to promote sales. Indeed, Ted Relph has gone so far as to suggest that popular culture “produces a profound *placelessness*, a spatial standardization that diminishes cultural variety and demeans the human spirit” (Jordan and Domosh, 1999: 295). However, placelessness has probably been an overstated characteristic of popular culture, and careful marketing of a unique product by the use of place or place name association can still be used to enable a more expensive and better quality “folk” product to be differentiated from its less expensive but more “popular” competitors. Such a strategy can be useful in the economic development of both “lagging” and more developed regions (Bowler 1998). A classic example of this is the selling of “Champagne”, which has managed to bring a cachet, and a premium price to a product that may be otherwise little different from many

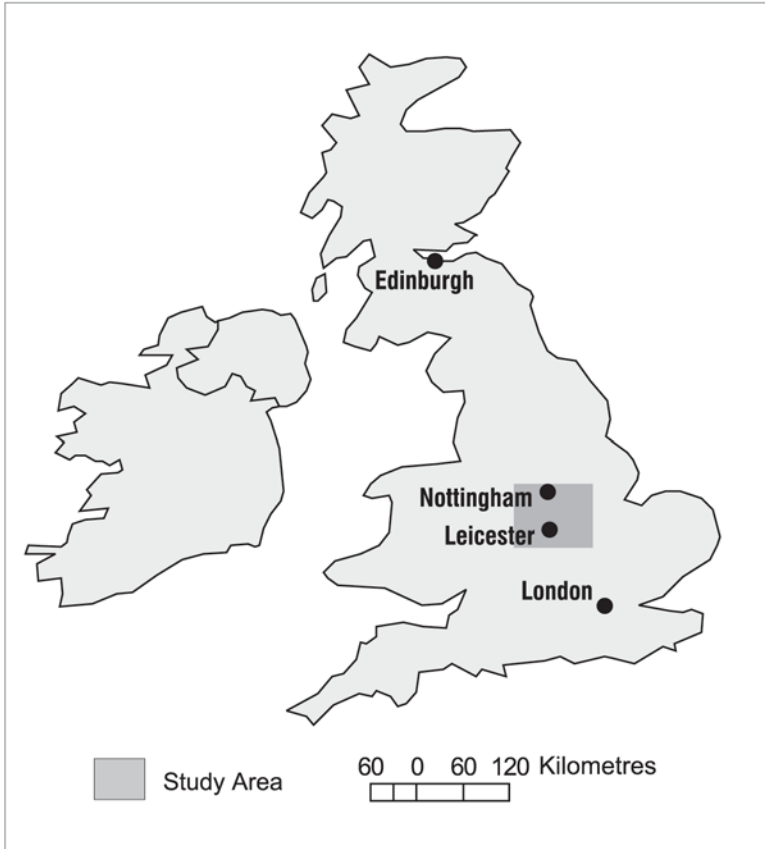


Figure 1: Location of study area.

other sparkling wines. In this case the place name “Champagne” guarantees the quality and character of the product, while conveying to a limited degree a sense of place, in this case France. Of course, such quality products have to be able to ensure that their advantage cannot be taken from them - in other words they need to ensure that their geographical identity cannot be used by mass produced products that simply reproduce the place name of the folk product to boost their own market shares (Moran, 1993a and 1993b).

Fortuitously modern legislation and regulations, including international recognition, make it possible to have such safeguards.

Two British case studies of such product differentiation are discussed in this paper. Both examples represent attempts to improve the marketing of a quality food product by using a regional name to differentiate it from their competitors producing an arguably inferior product. One of these products, namely Blue Stilton Cheese - the “King of English Cheeses”,¹ has already gained legal recognition within the European Union (EU) enabling producers to use place name association in promoting the product. Producers of the second product - the Melton Mowbray Pork Pie - are still trying to take advantage of EU legislation to ensure the ongoing success of the product. Both quality foods are produced in and around the county of Leicestershire, an area which calls itself “the heart of rural England”.

Stilton Cheese

Many localised folk cheeses are produced throughout Britain, based in part on variations in the physical environment within which the raw material (milk) is produced, for example the quality of the pastures grazed by the milk cows. In part localised cheeses are also associated with particular breeds of milk cow. But other factors can be important. For example, Stilton cheese, a blue-veined cream cheese, was probably developed (not invented) in the seventeenth and eighteenth centuries as a result of increased demand in London, and better transportation links to supply that demand (Hickman, 1995). The Great North Road provided the link, and the town of Stilton (then in Huntingdonshire, now in Cambridgeshire) was a traditional stopping point for travellers on this routeway. Although many competing cheeses were produced, locally and elsewhere, what became known as Stilton cheese proved more successful because it was made from top quality ingredients, while the product was standardised in terms of shape, size, and quality quite early in the first decades of the eighteenth century. Consequently, at its height, Stilton became the market-place for retailing huge quantities of cheese, with thousands of cheeses being sold each week. Today Stilton is the dominant blue cheese within Britain (with some 60%

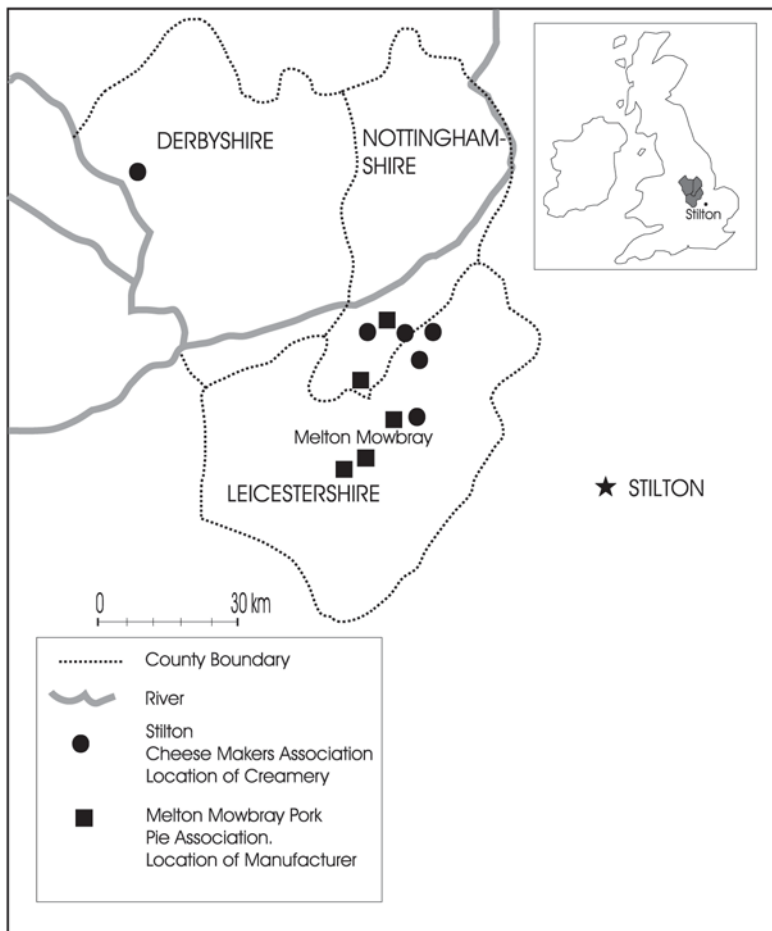


Figure 2: *Members of Associations.*

of the total market); its main competitor is imported Danish Blue (with perhaps 16% of this market).

Interestingly, Stilton cheese was not produced in or around Stilton, but farther north in the vicinity of Melton Mowbray, in present-day Leicestershire, as well as in adjoining counties in the East Midlands (Fig. 2). However, in the days of the coaching trade this market town was not readily accessible, and thus the cheese was transported out of its area of origin to be sold. When the railway

arrived on the scene, Melton Mowbray and its environs became more accessible, coaching towns became unnecessary, and the cheese market at Stilton collapsed almost overnight - although the well-known name was retained for the cheese. At this time, fox-hunting was increasing its position as the “sport” of choice among the upper classes in Britain. Foxes were becoming increasingly common in the Leicestershire area, perhaps as a result of land enclosures which produced an environment that was ideal for these animals, and a method of exterminating this animal was converted into a “sport”. The railways enabled the aristocracy to reach Melton Mowbray (“Melton”) -- which became a fox-hunting mecca from the mid-eighteenth century onwards -- with comparative ease.² They discovered Stilton cheese and, as Britain’s ‘tastemakers’ (Lynes, 1954), they spread its popularity far and wide. Consequently new producers appeared, ranging from individual farmers, to cooperatives, to individual dairy owners.

Although the production of Stilton cheese has been standardised to some extent for nearly three hundred years, it is still handmade and varies in texture and taste from dairy to dairy; as a consequence different cheeses are produced that appeal to different palates, and thus to different markets. It is the only British cheese that has its own certification trademark. Stilton cheese in general has mostly been seen as a specialised and expensive product, that is more commonly eaten by the upper classes, and only consumed by others on particular occasions. This gives Stilton cheese a certain cachet but does limit its appeal and availability to a more widespread consumer base, and thus restricts the overall demand. It is seen, however, as a food for special occasions, and Christmas-time still sees a boom in sales.

Although traditionally a product of the East Midlands, Stilton cheese has been produced elsewhere, and is in competition with other “up-market” blue-veined cream cheeses (such as Danish Blue and Gorgonzola). Consequently, a Stilton Cheese Makers’ Association (SCMA) was set up to help protect producers and promote the cheese. It limited the name to cheese produced by recognised dairies - in the traditional region of production - following traditional recipes and modes of manufacture. Currently Stilton cheese is produced by seven dairies of variable size and

capacity in the designated counties of Leicestershire, Nottinghamshire and Derbyshire. Six of these dairies are members of the Association (Fig. 2). Although production levels are somewhat flexible, they are influenced by the limitations placed on the supply of the product by the terms of recognition of the SCMA. They are also restricted by the relatively limited shelf-life of Stilton cheese which complicates its marketing on a widespread geographical basis.

In order to protect the suppliers of the cheese further from competition, the SCMA successfully applied for a **Protected Designation of Origin (PDO)** (Regulation 2081/92) certification from the Ministry of Agriculture, Fisheries and Food (MAFF), following EU legislation designed to protect the production of traditional products that have “exceptional reputation and renown”. This certification, which is the same as that achieved by the makers of Champagne, restricts production to licensed producers within the geographical area made up by the three counties of Leicestershire, Derbyshire, and Nottinghamshire. This region has not only been defined by tradition, by the human occupation of space and by the creation of a place name association, but this definition has now been given a legalised boundary that can be clearly defended in law against other producers. Indeed the designation has been successfully tested against a producer in Wisconsin. The SCMA is ever-vigilant in preventing potential producers from (mis)using the name of Stilton for their own cheese.

Melton Mowbray Pork Pies

The Melton Mowbray Pork Pie (MMPP) has a similar history to Stilton Cheese, and was developed in the same part of Britain (Hickman, 1997). Pies have been a traditional part of the British diet since at least medieval times, and the ‘raised ‘ or ‘standing’ pie of which the MMPP is an example developed during medieval and Elizabethan times. Originally the pastry “coffin” was just a way of containing and protecting the meat during baking. It was then thrown away, not eaten. Now it is an integral part of the meal. Trevor Hickman, the biographer of the MMPP is convinced that

the “name Melton Mowbray is synonymous with pork pies” (1997: 7). Certainly it is the best known variety within Britain. The MMPP achieved fame for two major reasons. First, the cheesemaking industry in the Melton area produced large amounts of surplus whey when the cheese curds were removed, and whey mixed with bran is an excellent food to feed pigs. Thus a waste product could be converted into a financial asset. Second, the aristocratic hunters who came to “follow the hounds” learned about this convenient food from their servants who carried the pies in their pockets, and soon ordered them served at the ritual hunt breakfasts. As tastemakers, these aristocrats spread the fame of the MMPP to their London clubs (where they also expected them to be served) and elsewhere within Britain. Thus this product of local culture and tradition became marketed -- originally along stagecoach routes -- outside of its first area of production. The commercialisation and promotion of the MMPP is officially dated at 1831.

The Melton Mowbray Pork Pie, like Stilton cheese, became associated with special occasions; indeed Christmas-time remains the most important season for production and consumption of the pie (Hickman, 1997: 96). As with Stilton, the MMPP was similar to some of its competitors, but the method of production and the recipe were quite distinctive, and gave it a uniqueness that became part of its cachet. Again as with Stilton there are variations between the pies depending upon the tastes and the recipe of the producer; but it has been agreed that all pies produced according to certain standards, and within a designated area, are allowed to be called Melton Mowbray Pork Pies. The production standards and recipes supposedly follow traditional patterns while the production area reflects the natural and human boundaries of the market area of Melton Mowbray (about a 25 mile [40 km] radius around the town). However, as the production area is not made up of political units (counties) as is the case with Stilton, but rather reflects one expert’s opinion of where the line should be drawn, some sections of the boundary have been disputed by other producers, and this may cause problems in the future.

In recent years the producers of MMPPs had become concerned about sales of their pies. Sales have suffered for several reasons, but one that could be addressed by the producers in the Melton

Mowbray area related to a belief that the name was being misused.³ It was being applied to pork pies that were produced outside of the traditional region, and to machine-made pies which did not follow the traditional recipe or method of production. Such changes had been made by large-scale producers either because they simplify the production process itself, or because they enabled it to be marketed on a much more widespread basis. The true Melton Mowbray Pork Pie, even more than Stilton cheese, has a very limited shelf life -- of only a few days if its best condition is to be maintained. The possibility of protecting the name legally was investigated, but current law was believed to offer little protection.⁴ Consequently the Melton Mowbray Pork Pie Association was (MMPPA) was set up in 1998, and in 1999 it applied to register the MMPP as a product with **Protected Geographical Indication (PGI)** under EU Regulation 2081/92. PGI is a designation open to products which are produced or processed or prepared within a specific geographical area, and with a reputation, features, or qualities attributable to that area. It differs from the **PDO** designation in that the ingredients for the MMPP (flour, pork, spices, etc.) most often come from outside the designated area (although only British pork is used). To gain a **PGI** certification, the product itself has to be produced within the designated area. As with Stilton cheese, however, and despite the “place” implications of the **PGI**, few consumers outside of the East Midlands know where Melton Mowbray is, and fewer still know where the MMPPs are produced. But once again this lack of knowledge has not detracted from the symbolism associated with the MMPP.

There are currently five members of the Melton Mowbray Pork Pie Association who produce within the designated area, following traditional recipes and procedures (Fig. 2). More so than with Stilton cheese, the producers vary considerably in size and productivity, ranging from individual butchers shops to one large-scale concern which dominates overall production. All producers of MMPPs currently recognised as legitimate by the MMPPA are members of the Association. There are other producers, outside of this area, who make a similar pie, following traditional recipes and procedures, who do not use the MMPP name, and at least one who does. This producer bought out another one who was located within

the designated area, but then moved his production outside of the official boundary. His exclusion is currently a subject of debate within the MMPPA. There are other producers who make a so-called (i.e. “pretender”) MMPP using different recipes and procedures, and who produce their pies elsewhere. Some of these are well known brands within Britain -- such as Marks and Spencer. It is principally these producers who are targeted by the MMPPA, and who would be most affected if the **PGI** designation was to be granted. Other pork pies are not seen as competitors to the same extent, for the MMPP is seen as an “up market” product, directed at a niche market. As with Stilton cheese, a distinct place name association has been generated by Melton Mowbray Pork Pies over the past two hundred years. Although the application to the EU for PGI certification is incomplete, the MMPPA hopes that the use of the place name association will enable its members to resist competition from “pretenders” intent on taking advantage of the traditional name to market an arguably inferior product.

Conclusion

In recent years the British food industry has begun to market folk products more widely, based on a production line basis, and sold nationally by chain stores throughout Britain and the rest of the world. However, this new system of production has necessitated the adulteration of the folk recipes, partly to simplify the production process, and partly to enable the food product to be marketed on a wider geographical basis while retaining its freshness. Fortunately for products such as Stilton cheese and Melton Mowbray Pork Pies, legislation now exists which can protect a “place named” product as a kind of intellectual property of the area of origin (Moran, 1993a). Controls over the production of foods from particular named locations can be more or less stringent depending upon the methods of production and the ingredients used. However, quality characteristics instilled in the image of a traditional product over, in some cases, many centuries can be used to protect the production of traditional foods, and restrict this production to the area of origin of the food. In addition, the uniqueness of the product can be used

as a marketing tool in order to guarantee the success of each enterprise. At the same time these actions widen the opportunities open to individuals, and enable them to promote local communities beyond the designated regions. Thus such actions can be seen as one means of giving a unique expression to one facet of popular culture, while retaining the localism and individuality inherent in folk culture, and thereby gaining the best of both worlds.

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End Notes

¹.Both Blue Stilton and White Stilton are produced. The story of each is quite similar. Only Blue Stilton is referred to in this discussion as it is the variety that is best known, and with which the name “Stilton” is most closely associated.

².The Syston to Peterborough railway (via Melton Mowbray) opened in 1847. Its terminus was in London.

³.Other challenges included a move away from meat consumption generally, and a well-founded belief that a MMPP, high (for instance) in fat did not qualify as a health food! Sales are certainly stronger for males than females for this reason.

⁴.An attempt had been made in the 1880s to copyright the name “Melton Mowbray Pork Pie”. This failed, however, when the manufacturers were not allowed to copyright the name of the town (Hickman, 1997:18). Another company was allowed to register the name Belvoir Pork Pie, named after the Vale of Belvoir, in the late 1800s (Hickman,104).

The lure of food: food as an attraction in destination marketing

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Abstract: In an era when economies are busily converting from the production of physical goods to the provision of services, tourism has frequently been promoted as a means of providing jobs and an inflow of revenues to communities. Places, both large and small, are promoting themselves as offering something different, yet trying to appeal to a broad spectrum of the tourism market. Not only is food essential to everyone's survival, it can be one of the more important attractions sought out by tourists in their craving for new and unforgettable experiences. Its contribution to the tourism economy is of considerable importance, and because of its intensive use of labour, it also contributes very heavily to the tourism employment sector. As a result, food is becoming increasingly important as an ingredient in marketing destinations to tourists. This paper examines some aspects of this phenomenon in Manitoba's tourism industry.

Introduction

Food is one of the most important attractions sought out by tourists in their craving for new and unforgettable experiences. However, food is a very much overlooked and unsung component of the tourism literature. Typically, food is lumped together with accommodation in compilations of tourism statistics, partly perhaps because of its being almost always part of another attraction, and also because of its being a necessary element of survival no matter where a person is located. Dining out is one of the most popular activities undertaken by Canadian tourists and the practice is rapidly growing (Coopers and Lybrand 1996 pp.14-15; Wilton 1997 p.28). Furthermore, the contribution of food to the tourism economy is of

very considerable importance, and because of their intensive use of labour, food preparation and services also contribute very heavily to the tourism employment sector. In Canada, nearly a million people work in the food service industry, and according to Statistics Canada, 21 per cent of a tourist's budget is spent on food and drink (Snapshots 1998 p.144). Manitoba statistics show an even higher percentage of the tourist dollar being spent in this way, with more than 28 per cent being spent on food and drink by intra-provincial travelers (Statistics Canada 1997). The promotion of regional cuisine is therefore an effective way of supporting local economies and agricultural production. This paper provides an overview of the relevance of food to Manitoba's tourism industry.

Manitoba's food attractions command scant attention from international food guides such as the Michelin Guide, nor do they receive much notice from Canadian productions featuring restaurant fare. As examples, Air Canada's in-flight magazine, *En Route* typically contains only a handful of entries for Manitoba, and a recent feature article, "Haute Canuck," in *Maclean's* magazine, barely mentions Manitoba's contribution to Canada's haute cuisine (Chidley 1998). But as the statistics indicate, revenues from the sale of food are a very large component of the total amount of tourism product sold. Fine dining is important in Manitoba, and as a recent survey shows, more than 50 per cent of travelers to Manitoba were motivated in part by the desire to try different foods (Travel Manitoba 1995). Manitoba restaurants boast a number of top-ranked chefs who have developed a distinctive "Manitoba Regional Cuisine," carrying off gold medals from the World Culinary Olympics and other international competitions (Tourism Winnipeg 1999a p.28; Tourism Winnipeg 1999b p.2). The Manitoba Restaurant Association is more than fifty years old, has more than 500 members, and takes an active role in promoting the province's food services industry. The association sponsors an annual trade fair, the Food and Beverage Expo, while some thirty of its more up-market restaurants are featured at the Manitoba Food Fair, one of the more popular of Winnipeg's annual visitor attractions (Manitoba Restaurant Association 2000).

But as the statistics also show, most food expenditures are for more mundane dietary needs. As with world tourism, it is the largely

unsung domestic tourist who consumes the bulk of the food and contributes most to the food tourism total. Thus, at the lower end of the hierarchy of culinary cuisine, there is a wealth of foods consumed by the local tourist and only to a lesser extent by the traveler from more distant parts, even though the latter may be critical to the success of the food outlets available.

Winnipeg Festivals

Nowhere is this more readily visible than at Folklorama, Manitoba's largest festival and most important annual tourist attraction. Begun in 1970 in celebration of Manitoba's centennial, Folklorama originally took place over a single weekend and was a totally volunteer operation comprising a mere handful of cultural groups. However, it became an instant success with the local population and is now a firmly established event in Winnipeg's calendar, normally spanning a two week period in mid-summer and consisting of around forty "pavilions" scattered through the city, each representing one of Winnipeg's diverse cultural groups. The pavilions present displays, crafts, dances and, most important, a sampling of distinctive foods which, along with drinks, generate substantial revenues for the festival and its participant groups. In 1998, the festival attracted more than 425,000 visits to its pavilions, serving up 600,000 meals and 1,000,000 beverages (Folklorama 2000). According to Tourism Winnipeg's research, Folklorama in 1996 contributed \$7,200,000 to Manitoba's GDP, more than twice as much as any other annually recurring event (Grant Meder 2000). With this growth, the character of the event has changed significantly.

Although volunteers and the ethnocultural mosaic remain at the heart of the operation, there are now strong corporate and commercial interests involved. Folklorama is presently organized by the Folk Arts Council of Winnipeg, a non-profit corporation with a Board of Directors and a dozen permanent staff including four marketing personnel. Their efforts are supplemented by the activities of Travel Manitoba and Tourism Winnipeg, both of which feature Folklorama in their promotional work. More than 20,000 people still volunteer their time to the Festival, frequently giving

up part of their holidays to the event. Others spend weeks and months in advance preparations. However, the large scale of current operations has meant that the bigger pavilions now contract out their food preparation to professional caterers and have to rent space for their activities. In 1998, only six pavilions failed to earn a profit, while twenty made over \$6,000 (Folk Arts Council of Winnipeg 1998 p.14). There are guidelines in place which seek to prevent profiteering, keep prices in line, and ensure that the spirit of Folklorama is retained. However, participating organizations do use the event as a money-making venture to support their other activities and the event has now become very much a commercial operation (Sam Loschiavo 1999). According to some, new volunteers are becoming more difficult to recruit and there are dark suggestions that “money is being made on the backs of the babas,” the dedicated, but aging ladies who still spend countless hours of their time preparing foodstuffs for the occasion.

The Ukrainian Lviv Pavilion, one of the mid-sized pavilions operating out of the Ukrainian Labour Temple, still relies almost entirely on volunteer help. Its culinary crew meets in the spring to review past year’s orders and begins purchasing bulk foods in May. Food preparation starts in early June, over a month before the Festival opens. A fifteen person team spends a total of some 260 hours making, packaging and freezing more than 8000 pyrohi, a potato and cheese filled dumpling; another 150 hours is spent producing about 4000 holuptsi, or cabbage rolls; 60 hours making khrustyky, a light pastry dessert, along with the labour required to shred 100 lbs. of beets and 500 lbs. of cabbage for borscht and sauerkraut. These staple items are supported by freshly produced nalysnyky (cheese filled crepes), kapusta (baked sauerkraut, onions and cabbage), and kasha (buckwheat). Purchased headcheese, garlic sausage, bread, pastries and beverages round out the meal. Revenues from Folklorama net the Lviv Pavilion around \$12,000 with about 60 per cent of that coming from food and most of the remainder from entry passes (Stearns 2000). Clearly, the food component is central to the operation.

Tourists make a considerable contribution to the revenues. Many former Winnipeggers use Folklorama as an opportunity to visit with friends and relatives. Even if their visit is coincidental in

time, they are inevitably invited to take in some of the activities. There are also especial, major efforts to attract tourists to the event. The Folk Arts Council attends trade shows and arranges familiarisation (FAM) tours for tour operators and travel agents across the USA and Canada. Their efforts have led to Folklorama being recognized as an “Internationally Known Super Event” and the “Number One Event” in Canada by the American Bus Association. The Festival organizers claim that “thirty per cent of attendees are from outside of Winnipeg, some travelling from as far as Australia, Korea and Paraguay.” (Folklorama 2000). Between 70-110 bus loads of tourists take in the festival, most of them from the United States. The tour buses stay in Winnipeg between one and three days, are supplied with local guides, and transported between pre-designated pavilions. Typically, the visitors are served an appetizer at the first site, a meal and a show at the principal stop, and possibly a dessert at their third destination (Loschiavo 1999). Although food is only one component of the total Folklorama package, it is an essential ingredient, not only as an attraction, but as a supplementary revenue producer for the participant groups.

Winnipeg’s two other major festivals operate along similar lines to Folklorama. However, there is less emphasis on food. The Festival du Voyageur, a ten-day event held in the French quarter of St. Boniface, is Western Canada’s largest annual winter festival and one of the three biggest Canadian winter festivals. As with Folklorama, Festival du Voyageur consists of a number of pavilions scattered through the community that are operated by sundry groups which offer entertainment and food services to their visitors. These highlight their French-Canadian, Metis, and fur-trading heritage, featuring favourites such as tortiere, pea soup, pork and beans, bannock and the like. Beaver tails, maple syrup and poutine have been more recent additions to the selections. The third largest festival, Winnipeg’s own week-long version of “Oktoberfest,” is billed as the world’s third largest, and is essentially an excuse for swilling beer. However, it also features an interesting blend of delicacies such as “Oktoberfest Sausage on a Bun with 4 Perogies,” “Knackwurst Pizza” and sundry other innovative, but hardly “authentic” dishes, which contribute to the event’s revenues.

The previously mentioned "Taste of Manitoba" festival is held on the July long weekend, also in Winnipeg. The more than thirty of "Manitoba's great restaurants," attract in excess of 50,000 visitors (Manitoba Restaurant Association 2000). Not only is the festival a major attraction in its own right, it also lures people to the participating restaurants. For example, because of its participation in the food fair, the Roblin Inn succeeded in bringing the 1991 Canadian Association of Geographers' Prairie Division conference to Russell, in rural Manitoba.

Another interesting development in Winnipeg has been the generation of street festivals with a neighbourhood focus that feature the distinctive foods of the district and which attract the so-called intraurban tourist. These are people who seldom, if ever, visit "foreign" parts of their city unless attracted to do so by some tourism-like promotion. Two such festivals come to mind. The first, the Corydon Avenue "Days of Wine and Roses" street festival was sponsored by the local Italian community and the speciality Italian restaurants along the Corydon commercial strip. What began as a local event promoting Italian culture and foods became so overwhelmingly popular, especially with the addition of huge bars pushing beer sales, that the whole scheme was eventually abandoned. As with some other tourist events, the festival's success in attracting massive numbers of visitors brought about its own destruction (Spina 1998). Another street festival has recently been initiated in the inner city's Wolseley district. This residential enclave, known as Winnipeg's "granola/muesli belt," has been experiencing a degree of gentrification, with its festival featuring 'veggie' burgers and carrot sticks, as well as the more conventional hamburgers and wieners.

An even less conventional festival featuring food, although not in the conventional sense, is the Winnipeg "Banana Festival." Not included in the mainstream tourism publicity and promotions of Travel Manitoba and Tourism Winnipeg, the Banana Festival is an annual week-long event in March sponsored by "Teasers," Winnipeg's principal burlesque house located in St Boniface. This event, dreamed up a decade ago by the proprietor, Sabino, began as a publicity stunt wherein patrons/exotic dancers participated in a simple banana eating contest. Now, nearly a decade after its

inception, the banana eating contest has evolved into its current format. The showroom, decked out in a variety of bananas, inflated and plastic, some of them up to six feet in length, form a backdrop suspended around the room. Bunches of real bananas hang from the ceiling around the stage, ready at hand to the exotic dancers. These are plucked by the dancers and incorporated into their dances. Dancers also feast on the bananas with gusto with all the lascivious gestures and mannerisms reminiscent of the classic feast scene in the movie "Tom Jones," urged on by the heavy beat and reverberation of the music, the deafening encouragement of the DJ, and the shouts and hooting of the patrons. The Banana Festival is advertised through mid-western cable TV Channels 8 and 4. Channel 8's primary market is Winnipeg, but it is also readily available to American audiences in Grand Forks, Fargo and the like in North Dakota, Minnesota. Channel 4 WDAZ, based in Fargo/Grand Forks, serves a similar region and also penetrates further south into the cities of Minneapolis and St. Paul, reaching a potential total audience of several million people.

The American pornographic magazine Cheri which dubs itself "the world's most explicit sex mag!" frequently features a multi-paged spread of Teasers' strippers, and in doing so, also promotes them as a north-of-the border tourist attraction. To quote from a recent issue:

Winnipeg, Manitoba, has been called "the dullest city in Canada, and therefore the world." Of course that was before CHERI Magazine showed up. We went to this medium-sized city in Canada's "wheat belt" to look for the finest flesh that the sleeping giant to the north has to offer.... They Searched - and they found.... Maybe Winnipeg ain't so boring after all! Any town with a hopping strip joint like Teasers within its borders can't all be bad... And for anyone who thinks that Canadians are uptight or (pardon the pun) provincial, consider that even a farm town like Winnipeg permits bottomless dancing in establishments with liquor licenses - at a time when some clubs in New York can't even show topless. Kind of makes us here at CHERI want to apply for Canadian passports (Anonymous 1999).

Cheri's reporters showed up at Teasers' first Banana Festival in 1991 and have continued to promote the burlesque palace since then (Anonymous 1991). Sabino, the former proprietor, claims that the Festival attracts visitors from as far away as Toronto, Vancouver, and other major Canadian cities, as well as from the United States. He estimates that the Festival attracts around sixty per cent of its audience from south of the border. Furthermore, Teasers is locally owned and most of the strippers are from Winnipeg, resulting in there being very little leakage from the community (Sabino 1999).

Rural Events

Food tourism is very important to the rural areas of Manitoba where there are literally dozens of festivals featuring food as their principal attraction. Virtually every Manitoba community of any size continues to put on its annual agricultural fair, an event dating back to the early days of settlement. Even more widespread and frequent are the harvest, fall/fowl suppers that take place around the province. These are concentrated in the autumn months, complementing the summer fairs and less frequent winter festivals and spring celebrations. The rural fairs and suppers feature local food specialities that include indigenous produce such as berries and fish, foods representative of ethnic concentrations of population, and agricultural produce special to the different regions. These differences are particularly noticeable in the south central part of the province with its higher population, rich chernozem soils, warmer climate and longer growing season that have encouraged the production of a wide range of speciality crops.

Among the larger rural summer festivals featuring food is the Morden 'Corn and Apple Festival' celebrated at the end of August. Formerly a two day event, it now extends over three days and attracts 40,000 to 50,000 visitors each year. Although the festival boasts a wide variety of attractions that include a midway, live stage entertainment, parade and a hundred or more booths and street displays, important lures are the free hot buttered corn on the cob and apple cider drink 'giveaways.' During the 1999 festival weekend some 32,000 corn cobs and 34,000 ciders were dispensed to the crowds. The Morden festival attracts numerous day visitors,

including a couple of bus loads from Winnipeg, just over 100 kilometres away. However, many visitors stay over the weekend at the 100 unit local beach permanent campgrounds or the 135 unit temporary campground in the school yard (Fehr, 2000; Batters, 2000).

At nearby Altona, the town's "Sunflower Festival" emphasises the importance of sunflower and vegetable oil production to the local farm economy. Altona's "Rhineland Agricultural Fair Day" dates back at least to the 1930s and the Sunflower Festival, inaugurated in 1965, originally ran independently of the older fair (Town of Altona, 1999). The two operations have now been amalgamated and the two-day festival is celebrated at the beginning of August. Whereas the Fair focused on the more traditional agriculturally based activities such as farm implement displays, livestock and produce shows, the July Festival features a more popular range of attractions and entertainments that include motocross races and a demolition derby. Distinctive food attractions have Mennonite origins, including "rollkuchen," a pastry rolled out and deep fat fried, as well as sunflower ice cream. However, the Festival's organisers have determined that they would not boost their budget to compete with other localities for outside visitors, but should instead concentrate on providing the local community with some summer fun. Nevertheless, they are still concerned to attract tourists and are promoting the Festival more widely (Epp, 2000). In contrast, Winkler, like Morden, has built its "Harvest Festival and Exhibition" into a major three day attraction with a wide variety of entertainments and bus tours laid on from Winnipeg. The event still includes the Municipality of Stanley's traditional "Agricultural Society Exhibits and Horse Show," but it also incorporates a parade, rodeo, fireworks, midway, Low German Theatre Festival, Victory Ball, Queen Pageant, Hutterite Colony Choir, Ukrainian Dance Ensemble, Skate Board Demonstration Teams, square dancing, Heritage Fashion Show, Dog Team Performances, Classic Car Show, and "exciting live entertainment all weekend long." Other highlights are free pancake breakfasts and a free barbeque with "lots of Great Mennonite Food." (Town of Winkler, 2000). Clearly, these events, although still featuring

agricultural produce, rely on other inducements to attract their visitors.

Further north, in the cooler, mixed farming area near Riding Mountain, the town of Russell celebrates its “Beef and Barley Festival and Rodeo” in October. Further east, at Ste. Rose du Lac, the self-styled “Cattle Capital of Manitoba,” puts on its “Hoof and Holler Days” in the same month. These events feature “western style” foods such as pancake breakfasts and a beef barbeque. Fall events, and the prospect of Halloween, feature the pumpkin. An example is Teulon’s “Pumpkin Fest” with its competition for the “largest pumpkin, most perfect, most unusual and best carved pumpkin,” along with its farmers’ market and food booths. And then there’s Roland’s “Pumpkin Fair” featuring the giant pumpkin weigh-off and “pumpkin desserts in the Pumpkin Patch Tea Room.” (Travel Manitoba 1999a).

Other small towns base their festivals on natural resources, for example, the Garland “Blueberry Festival,” the St. Pierre Jolys’ “La Cabane a Sucre,” and Selkirk’s “Manitoba Catfish Festival.” These events have evolved as the different communities have sought to re-position themselves and lend uniqueness to their otherwise conventional summer festival fare. And then there are the more people-oriented celebrations: Brandon has its “Children’s Country Picnic,” there’s the “Mother’s Day Tea” at Piney, and the “Father’s Day Smorg” at Steep Rock. There’s even recognition given to expatriate Maritimers with the “Manitoba Maritimers Lobsterfest Picnic” at Bird’s Hill.

These events, as with most other Manitoba attractions, are largely directed at the local market. However, they have become essential ingredients in the drive to flesh out the menu of Manitoba’s tourism offerings directed at Canadian and international guests. For Manitoba, one of the most effective ways of increasing tourism revenues is to persuade visitors to stay a while longer than they are otherwise prone to do. The promotion of food based fairs and festivals is part of this strategy. Similarly, small town Manitoba hopes to cash in on the wider market and to encourage visiting friends and relatives to return home for perhaps an overnight stay.

The Fall Supper

Along similar lines, the fall, or fowl supper, is a Manitoban institution that appears to be undergoing a renewal despite the continuing depopulation of the countryside. Literally hundreds of these events occur each year, sponsored by church and community groups as a means of raising funds for a variety of purposes. Most suppers attract only a local clientele consisting of church members and neighbours, but many have risen in importance to attract ‘out-of-towners’ in large numbers. They are an important incentive to former residents and relatives of rural townspeople and surrounding countryside to return for a visit to their roots. As Lucille Chappellez says of the St. Claude fowl supper: “People come from far and wide to attend this event which doubles as a reunion/gathering of old friends and family. People who have moved away from St. Claude will often return on this occasion to visit with their loved ones” (Chappellez 1999). However, the fall supper is also an increasingly important mechanism for attracting the excursionist or paratourist, particularly Winnipeggers out for a drive into the country.

The fall supper has its origins far back in time. They have evolved from being a purely local and primarily religious celebration of the harvest to that of a major fund-raising event. Nowadays, organised church support groups or secular institutions such as the chamber of commerce sponsor the fall supper. There are carefully worked out marketing plans designed, not just to notify, but to attract visitors from far afield, increasingly from metropolitan Winnipeg, the principal population centre. The season starts in September and runs through virtually to the end of the year when “Christmas Suppers” take over.

The suppers are widely and intensively advertised locally using district newspapers, church announcements, posters and the like. However, to a growing degree, Winnipeg’s principal newspapers and radio stations are asked to publicise the events. Last fall, the number of requests to the Canadian Broadcasting Corporation’s Winnipeg regional network for inclusion of fall supper dates in its public service announcements reached such proportions that they could no longer be accommodated “on air.” Fall suppers are also

now being listed by Travel Manitoba in its Events Guide. This season's Guide listed more than thirty suppers in its columns, more than doubling the previous year's entries (Travel Manitoba 1999b; Travel Manitoba 2000). Countless more suppers rely on solely on local advertising and word-of-mouth.

The popularity of the fall supper is quite immense, with the larger events drawing more than a 1000 people to share in the bounty of a single supper. In addition, many towns have several suppers in a single season. For example, Pilot Mound, some 200 kilometres from Winnipeg, hosts two fall suppers on consecutive weekends in October. Pilot Mound began its suppers back in 1963 to pay for the recently built community hall. From that time, the institution burgeoned to the point where more than 1000 people were being served at each of the suppers. However, over the past ten years or so, competition has increased so that a turnout of 600 or so is the norm. The suppers are advertised over a radius of approximately 100 kilometres, although some people are drawn from as far away as Winnipeg. Pilot Mound's suppers are operated by the Chamber of Commerce, which puts on four fund-raising smorgasbords a year, two in spring and two in the fall. The town also hosts a United Church fall supper and the Legion puts on a steak barbeque. Competition between communities is kept to a minimum by staggering the events among towns in the immediate vicinity of each other. Nevertheless, the district's local radio station at Portage-la-Prairie announced fifteen other suppers to be held on the same weekend as Pilot Mound's (Collins 1999).

Part of the attraction of the fall supper excursion lies with the multi-cultural structure of Manitoba's communities, which lend diversity to the meals. Pilot Mound, in the south-west of the province, is an area substantially pioneered by British migrants. Their fall supper menu is therefore pretty conventional and representative of the majority of the population: roast ham, roast beef, baked chicken, a variety of salads, aspics and pickles, followed by pies and other deserts, washed down with tea and coffee. However, at St. Claude, a French Canadian community a hundred or so kilometres to the east, essentially the same menu is slightly more flavourful. As an added touch, the very attractive table centre pieces of wheat ears, miniature squash and corn enhance the

presentation of the meal. Further east again, at St. Joseph, the flavour is even more distinctively French Canadian. There, tortiere is featured, along with hominy corn, bean pie, and sugar pie. There is also wine available. At Dufrost, some eighty kilometres south of Winnipeg, there is a mixture of French Canadian and Ukrainian. As a result, perogies, holuptsi and home baked beans appear on the menu, along with the ubiquitous meats, salads, pies and deserts. Dufrost, with only a handful of local population, is a much more “homespun” affair, although it does feed about 450 people over the course of the meal (Durbowski 1999). Its suppers are held in a small hall that was formerly a church (Figure 1), creating a very different ambience from the much more spacious and more recently built community halls of the larger communities (Figure 2). It is interesting to note that many of these halls are being paid for by the proceeds from fall suppers.

It has not been possible to obtain conclusive data on the total number of fall suppers prepared during a season, but there can be no doubt that the numbers are high. Using a rough estimate of 300 people per supper, ten suppers per weekend, and a twelve week season, this would suggest that in the order of 36,000 meals are served. At current prices per plate now at around \$8.00, this would generate in the order of \$288,000 a year. Given the much higher numbers generated by some of the larger suppers, this is a very conservative estimate. With these numbers, it is obvious that the suppers perform valuable services to the host communities and to those who patronise them. For smaller communities they are a “mini-mega” event, providing them with revenues to support a wide variety of facilities and services. These range from general support for community infrastructure to special projects such as the purchase of a wheel chair for a needy invalid. They foster community spirit in giving a sense of pride and purpose to residents in presenting the suppers. They also offer excellent value for money to the patrons who also enjoy the opportunity to socialise and to take advantage of these occasions to get out and enjoy the fall countryside. Weather conditions and the pressures of farm work can have a considerable effect on visitor numbers. Finer weather brings out more people, except farmers, who take the opportunity to work their fields. Adverse conditions reduce turnout. However, many people attend



Figure 1: Dufrost Community Hall (top). The interior (bottom) shows typical buffet style serving and dining table arrangement.



Figure 2: St. Joseph Community Hall and featured haricot bean icon. Note the tour bus and extended line-up for admission (bottom).

several suppers during the course of the season, often travelling much further than necessary because they “enjoy the ride,” or go out of their way to take in a supper destination more renowned for its cuisine than what is available closer to home.

These numbers have brought changes to the manner of food preparation, although almost everywhere the emphasis is on local volunteer contributions. In Pilot Mound, one of the more “commercial” operations, major food items are purchased from local suppliers and cooked in the town bakery rented for the occasion. These include four whole hams of about 80 pounds each, a hip roast of beef of about 100 pounds, and 1200 pieces of chicken. Initially, volunteers would start peeling potatoes at five in the morning for the dinner, but now powdered mix is used. However, volunteers still prepare the salads, pies and other deserts, with the country ladies producing them for one of the suppers and the town ladies for the other. The women slave over the dishes in the kitchen down in the basement, while the men serve the meals. The school’s student council is given a \$100 for providing clean-up assistance. Because the hall seats only 250 people, clean-up is continuous throughout the meal period. As elsewhere, it is becoming increasingly difficult to find the necessary volunteers to meet the demand (Krotz 1993; Simon 1999). Pilot Mound used to have fifty or so men to call on; now there are forty volunteers altogether. Declining rural population, changing demographic structure and reduced volunteerism are taking their toll. Nevertheless, net proceeds from Pilot Mound’s two suppers amount to between \$7,000-8,000 a year - a profit similar to that produced by the St. Claude supper (Collins 1999; Chappellaz 1999).

Because of these potential profits, many communities are now aggressively marketing their suppers and developing new initiatives. St. Claude, for example, advertises in six district newspapers as well as notifying the Winnipeg press; five television stations are notified; posters are displayed in all towns within a 40-mile radius of St. Claude, and larger billboards are placed on Highway No.2, which passes the town. St. Claude is also involved with the “Gathering of Nations Festival,” an annual rotating festival including St. Claude, Treherne, Swan Lake, Somerset and Pilot Mound (Chappellaz 1999). Other communities have learned the

benefits of cross marketing their supper with other events. Eriksdale, for example, now schedules its fall supper to coincide with the town's "Cream of the Crop" horse sale, an important regional attraction in the Interlake. Some communities, like Miami, St. Joseph and Cook's Creek have also attracted organised bus tours out of Winnipeg (Fehr 1999). Smaller communities are also benefiting from one-off tours by special interest groups such as the Manitoba Historical Society and geographical associations which for years have led groups of their members and other interested parties on trips around the province. These tours rely very heavily indeed for their success on the dining component of the trip. Itineraries are built around places which are able to offer the trippers a "unique" dining experience offering "authentic" recipes prepared in the traditional manner, and often served up in a relatively rustic setting.

Discussion and Conclusion

Food is fundamental to survival. Eating is an acknowledged part of the tourist experience and is featured in a significant amount of tourism promotion. The tourist is necessarily eating away from home, but food is also a strong motive for travel. To many, dining out is relaxing and an opportunity to relieve the cook from the drudgery of everyday living. While eating away from home is enjoying a massive following, so combining it with an element of travel and a more exotic location is also growing in popularity. Food is a reminder of one's roots, a window into the identity of other cultures, and a pleasurable experience. For the tourist therefore, the consumption of food is likely to be a central part of the travel experience.

Although much of what has been discussed in this paper pertains to the excursionist and therefore is not tourism in the strictest sense, the events described are nevertheless taking on the trappings of mass tourism and pushing local organizers to larger scale production to cater for the growing demand. To the small community it is immaterial as to whether the visitor is from Timbuctu or from another town. The small town, or community based organization, is putting on its fowl supper as a revenue

producing device and it is of no consequence that at a regional level the money redistribution amounts to a zero sum game. The local sees it as a means of obtaining visitor dollars to finance and help support the local parish or community facility. To the extent that the smaller communities can attract people from Winnipeg to their events, it is a reversal of the normal pattern of money flows and a worthwhile strategy in the struggle to maintain the health of the rural economy.

As post-modernists have observed, the world today is full of contradictions and counter movements. The same can be said of the lure of food and current trends in food tourism. Globalisation has led to homogeneity. Cuisine has been internationalised, food has become genetically modified, allowing it to be shipped worldwide, uniform in shape, taste and lasting for ever. To even the most unsophisticated palate, the loss of taste, texture and flavour is conspicuous. Food is beautiful in appearance, even aroma, but in the eating a disappointment. It tastes the same. There is shape over substance. For mass marketing, these characteristics are acceptable and also desirable to many consumers. However, this leads to the counter revolution. The jaded palate, recalling the succulence, juiciness, sweetness and variety of the taste experience, searches for the "authentic." There is a growing demand for organic farming, maintenance of the foodstuff gene pool, and the restoration of food varieties. This counter movement expresses a desire for uniqueness, distinctiveness, and the taste of authentic foods prepared in the traditional manner. Food fairs and festivals attempt to service both demands, appealing to those who want the convenience of eating out, and offering distinctive tastes to those who are seeking something different. However, in catering to these contrasting wants, compromises in preparation become necessary. Menus lose some of their authenticity by being produced in large quantities for a diversity of tastes. Just as with most other tourism attractions, as food becomes commodified, it is adapted to satisfy tourism demands.

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Neepawa's heritage tourism: Margaret Laurence's literary legacy

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Introduction

Heritage is known in ways utterly unlike history. It is sanctioned, not by proof, but by present day exploits. As Lowenthal (1996) points out, "no one in the fourteenth century would have thought to test the date of the Turin Shroud. What mattered was the shroud's current miraculous efficacy." The value of heritage is similarly gauged, not by critical tests, but by current potency. History is for all; heritage is for ourselves alone. It is presented as the secret, sometimes personal, history, created to generate, protect and/or enhance group interest. Heritage is sometimes equated with reliving the past. More often, it improves the past to suit present needs.

In North America, heritage has been promoted to requite economic and social angst and lost community. Preserving old towns and small rural communities, particularly in Middle America, is gaining mainstream supporters (Lowenthal 1996). Sustaining a legacy in stones, silos, family farms and mainstreet towns, requires stewardship. According to one United States National Endowment for the Arts annual award recipient, "We are the heritage" (Lowenthal 1996). Under labels like "folkways", "organic farmers", artisans, such as thatchers and cowboy balladeers, become living, national treasures, as these types of heritage in the U.S. can be sustained and commodified best in a living community.

Modern preoccupation with heritage dates from the 1980's, a time of strong conservatism characterized politically by Reagan's America, Thatcher's Britain and Mulroney's Canada. It manifested itself differently in different places. According to Lowenthal (1996),

Each country or region treats its newly inflated heritage concerns to be unique, reflecting some trait of character or circumstance, some spirit of veneration or revenge that is peculiarly its own. Some impute these concerns to patriotic ardor, some to nostalgia, others to mourning or celebrating.

Vaunting its own legacy, each place seems unaware of how strikingly concurrent it often is with those of its neighbors. For example, below is a typical list of unique heritage sites from relatively recent brochures from the Canadian Identity Cultural Development and Heritage Ministry (1997):

Chestnut canoes, cowboys, O Canada!, the Rocky Mountains, totem poles, wheat fields of the prairies, Peggy's Cove, moose, autumn leaves, mounted police, fishing villages, loons, northern lights, strong and free, maple syrup, Jack pine wilderness, Group of Seven, hockey, Inuit, toboggans and Anne of Green Gables, The Great Lakes...

These items are Canadian, but the resonant words and stress wilderness, national pride, ethnicity, and childhood typify heritage anywhere. American self-praise is equally sweeping, but punctuated by stronger ideological undertones than those found in Canadian heritage. This is reflected in the use of expressions such as: 'freedom-loving', 'hard-working', 'egalitarian', 'generous', 'civil liberty' and 'manifest destiny'; all qualities and attitudes which typify the American legacy in heritage tourism literature. The various ways in which these inflated national legacies are interpreted by visitors to the numerous tourist sites in Canada and the United States remains unknown, as heritage, a source of national identity and the 'past', continues to increase across North America.

Background to the Study of Literary Tourism as Heritage Tourism

Those who express a desire to experience this type of tourism are a relatively new legion. Heritage expands because more and more people now have a share in it. In literary tourism, for example, heritage is reconstructed, exclusive and biased in favor of the author. The period within which he/she wrote is usually glossed over. Exclusion and bias consolidate into a generalized version of the writer's past. Often, this revamped legacy of the writer reflects what people think of the present, or what they want it to be.

Today, people use this type of tourism experience to negotiate and redefine other social and cultural values. How is this so? The empirical material collected and discussed here is an attempt to answer this. It is drawn from responses to questions developed from a literary tourism survey used for Neepawa, Manitoba. The significance of the information learned by tourists, and the links that are made between this information and its broader meanings, become very interesting in the context of literary tourism. Survey questions and responses act as a catalyst for a whole range of social and cultural heritage issues. In brief, the findings from the one hundred and fifty three completed surveys included ideas of national/regional identity, exclusion of minority heritage, authenticity, the preservation of 'history,' and the contemporary significance of fictional prairie writers. In the case of the tourist town of Neepawa, Manitoba, tourist responses stated that the town's reconstructed heritage is not confined to Margaret Laurence's literary legacy and her childhood home, which is now a museum, is only one part of this town's heritage. In fact, Neepawa, outside this home, contains few 'signs' to indicate Laurence's literary associations with this place. As a result this town manages to symbolize, for their visitors, certain myths regarding the North America's frontier heritage and identity.

Margaret Laurence's 'Manawaka'

Her birthplace, the setting for Margaret Laurence's Manawaka canon and her final resting place, the small prairie town of Neepawa, Manitoba, has, since her death in 1987, received international recognition as a literary tourist attraction.

Though the many literary accomplishments of Margaret Laurence did not impact directly on the town of Neepawa's tourism industry until 1983, in 1975, Ivan Traill, then principal of the local school, invited Margaret Laurence to visit her home town and be honoured by its residents for her contribution to Canadian literature. In 1983, a Margaret Laurence Room was set up in the Neepawa Post Office building by the Viscount Cultural Council, an organization already dedicated to the promotion of events within Neepawa. Members of the Viscount Cultural Council were the first Neepawa residents to realize the importance of a tourist site which would honour their famous citizen. It was at this time that Dorothy Campbell-Henderson, founding member of both the Viscount Cultural Council and the MLH Committee, designed and published the first brochure (still used today) which stated "Margaret Laurence...a Prairie person at Heart." By 1985, when the Margaret Laurence exhibit of Laurence artifacts in the Post Office building had outgrown its room in the building's basement, some members from the Viscount Cultural Council branched out to form the MLH Committee.

The purchase and restoration of the Margaret Laurence Home commenced in 1985. At that time, the house at 312 First Avenue, which was built by Laurence's grandfather in 1895, was a boarding house for mentally handicapped girls. It was about to be sold to a developer, who planned to demolish the house. Laurence had lived in this house from 1936 until 1945, the year she left Neepawa to study at university. The house has come to symbolize in Laurence's novels, authority and power, along with the perseverance and intrepidity of pioneers like her grandfather. The Neepawa Area Development Corporation, dedicated to the tourist growth and promotion in the area, offered \$10,000 (Canadian) to any group interested in buying and developing the house. The MLH Committee decided to buy the \$40,000 (Canadian) house from Muriel Mackenzie in October 1985. Laurence herself showed a genuine concern for how the home restoration would develop. She wanted it to be used rather than become a stuffy museum. In 1986, Laurence wrote to the committee saying: "I was delighted to learn that the Old Simpson House has been purchased. It means a very great deal to me that the old brick house will remain in the town and

will survive.” (Margaret Laurence Newsletter 1992) She continued to donate many of her own artifacts to the Home’s museum until her death on January 5, 1987.

During the first years of renovations, the committee took in paying tenants (local artists) to offset the costs. The home’s kitchen became the temporary head office and showroom of the Viscount Cultural Council, which used the space to promote other local artists. The Viscount Cultural Council donated all of its collected Laurence artifacts and eventually moved into a building along Hamilton Street, called the Manawaka Gallery. This arrangement suited both organizations, as they now had the abundance of space needed to fulfill their particular mandates. Today, the kitchen operates as the Manawaka Books, Gifts and Souvenir Shop, and the parlour, now restored with hardwood flooring and antique furniture bought or donated from the local surrounding area, is the home of many of Laurence’s memorabilia and artifacts, which have since spread into the upstairs area. The home was designated a Provincial Heritage Site in 1989.

In 1991, a past committee president, Brian Curtis, convinced CBC Radio’s Peter Gzowski to interview him about the Margaret Laurence Home on his popular show “Morningside.” During the interview, Curtis mentioned that the committee was raising funds through private donations and the sale of Laurence’s own memoir, which had been posthumously published by McClelland and Stewart in 1989. The final payment on the mortgage of the house was then made through the sale of those five hundred hardback copies of Laurence’s *Dance on the Earth*, donated to the MLH Committee, in 1990, by McClelland and Stewart publishers.

On June 24, 1992, the MLH Committee burned the mortgage to the Margaret Laurence Home in a ceremony dedicated to Margaret Laurence’s contributions to the town. At this time, the then President, Lawrence Hargreaves, thanked, in the Margaret Laurence Newsletter, “all board members and other volunteers who helped make 1992, a success,” stating that, “We must continue to fulfill our mandate to promote, develop, and preserve historical biographical property, both real and personal, relating to Margaret Laurence and promote. . . education and tourism.” (Margaret Laurence Newsletter 1992) Earlier that year, the Laurence children,

David and Jocelyn, donated to the home, university robes, fourteen ceremonial hoods, honorary degrees and Laurence's old Remington typewriter on which she typed almost all of her novels.

In 1997, between May and October, the Home received over four thousand visitors between May and October, suggesting it has developed into a very popular spot for tourists. During the school year, tours are conducted for student classes from Winnipeg and other neighbouring cities. In October, 1996, Neepawa's Mayor, Roy McGillary, declared Margaret Laurence Week, commemorating Laurence's life and work. The week included a Gala Evening at the Neepawa Yellowhead Centre, video clips of the renowned author, and Canada Post's unveiling, in her honour, of a special postage stamp which featured the Margaret Laurence Home symbol. All proceeds from this event were directed towards the continued operation of the Home. Besides these one-time grand events, literary workshops, book launchings, Elder Hostel educational programs and conferences occur regularly and the MLH Committee raises funds from the local Neepawa residents through its annual antique auction held on the Home's front lawn. Proceeds from this annual event have traditionally been in the range of CAN \$5,000. As well, books and souvenirs are sold inside the home to offset the home's upkeep costs. The latest project, initiated by the Laurence Home Committee, is a plan to improve and expand the Home's wrap-around porch, in response to summer visitors' requests to sit and have tea there.

The popular and commercial tourist brochures for Manitoba and, in particular, the Yellowhead Highway Route, have, since the early 1980s, promoted the town's association with the famous Canadian writer and Neepawa's fifteen hundred varieties of flowers, "Lillaceae" (lily), available for viewing in July and August. Historically, the Lily Nook Festival took precedence over the Laurence Home as a tourist attraction. The last three years, however, have seen a dramatic increase in the popularity of Margaret Laurence's life and writings about the town. This rise in popularity coincides with the broader attempts of regional and provincial proponents of tourism to promote and preserve Manitoba's heritage. Popular tourist publications, since 1990, have marketed the provinces one hundred and fifty commemorative plaques, and over one hundred

and sixty museum and heritage sites. Prominent among them is the Margaret Laurence Home. The *Museums in Manitoba* 1997 brochure highlights this marketing strategy with, “Manitoba’s museums offer a wonderful opportunity to experience the best of our memories and our rich heritage.” (The Association of Museums and the Ministry of Culture, Heritage and Citizenship 1997) Local visitor guides (in existence since 1993), created through advertisement space and published by members of the local Chamber of Commerce, now place Margaret Laurence on the front page, highlighting her former home as open to the public and containing much of her memorabilia. Other recent regional publications, developed out of the city of Winnipeg, also actively promote the town’s Margaret Laurence Home as a tourist destination. Commercial publications, such as the most recent 1997 publication, *An Architectural and Lily Walking Tour*, in collaboration with Neepawa’s Viscount Cultural Council, the Board of Directors for the Beautiful Plains Museum, the Historic Book Committee, McClelland and Stewart publishing house, the Margaret Laurence Home Committee, Chamber of Commerce, and the Legislative Library of Manitoba, produced an historical illustration and narrative of Neepawa, which incorporates the Margaret Laurence Home as both the childhood home of a famous Canadian author and an historical heritage building. Once concerned only with the alleged scandalous paragraphs from one of Laurence’s novels, tourism proponents have, particularly since her death in 1987, promoted both her status as a writer and her heritage connection with the town of Neepawa

Discussion of the Study

What has not taken place is an embracing of Laurence’s rich literary legacy and subsequent landmarks by the proponents of tourism at either the local, provincial or even the federal level. Margaret Laurence’s Neepawa, has yet to be reconstructed into a town that represents, for tourists, an assembly of literary sites that together create images of her Manawaka culture and society. Instead, only her childhood home provides an interpretation of Laurence’s own personal heritage, and even here, most of the

artifacts are not associated with Neepawa, directly. Tourist interpretations of what Neepawa more broadly represents for Canadians were ambivalent, with 'small prairie town ideals and history' being the most frequently stated response after remarks about the town's connection with Laurence.

Visitors did, however, couple the Neepawa they encountered through Laurence's literary connection with the many Canadian ancestors who had settled the prairie; for example, 'this is the town of my people who gave it its rich cultural heritage and strong religious values.' Many others commented on the importance of perpetuating a Canadian heritage through sites like these. Neepawa is 'a part of Canadian culture and an important ingredient to Canadian heritage. Neepawa is Margaret Laurence as she brings it alive in her literary works', and 'the home of a Canadian writer that helped to put the prairies on the map'. The importance of Neepawa in relation to Canada's broader national identity and heritage is prevalent throughout the responses. Laurence has become part of a wider symbolic system and, correspondingly, these interpretations even occurred cross-culturally. In Germany and Japan in particular, fascination with Margaret Laurence and her town of Neepawa continues to grow, to some extent because of wide spread fascination for rural Canada and the possibility of experiencing Laurence's Manawaka firsthand.

The issue of notions of country was also expressed by respondents. In a larger sense, the touristic experience also helped people to fulfill certain understanding about the prairies in general and Canada in particular. Here again, both Laurence and the tourist's exposure to the town itself were subsumed within a larger symbolic framework, as people negotiated literary associations to make some powerful statements about other social and cultural values. For example, Neepawa represented for some visitors 'any town in prairie Canada', 'a friendly Canadian small town', 'our Canadian cultural heritage of the west', and a 'typical Canadian landscape'.

These ideas of Canada have their origins in other cultural traditions. Such traditions reflect an intricate combination of historical fact and myth, perpetuated and promoted, among other sources, through contemporary tourism literature. Because cultural approaches are about meanings and communication, the way that

Laurence has been incorporated into such defined ways of seeing the Canadian prairie provides graphic illustration of the various producers, consumers and interactions that underlie interpretations of literary tourism sites. As these meanings and values for Margaret Laurence intersect with wider cultural influences and sources, certain interpretations of what is Canadian prairie become accepted.

Valuing heritage as the very source of the past can create interesting facets of heritage pride and national vainglory associated with particular places. Lauding triumphs and lamenting tragedies, literary tourists from Neepawa claimed, in their expectations of this town a type of patriotism and national pride were very much in evidence. Comments described the representations of such a town as: 'quaint', 'strong and enduring', 'how settlers rooted themselves', 'beautiful', 'culturally representative of Canadian prairies', 'prosperous and clean', 'full of Canadian heritage of the west', 'a place of high culture because of Margaret Laurence', 'wheat bowl', 'typical close knit prairie communities', 'a Canadian landmark'. These comments reflect not only images of Neepawa's heritage, but a heritage of the Canadian west and its inhabitants. Characteristics such as clean, upstanding, ordered, conservative and prosperous, resonate to punctuate the ideological undertones which have created an image of Canadian small town heritage. Words which stress qualities like unassuming, hard working, wheat bowl prairie inhabitants, typify the heritage of this region.

Conclusion

The issues of heritage and the literary sites of Laurence are inextricably linked. As demonstrated in the tourist responses to the various survey questions. Responses revealed the various ways Neepawa has been socially constructed to reflect a particular sense of the past. While history is never objective, always written from a specific point-of-view, history in the case of literary tourism is not simply interpretations of the past, based on some empirical evidence, but rather a fabrication of the past based on a writer's personal visions and imagination. In the case of Neepawa, Manitoba Margaret Laurence's childhood home and some of the details from

the settings of her fiction are offered up to visitors as integral parts of Canada's small town prairie heritage.

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Winnipeg's little Italy: the commodification of ethnic heritage

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Ethnic communities are found in most large cities in Canada and the United States. Though these ethnic communities today cannot be described as slums, occupied by ethnic group members because of social or economic pressure, or as ethnic enclaves, an area in which a particular group of people lives or works, residential concentrations of these groups once did, or still do appear in these cities. Since the turn of the century, Transcona and Fort Rouge in Winnipeg acted as receiving areas for Italian immigrants who came to work in the large railway shops located in both areas. Over time, these concentrations grew, not only from continued migration but as initial immigrants laid down roots and raised their families. Previous research has shown that based on a 20 percent sample of the Italian community, concentrations of Italians in these areas still appear today (Figure 1) (Spina 1996 and Spina and Lehr 1997).

Over time, many ethnic communities, including Winnipeg's Italian community, drew on their own resources to assert cultural distinctiveness and to develop trade and tourism in urban areas. Since the late 1980s, three blocks of Winnipeg's Corydon Avenue, known locally as "Little Italy," have emerged as a shopping and recreation destination for Winnipeggers. It has also become a tourist destination for visitors to the city attracted by the marketing of products associated with Italians and by the perceived European atmosphere of Corydon Avenue. Corydon Avenue is located in the southern sector of the city in the midst of a concentration of Italians (Figure 2). The commodification of Italian culture in this "Little Italy" has successfully turned this otherwise unremarkable



Figure 1: *Distribution of Italians in Winnipeg, 20 percent sample (Spina 1996).*

commercial area into a destination for both area residents and for visitors from Winnipeg's retail hinterland. This paper examines the issues of authenticity in the cultural experience offered by Corydon Avenue and argues that today, this "Little Italy" is more of a commercial district marketing ethnic goods and services and less of a cultural community. The process whereby this "authentic" Italian or European ambiance was created is also discussed.

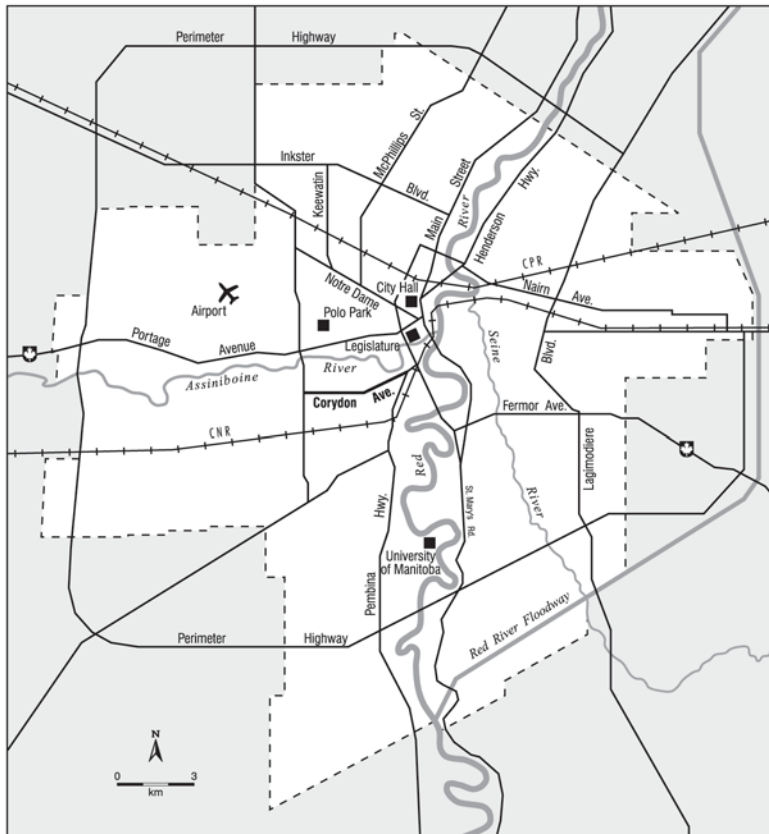


Figure 2: Location of Corydon Avenue, Winnipeg (modified from Welsted et al 1996, 140).

Research Methods

This study used qualitative research methods to obtain its data. In-depth, open-ended interviews with members of various groups who have been affected by, or have played roles in, the development, growth and promotion of Corydon Avenue were conducted over a period of three years, 1995 - 1998. Research into the history and process of Italian immigration to Winnipeg was an integral part of

this study as were observations of the Corydon Avenue streetscape over the period 1995 - 2000.

Creating an Authentic Ambiance

Upon the arrival of the Italians in North America and the city of Winnipeg early in the 20th century, Little Italies performed many functions for Italian residents, including the provision of mutual aid and a sense of security to each other and to new immigrants, helping them adjust to their new social and physical environment. Other functions have always included the preservation and enhancement of old world customs and ethnic traditions in a multi-cultural society and the continued strengthening of village and regional alliances through interaction with members of the same ethnic background. Further, Little Italies allowed immigrant groups to pursue a common objective of attempting to recreate a cultural milieu in which traditions and a sense of identity are preserved and social environments may be replicated.

Until the early 1970s, Italian businesses on Corydon Avenue, in the Fort Rouge area, mostly served the Italian community there. Italian businesses were gradually added to the area during that decade, a trend that continued throughout the 1980s. The emergence of new shops was most likely due to the growing affluence of Winnipeg's Italian population and their ability to absorb the start-up costs associated with new business ventures.

During the late 1980s, there was increased visitation from Winnipeg's other residential communities and from surrounding rural municipalities to Corydon Avenue, especially during the summer months. Merchants realized that their target markets were people from Winnipeg's suburban and exurban residential communities. Consequently they began labeling and marketing the Avenue as a Little Italy. Individually, merchants made improvements to their business facades to emphasize the Italian heritage of the district by exploiting Italian iconography. This included the use of Italian names (Figure 3), the Italian language, (Figure 4), design characteristics, and incorporation of Italian images in business facades (Figure 5). Many outdoor drinking and



Figure 3: Sofia's Caffé, 1996 (photo by J. Spina).



Figure 4: Colosseos Ristorante Italiano, 1996 (photo by J. Spina).



Figure 5: Bar Italia, 1996 (photo by J. Spina).



Figure 6: Outdoor drinking and dining area on Corydon Avenue, 1996 (photo by J. Spina).

dining areas were also established to attract visitors to a staged authentic ethnic environment (Figure 6) (Gale 1972, 15 and Wilkins 1991, 35).

Corydon Avenue's streetscape quickly became infused with cultural meaning, symbolism, imagery and ideology as Corydon Avenue merchants realized that the physical appearance of a business district is important in attracting and maintaining customers (Rogers et. al. 1992, 215). The beautification of public land and private buildings may establish an image for an area and usually forms the basis for the development of collective marketing and promotional campaigns carried out to market urban heritage and reinforce that image through the development of mass advertising campaigns or the initiation of neighborhood events and festivals (Department of Environmental Planning 1988, 3).

The Corydon Avenue Business Improvement Zone¹ has played a very important role in the beautification of the Corydon Avenue streetscape by lining the street with flowers, hanging baskets of flowers from gaslights (Figure 7) and decorating Corydon Avenue's street signs in the Italian national colors of red, white and green. Another beautification initiative undertaken by the Corydon Avenue Business Improvement Zone was the painting of murals portraying Italian, Mediterranean and European themes consistent with the commercial theme of the area on the sides of buildings (Figure 8). Murals are a growing phenomenon within Winnipeg and small prairie towns, particularly Boissevain, Manitoba (Hildago and Lehr 1997) not only as a beautification initiative but as a way to attract tourists. Winnipeg is now beginning to promote itself as the mural capital of Canada. The promotion and the mass marketing of Corydon Avenue is the responsibility of a larger agency, Tourism Winnipeg², which markets Corydon Avenue through tourist guides, brochures and the Internet. Both the Corydon Avenue Business Improvement Zone and Tourism Winnipeg emphasize Italian and Mediterranean themes and the European "ambiance" of Corydon Avenue in their promotions.

The image of Corydon Avenue as an ethnic enclave providing ethnic food and products led to the inception of an Italian-flavored street festival named *Festa Italiana* by the *Sons of Italy*, *Italian Association* in 1989 to promote Italian culture throughout the city



Figure 7: *Flowers and hanging baskets of flowers along Corydon Avenue, 1996 (photo by J. Spina).*



Figure 8: *Painted mural on Corydon Avenue, 1996 (photo by J. Spina).*

in general and Little Italy in particular. A two day festival was held in September 1989 over two blocks of Corydon Avenue. The festival was a highly successful celebration and display of Italian culture, one well received by local residents and the Winnipeg media alike. In the *Winnipeg Free Press*, newspaper articles titled “Fabulous Festa Fever” (Winnipeg Free Press 19 September 1989) and “The Good Lord Must Be Italian” (Winnipeg Free Press 24 September 1989) reflected the success of the festival. Combined with the adverse economic impacts of the recession of the early 1990s, the festival led to a heightened interest by Manitobans for local, distinctive, settings that were accessible, affordable, and safe. Corydon Avenue quickly became one of the most popular and fashionable places to go for those seeking ethnic authenticity in the city. Within the built environment of Little Italy buildings and their surroundings have been planned to appeal to those who wish to experience a different ethnic ambiance. From a functional standpoint the environment provides a setting for those wishing to experience the past, provide a setting for entertainment, relaxation and shopping which convey a sense of the past through the use of stylized facades and design characteristics (Waitt 2000, 836).

Intra-Urban Authenticity Tourism

Where the cultural heritage of the host population is the principal attraction for the tourist, cultural tourism exists (Van den Bergh 1995). Corydon Avenue is an excellent example of this. It has become a destination for local visitors. Winnipeggers and people from surrounding municipalities can visit Corydon Avenue on any day of the week, not just weekends, because it is easily accessible to anyone within an hours drive of Winnipeg’s downtown. Thus, two new terms to describe this type of visitation are proposed. The first is “authenticity tourism” which describes the travel of individuals who are seeking experiences of a genuine rather than staged nature. The experience, of course, may be partially staged, in order to celebrate local heritage, either cultural or physical, and it will not require an overnight stop anywhere, or a stay of at least 24 hours which is part of the usual definition of a “tourist” (Murphy

1985, 5). I am also proposing the term “intra-urban authenticity tourism” to describe tourism focused specifically on a local destination. Corydon Avenue has spawned such tourism within the Winnipeg market. Thus, those who live in Winnipeg and visit Corydon Avenue for its Italian ambiance, in the same way as those with more time and money might visit the real thing, Naples, may be described as “intra-urban authenticity tourists.”

These “intra-urban authenticity tourists” are engaged unwittingly in the industry of culture which does not involve manufacturing, wholesaling or warehousing activities, but a cultural experience which can be genuine or at the very least, remarkably authentic. The purchase of an experience does not lead to the accumulation of possessions. The only apparent limits of our satisfaction lie in our imagination which has led to a seemingly unsatiable demand for culture (Ogilvy 1986). Thus, culture on Corydon Avenue’s Little Italy has become a commodity. It is purchased and consumed³.

From Cultural Community to Commercial Marketing District

As Little Italy has undergone this transformation it has lost many functions that it once performed for local residents. Today as more Italians are employed in technical and professional occupations, and as the Italian middle-class grows, many are choosing to live in the suburbs, not in Little Italies. Formerly serving as a community center for the Italian population, Little Italy has now become a more commercial area. The growth of the Italian population in many cities, however, provides a larger ethnic clientele for the Italian businesses in Little Italies (Li 1988, 103).

The major value of Little Italy to Italian businesses is its commercial appeal as a tourist attraction, which, from the point of view of marketing is a good strategy to promote ethnic goods and services. From the point of view of consumers, it offers an ethnic component that gives an added flavor and novelty to what would otherwise be another plain commercial block. In this sense Little Italy is a commercial district marketing ethnic goods and services and less of a cultural community. Consequently, the Little Italy as

a commercial area appeals to those entrepreneurs who market ethnic food and products and thus benefit from the tourist image of Little Italy as an ethnic enclave (Li 1988, 104).

Surprisingly commercial establishments selling an Italian-oriented product or products do not dominate the cultural landscape of Corydon Avenue's Little Italy. Rather, these businesses exist within a broader Mediterranean or European theme. Several businesses with no ethnic or cultural affiliation appear in the area. Although Italian iconography appears on Corydon Avenue's streetscape, basic community functions in the area do not reflect the Italian community or its heritage which still remains in the area in any way. Thus, the commercial growth of Corydon Avenue in recent years has been motivated by the commercial benefits of attracting the community at large and not catering to the local Italian community.

Conclusion

The use of the term Little Italy is a surrogate commercial name used for three blocks of Corydon Avenue. Initially this area was not Italian in appearance. Merchants served the local Italian community who patronized the area because they knew it as a place where they could purchase Italian groceries and so forth. Later, "Foreign", ie: non-Italian, or at least non-local patrons were attracted to the area which is actually more Mediterranean-flavored than purely Italian, despite the heritage of the Italian community in the area. Nevertheless, economic conditions in Winnipeg were favorable for the "take-off" of a Little Italy in Winnipeg in the late 1980s and early 1990s. Contributing factors include the resistance to mass marketing of generic foodstuffs and a new commercial attraction to niche cultural markets such as heritage, ethnic, and eco-tourism (Urry 1990). Engaging in this type of tourism offers opportunities to bring the past to the present and let tourists construct their own sense of historical places and create their own journeys of self-discovery with the help of ornamentation, style and symbols (Nuryanti 1996, 250-251).

Further, with an increasing awareness of heritage, consumers have developed the ability to express their individuality by recognizing and visiting historical environments and patronize venues which cater to their individuality. This often leads to what may be termed “consumer elitism” whereby the feeling of an elevated social and consumer status is attained. Consequently, the combination of heritage and culture with leisure and tourism may be considered one of the most significant and fastest growing components of the booming tourism industry (Alzua et. al.1998, 2). Corydon Avenue’s Little Italy symbolizes these developments.

Acknowledgements

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Notes

¹ A Business Improvement Zone is an association of business people who join together to promote and create a positive change within their common location in a defined commercial area. The concept, which originated in Toronto in the 1970s, is based on the organizational model of the shopping malls, which helps to increase each businesses' portion of the market share

allowing business to (1) join together to market their business district; (2) sponsor programs and events which enhance the area; (3) make improvements to physical amenities; and (4) have a voice in the political sphere on issues of shared concern. Business Improvement Zones are financed through a special levy collected by the city in association with the business tax which is then redistributed to individual zones, providing the financial vehicle to exert control over the appearance and image of an area. Department of Environmental Planning. 1988. **Information Winnipeg Quarterly Newsletter**. Winnipeg: Department of Environmental Planning 1-2.

² Winnipeg City Council established Tourism Winnipeg in 1988 as a non-profit agency intended to coordinate the fragmented tourism advertising and promotional activities of the local tourism industry. Tourism Winnipeg's goal is to increase the economic benefit of tourism to Winnipeg by effectively marketing the city of Winnipeg as a destination for individuals and groups of visitors. Although Tourism Winnipeg is not involved in product development, its mandate is to market the city which occurs in a number of ways. For example, cooperative marketing ventures establish strategic alliances with traditional and non-traditional tourism partners, thus allowing Tourism Winnipeg to introduce new marketing programs and expand existing ones through partnership buy-in programs. Tourism Winnipeg can be found on the world wide web at <<http://www.tourism.winnipeg.mb.ca>> Tourism Winnipeg. 1998. **1998 Marketing and Business Plan**. Winnipeg, Manitoba: Tourism Winnipeg.

³ The author hopes that by proposing these definitions an account will be made for a growing trend in the early Twenty-First Century toward the post-modern landscape, a trend which Relph argues, has evolved from a much larger evolutionary process. The post-modern logic of places is that places can look like anywhere developers and designers want them to, a function of market research about what will sell. Therefore, in order to understand the meaning and function of Winnipeg's Little Italy, the area must be deconstructed, a central concept in post-modern analysis. Relph, Edward. 1996. "Sense of Place." In **Ten Geographic Ideas that Changed the World**, ed. Susan E. Hanson, 205-226. New Brunswick, N.J.: Rutgers University Press.

Viva Vallarta! Impacts of the re-definition of a tourist resort in Jalisco/Nayarit, Mexico

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Abstract: Puerto Vallarta is a coastal resort in the state of Jalisco that depends upon what Pearce has termed “sunlust tourism”. Vallarta is located at the head of Banderas Bay (the “Bay of Flags”), and its recent growth and development has been dominated both by tourism and by the local physical geography. This paper looks at two major features that have characterised these changes. First, recent rapid growth has led to the opening of a huge opportunistic resort, in Nayarit State, known as Nuevo Vallarta. This may transform tourism in the Vallarta region over the long term, and we discuss this potential. Second, the growth of tourism in a restricted physical environment has meant that the population that works within the industry is constrained in its residential opportunities. Thus some residential areas within the city have been turned over to tourism, and some nearby towns act as dormitory settlements for tourist workers. We evaluate some of the impacts on one such town, Ixtapa, which was once the largest settlement in this region. It is concluded that continued growth in tourism may be inevitable at the head of “The Bay of Flags”, but that much care is needed in order to reduce the negative economic, social, and environmental impacts of such development.

Introduction

The purpose of this paper is to identify internal variations within a particular destination in Mexico, and to begin to explore the

impacts of the tourists upon this destination (McIntosh and Goeldner, 1990: Chapter 15; Pearce, 1989: Chapter 6). We will also show how a resort develops as a result of these changes - and in this case transforms into a series of quite different destinations.¹ It is hoped that this case study, apart from being of inherent interest, may lead to the development of more and better models of tourism, and thus provide a stronger base for its related sub-discipline within geography (Pearce, 1995:3). Mexico has been chosen because of its growing importance as a destination for Canadians. This importance is likely to increase (perhaps dramatically) as the value of the Canadian dollar remains low (Rafferty, 1993: 188), curtailing visits to many conventional sites in the USA, and as the perceived advantages of Mexico become more widely known.²

In this paper we shall discuss the case of the “leisurisation”, as Hoffman (1992) calls it, of the region around, and including, Puerto Vallarta, a major destination point near Guadalajara (Fig. 1). “Coastal resorts are perhaps the most common and distinctive form of tourist development” (Pearce 1989: 270), but in the case of Vallarta the characteristics that made this resort distinctive in the past are currently subject to change and the region may be transformed in the relatively near future. This dramatic change is occurring, in large part, as a result of a specific attempt by various levels of government in Mexico to use tourism as a mechanism for economic development (Clancy, 1999).

Coastal Resorts

Although the Romans frequented coastal settlements for recreational purposes, the coastal resort of today has its roots in 18th and 19th century European seaside towns (Pearce, 1995: 136; Hugill, 1975). And although we commonly associate the Mexican tourist experience with such places as Cancun, Cozumel, Acapulco, and Puerto Vallarta, such areas are also relatively recent tourist resorts, and as in many other places are clearly associated with recent developments in the leisure and transportation industries.

Coastal resorts may be quite recent, but they are also very important. First, they are based upon, as Pearce puts it, “sunlust



Figure 1: Location of Puerto Vallarta.

tourism” (1995: 136), and as a consequence have a morphology which differs, often markedly, from other tourist areas. Second, there are different kinds of tourist resorts which reflect different local factors, and which can give important insights into local cultures, and the challenges of and to these cultures. Although tourist promotion in Vallarta is not significantly based upon ethnicity, there are elements of what van den Berghe (1995) calls “ethnic tourism” in the local area. Third, they are located in geomorphological areas which are commonly more fragile, but still less understood, than other physical environments. Fourth, and as a direct result of the first three points, coastal resorts are often confronted by a series of contentious issues, are usually associated with planning nightmares, and are often areas where ecological conflicts and confrontations are continually coming to the fore. Many of these issues have arisen -- as have many of the resorts -- more-or-less overnight.

Puerto Vallarta

Puerto Vallarta officially became a city in 1918, and although it was associated with sport fishing at an early date, its first important connection with tourism is often dated to the opening of its first true hotel, the 'Hotel Rosita' in 1948. In 1954 the beginning of air transportation made the city more accessible to the rest of the world, but the next major event that brought Vallarta to the attention of the rest of the world came a decade later. To quote a Vallarta web site: "In 1963, with the filming of "The Night of the Iguana" in nearby Mismaloya (south of town), Puerto Vallarta was mentioned on the world news and quickly became one of the most popular destinations in the Mexican Riviera." In the 1970s, government policies to increase population in this Jalisco coast area coincided with a rapid increase in free time and disposable income for Anglo Americans, and Puerto Vallarta began to grow as a resort.

Tourism has been critical to the overall growth of the Vallarta region. The local physical geography has been a major factor in shaping this growth. Puerto Vallarta is located at the head (east end) of Banderas Bay -- the "Bay of Flags" (Fig. 2).³ It is located in the northwest corner of the State of Jalisco, but is adjacent to the border of the State of Nayarit, the boundary of which runs along the valley of the Rio Ameca. However, this "natural boundary", like so many of its kind, has recently proved to be a source of political and social challenges -- particularly associated with the tourist industry. The townsite is backed by a series of highlands (up to 2000 metres in height) which give considerable scenic value to Vallarta, as well as affecting the local weather and climate. However, these mountainous areas also complicate the process of urban growth by restricting the amount of easily serviceable land that can be used for building construction, as well as for transportation. These site characteristics are particularly important to the understanding of recent growth patterns in the Vallarta region. At one time poorer housing was concentrated in these hills, but recently expensive tourist villas have been taking over this scenic landscape, and the indigenous - or at least local - population has been impelled to move elsewhere, along with newer in-migrants. As might be expected, an understanding of the changing tourist



Figure 2: Bahía de Banderas.

elements is also critical to an understanding of the development of tourism in the Banderas Bay region.

The Leisureisation of the Vallarta Region

Originally Vallarta was an agricultural centre and a fishing village, and even after its incorporation of a town it retained these functions, with tourist activities being grafted onto the original settlement. Despite the influence of air travel, Hollywood, and tourism, growth has been (until recently) quite slow. From only 12,500 in 1964, by 1970 the population of the settlement had risen

to only 24,115. However by 1990 the population of Puerto Vallarta had grown to 111,457 and that of the Jalisco coast, which can be viewed as “greater Vallarta” now has an estimated population of over 350,000 (Jiménez Martínez, 1998; <http://www.pvconnect.com/map.html>), has at least 15,000 hotel rooms (<http://www.puerto-vallarta.com>), and receives two million visitors annually. Puerto Vallarta now receives about 30% of the total tourism of Jalisco State. Between 1970 and 1990 the tertiary sector of the economy (principally a tourist-oriented sector) increased in value from 59% to 82%, with the primary sector dropping from 10 to 2%, and the secondary sector from 24 to 16% (Jiménez Martínez, 1998).

The relatively slow and recent growth, has meant that the retention of “character” has been part of the charm of the settlement, and contrasts with manufactured resorts such as Cancun -- and as we shall see, the “opportunistic resort” that is being built at Nuevo Vallarta. One result is that the core/downtown of the city (Viejo Vallarta) still retains many older buildings, of traditional architectural style, although many of these have been converted from (e.g.) upper status housing to (e.g.) restaurants, art galleries, and cyber cafés. Despite these recent changes, which include the “popularisation” of the town with the standard fast food chains and clubs (McDonald’s, Hooters etc.) of Anglo America, Puerto Vallarta is considered by many to be the “most Mexican” of all the beach destinations in Mexico. Its home state of Jalisco is known as “the most Mexican” of all the states, due to its rich traditions and folklore.⁴

In part the retention of this character may also reflect the position of Vallarta within the Mexican urban system. For the Vallartan urban area is clearly dominated by the primate city of Guadalajara as this latter centre is itself dominated by Mexico City. Several million people live in and around Guadalajara, and many Puerto Vallartans access this urban area on a fairly regular basis for many traditional urban functions (such as shopping and entertainment, and even now higher education). As a consequence the Jalisco coast area has not taken on some of the urban functions that might otherwise be associated with a centre place for 350,000 people, and the CBD is still noticeably low-rise and non-metropolitan in form, and has become in essence an RBD

(Recreational Business District) with true CBD functions being few and far between.

Today the greater Puerto Vallarta region can be seen as a series of zones (Fig. 3). Traditionally three have been recognised within the city, although nowadays some others can be identified within the larger region. First there is the southern hotel zone, which lies south of the Cuale River. Second there is the central town or Viejo Vallarta (Old Vallarta), which lies north of the Cuale River, and third there is the northern hotel zone which has seen the greatest recent growth. Arguably it begins at the site of the still extant Hotel Rosita, and extends northwards as far as the Marina, which itself exemplifies recent developments in maritime tourism.

The Marina, constructed in stages since the mid 1980s, consists of a variety of hotels, mini-resorts, condominiums and restaurants along with a golf course and extensive area for pleasure boat docking (Fig. 4). For better or worse, it appears to be reminiscent of, if not modelled upon, the Marina del Rey area of Los Angeles. Marina Vallarta represents the development of a natural/physical area (a river estuary), and as such illustrates a dramatic transformation of the local environment. The Marina is a recent growth pole, and constitutes, in essence, a separate (fourth) sector of the city at the northern end of this hotel zone. At its eastern end is the cruise ship dock which has welcomed an average of nearly 200,000 passengers a year over the past decade. To the north of the Marina, the International Airport and a naval base fill most of the territory north to the state boundary, which has traditionally represented the northern boundary of the urbanised area.

Nayarit, the adjacent state to the north, recently used a massive influx of Federal funds to develop Nuevo Vallarta (which makes up a fifth regional tourist sector), a marina and resort area which extends some ten kilometres north of the political boundary with Jalisco. This resort area is one of the foci of this paper.

South of the southern hotel zone (and constituting a sixth sector) of Vallarta extends a belt of new construction (South Vallarta), consisting largely of expensive villas and condominiums - many of which are rented/owned by Anglo American expats or snowbirds. This zone terminates at Mismaloya - the site of the old movie set which is now a tourist destination. A number of fringe settlements,



Figure 3: Puerto Vallarta.

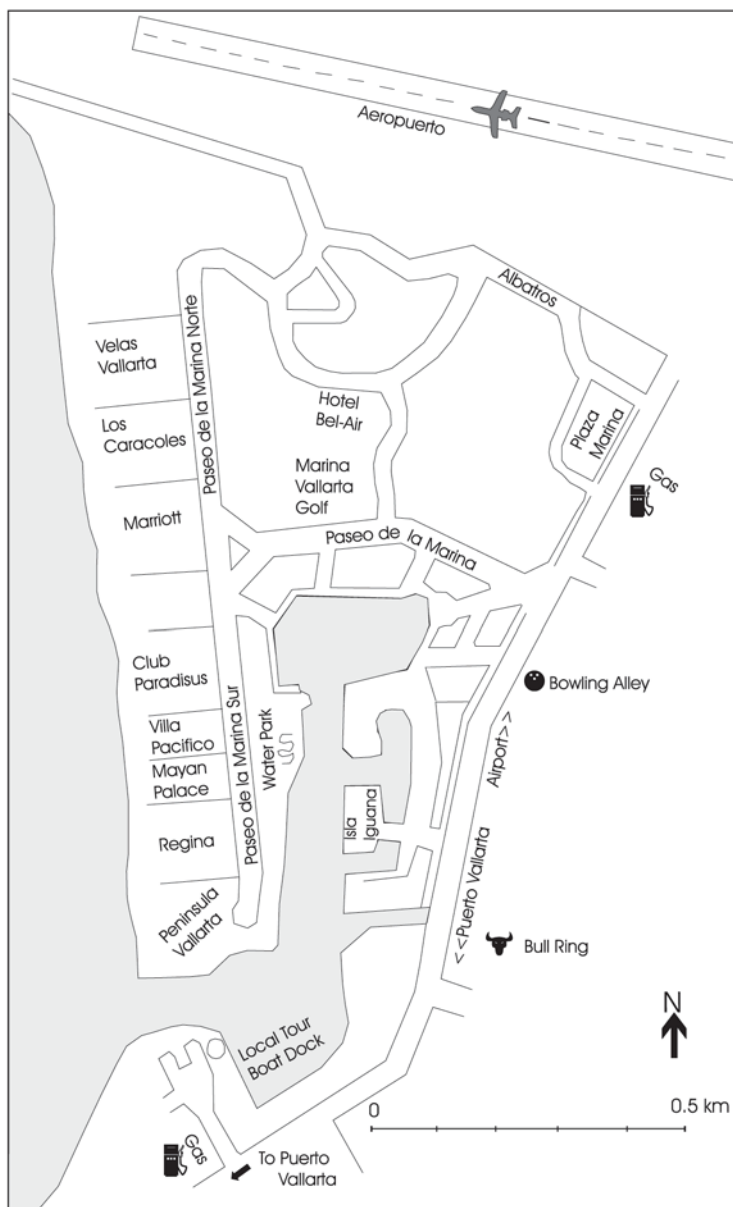


Figure 4: Marina Vallarta.

usually based upon pre-existing villages, have also grown in recent years. Most commonly these settlements such as El Pittillal and Ixtapa provide housing opportunities for people who cannot afford, or do not wish to, live in tourist-oriented Vallarta. Many of these in, for instance Ixtapa (another focus of our research), are recent in-migrants to the Jalisco coast, and have been attracted by opportunities in the tourist industry.

Some Consequences of Growth

a) The Cultural Landscape:

Arguably the most noticeable recent developments along the Jalisco coast have been the cultural landscape changes which, as is often the case, provide primary sources of information which enable us to understand the evolution of a region. Over the past twenty years the urban area has grown dramatically, and what was once a Mexican centre with tourism grafted onto it, has become a popular resort with Mexican character. Many new hotels, condominiums, and villas have been built, and the tourist landscape has been extended both to the north and to the south of the old centre. This has led to massive functional changes within the downtown itself. The old centre of the city is becoming noticeably less residential -- for non tourists -- and many of the old upper status dwellings are being converted to new commercial uses (such as restaurants, art galleries, and cyber cafés). The poorer dwellings in the hills behind the town are being commonly replaced by tourist-residential structures. The previous inhabitants are relocating elsewhere.

The more affluent people have, of course, a greater choice and are locating to a variety of sites along the coast. The poorer people have a more limited choice and are often being pushed inland -- if the environment is suitable -- or into pre-existing inland villages such as El Pittillal or Ixtapa. El Pittillal, now a town in its own right a few kilometres inland from the Marina, is more-or-less an extension of the Vallarta urban complex, although it retains its political independence and its town-like services for its inhabitants. Ixtapa, which lies about twenty kilometres northeast out of the centre of Vallarta, was once the major agricultural centre of the

region -- larger even than Vallarta. Although still retaining many central place functions for the surrounding agricultural area, it is now economically tied to the tourist industry. The local agriculture itself has now become more tourist oriented, and Ixtapa also plays host to many workers in the tourist areas along the coast. Some resorts (such as the Mayan Palace) run their own fleet of buses to allow the workers to commute from Ixtapa to Nuevo Vallarta.

Nayarit shared to only a limited extent in the tourist boom in this part of Mexico during the 1970s and 1980s. Although no study has been found which explains this state of affairs in any detail, it does seem to be a result of some predictable factors. Transportation was, and is, less advanced in coastal Nayarit. Services were poor or non-existent -- particularly for the more 'sophisticated' tastes of the Anglo American tourists now being attracted to this "Mexican Riviera". Nayarit had little money to spend on tourism. And, perhaps most importantly, demand was not great enough to generate self-sustaining growth, with Vallarta being able to absorb all of the necessary expansion until the mid 1990s. However, as "consolidation" occurred and the coastal landscape from Mismaloya to the Marina became filled up with tourist outlets, choices were limited, and there was the possibility for "stagnation" (Butler, 1980). Vallarta could have gone to another stage of the "resort cycle", with an increase of vertical scale in order to compensate for the limited seafront space available. However, the Mexican government took a hand and funded new development in Nayarit. The growth of the tourist landscape in this area has since been stimulated by what Gill (2000) terms a "growth machine" made up of local landowners, realtors, speculators, entrepreneurs and business persons who have allied themselves with local elites and governments in order to pursue economic development.

This development took place between the political boundary of the Rio Ameca and the town of Bucerias, along beaches such as the Playa Flamings (Fig. 5). It was designed to stretch between five and ten kilometres, have a north (Boulevard Nuevo Vallarta) and south (Boulevard de Nayarit) access road, its own water and sewage system, its own electricity (and other services). The access roads connect to a new four-line highway which itself connects the overall development to the Puerto Vallarta complex to the south,

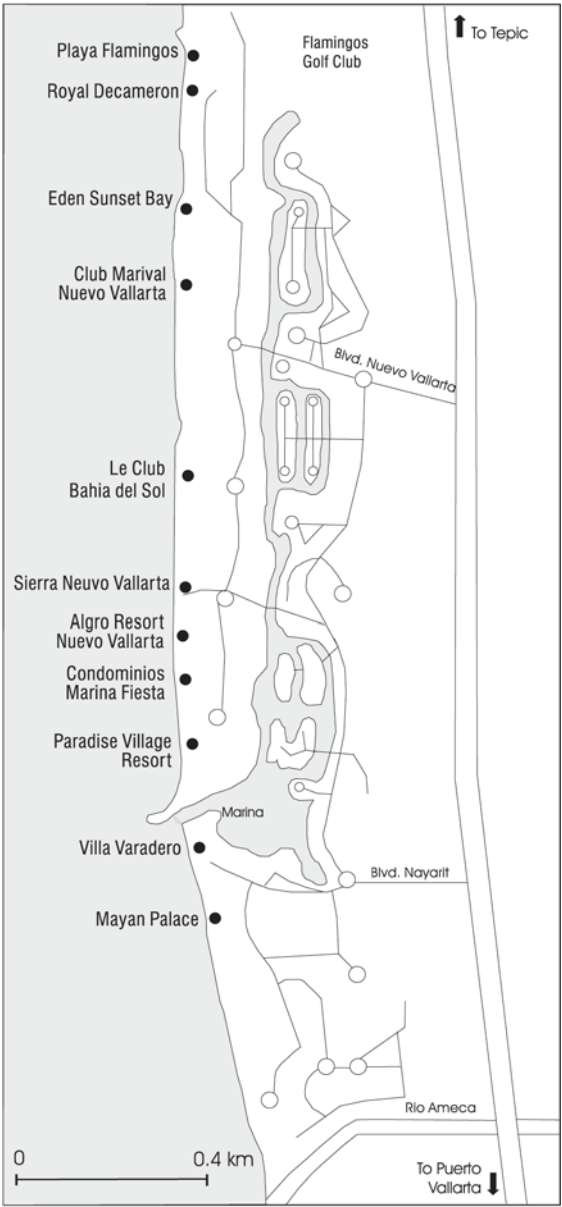


Figure 5: Nuevo Vallarta.

and Guadalajara and Mazatlan, via other routes, to the north and east. Nuevo Vallarta is planned to contain self-contained resorts (such as the huge Mayan Palace development), hotels, condominiums, golf courses, villas and other housing complexes, a marina and shopping areas. At present most of it is still under construction -- at best. Although some residential structures have been built and are being built, much of the area is still uncleared bush and mangrove swamp. It is likely to be many years before Nuevo Vallarta becomes anything like a continuous stretch of tourist services. The plan is clearly a grand one, providing as it does for many thousands of new visitors and residents. A question remains as to whether it will be, or remain, economic long enough to reach its optimum, and whether its existence will threaten Puerto Vallarta, the growth pole that spawned the whole series of developments to begin with.

A major issue with Nuevo Vallarta (as it was with Marina Vallarta) is the environmental impact of this development upon a landscape that may not be able to cope with it. Mangroves are being cut, canals dug, low spots filled in, and artificial landscapes substituted for natural areas. Massive golf courses and residential subdivisions are being built, or are in the planning process. Such developments threaten the overall ecology of the region, and their impact is, as yet, poorly understood.

b) Social and Cultural Effects:

As usual tourism has had major social and cultural impacts on the Vallarta region. These effects are both small and large, and arguably both good and bad. Only a few can be summarised in this paper. Although a focus will be made at this point upon Nuevo Vallarta and Ixtapa there is little reason to suspect that these results are not applicable to the rest of the region around Banderas Bay.

Clearly, the people in this region have been dramatically affected by tourism in general and more recently by Nuevo Vallarta in particular. It is hard to examine these effects, in part because it is difficult to decide who has been affected. The indigenous Indian groups have been impacted, but they may have had little historical coastal presence. Many of the Mexicans who have been affected are later arrivals -- many of whom may themselves be a product of

tourism. Vallarta has many immigrants and they are by no means all Anglo Americans. Cultural integration of these different groups has not, of course, been equal, and various social strata have been produced. To a large extent these appear to be reproductions of social sectors found elsewhere in Mexico -- with the tourist/snowbird/expat groups as an added ingredient to the mix.

Although Indians can be found in the Vallarta area they tend to be less affluent, and less well integrated than other groups. They are commonly represented as street or beach sellers of goods that may be commercially made, or may even have been made in traditional ways and using traditional techniques. Other less well-educated groups act as taxi drivers, construction workers, and service workers. Most of these occupations are relatively poorly paid, and are clearly affected by the seasonal nature of tourism.

Our study town of Ixtapa is a particularly clear example of these changes (Fig. 6). Although it still exhibits many signs of its origin as a 'central place' for the surrounding agricultural areas, acting as both an economic and social centre for the local populace, it is also showing signs of recent growth that are clearly a result of "non-local" circumstances. Thus new housing is being constructed to serve both recent in-migrants, and other Jaliscans who have chosen, or been impelled to move out of Vallarta. These inter-urban moves have resulted from both social and economic circumstances. In some cases Vallartans have chosen to live in a more rural setting, away from what is now a very busy urban centre -- especially during the tourist season. In other cases the spread of the tourist landscape has eaten-up previously residential areas populated by local Mexicans, and replaced them with commercial areas or residential zones devoted to Anglo Americans and/or non-local Mexicans (from Guadalajara, Mexico City etc.). Thus the working population of the urban area has begun to seek shelter at a greater distance from the central city.

c) Economic Characteristics:

Economically tourism has had a major impact upon the land bordering the Bay of Flags. This impact is continuing, and expanding in all directions, but particularly along the coastal zones. Our field research revealed that this impact can be seen as more

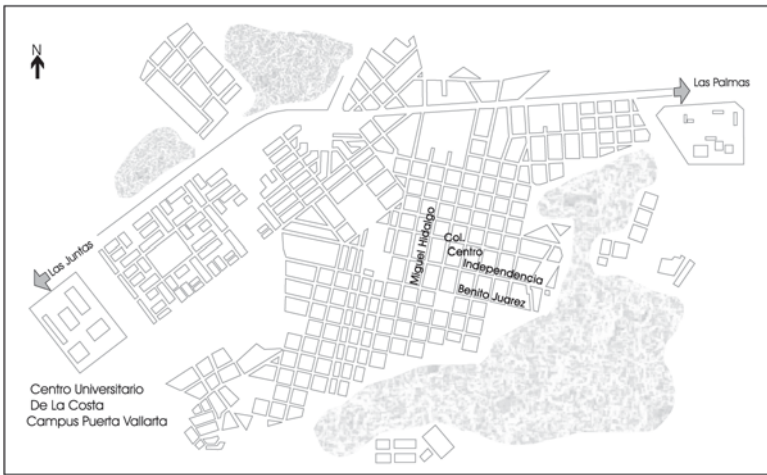


Figure 6: *Ixtapa.*

and less obvious. More obvious are the tourist developments such as Nuevo Vallarta which have pumped a large amount of money into the local economy as the result of infrastructure construction alone. Further huge influxes of capital will accompany resort development. However, how much of this will remain in the coastal region is unclear, as many of the larger developments are owned and/or funded by Mexicans living in other parts of the country, or by foreign capitalists.

Less obvious are changes in agriculture, settlement patterns, and even education -- for the new university of Puerto Vallarta can itself be seen as a result of the package of economic and social developments that are characterising this region. Agriculture has changed in its extent, with land being lost to urban development close to the city, but replaced by land carved out of less-intensively exploited areas inland -- with little thought being given to the consequences of growth in these fragile environments. Cultivation has also changed in its intensity, with new tourist-oriented truck crops being grown, often literally in place of the traditional maize and beans. Some older agricultural settlements have been transformed by recent growth which is largely tied to the tourist economy. Our study settlement of Ixtapa has grown significantly

in recent years. Although some of this reflects “natural growth” of the pre-existing population, a significant amount is a result of migration -- from both relatively local and long distance sources. This new immigrant population is likely to have different values and ideals from the original inhabitants, and if not allowed for, this could be a source of social conflict.

Conclusion

Although the leisurisation of in the Bahia de Banderas region has been proceeding for some time, the establishment of Nuevo Vallarta has probably led to more critical debate than did the earlier developments. This partly reflects the fact that tourist developments are being questioned and scrutinised to a greater degree in general nowadays, and partly reflects the magnitude of the Nuevo Vallarta development, and thus its potential impact locally, regionally, and even nationally. Much of the distinctiveness of coastal resort developments arises, of course, from their physical geography and, in particular, their proximity to beaches and the seashore. In the present case study, the distinctiveness that is now evolving is also a function of the local political geography of the area. Growth has been limited by site characteristics, but has been promoted by political considerations. As Ryan indicates, it is to be expected that tourist zones change over time (1991: 64), as the tourist experience is bound within a psychological, social and cultural milieu that is always changing (1991: 204). In addition, as Pearce (1989) has pointed out, although tourist expansion is likely to continue, this is a cyclical pattern and there are likely to be both “ups” and “downs” in the overall process over time. The big question is whether this probable growth and change can be maintained and sustained, and what form that this might take.

Following Butler’s (1980) model of the evolution of a tourist area, growth might be seen to prove to be beneficial or deleterious to pre-existing developments. It could be seen as beneficial if it allows Vallarta to retain the character that has been part of its essence, and leads to reduced negative impact, or even to a positive, planned, rejuvenation of the older area.. It could be negative if it

drains investment from the areas of original growth, and leads to stagnation or decline. It is vitally important to strategically assess how many tourists are wanted in the Vallarta region, and how many can be sustained, socially, economically, and environmentally within this area (Ryan, 1991).

Although data limitations remain, and are likely to continue into the foreseeable future, it has been possible to identify a number of general patterns and the processes that underlie these patterns. It is thus possible to at least hypothesize some of the implications of recent tourist developments in the Vallarta region. However, as major developments are still in an embryonic stage, scope exists for important research in this area. In particular there is a need to monitor the changes in morphology that are currently taking place so that the processes involved can be better understood, and further developments in this area can be better planned in order to allow for social, economic and environmental carrying capacities (Pearce, 1995: Chapter 9). It is hoped that such research will enable us to better understand the impacts and challenges of tourism in the Vallarta region, as well as give clues to similar activities on a larger national and international scale.

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Websites

<<http://www.pvconnect.com/map.html>>

<<http://www.puerto-vallarta.com>>

Endnotes

¹ The term resort has most commonly been applied to tourist settlements - such as Cancun, or Vallarta. However, there is a growing tendency for this word to be applied to individual hotels - especially where these latter developments are extremely large, and are essentially self-contained service modules. The Mayan Palace development cited in this paper is one such development that is still under construction.

² The PCGNP of Canada in 1995 was \$20,670; for the USA it was \$20,750; for Mexico it was \$3,750. However, it is likely that visitors to the Vallarta region are wealthier than the average Canadian and American, with many of their hosts in Mexico being possibly poorer than the national average for that country.

³ Banderas Bay was first explored in the early 1500's by Francisco Hernández de Sanbuenaventura, a nephew of the famous Conquistador Hernan Cortez. He named the bay because he was received by 20,000 Indians bearing feather flags. "Banderas" is the Spanish word for "flags". The town itself which was founded in 1851, is situated in the southern part of Banderas Valley, facing west over the bay with the same name.

The town was named after Ignacio L. Vallarta in 1918 and declared an official city on May 31st, 1968 (<http://www.pvconnect.com/map.html>).

⁴ Among other things, it has given to Mexico its traditional costume, that of the charro; its national beverage, Tequila; and its most representative music, that of the Mariachi (<http://www.puerto-vallarta.com>).

The apophatic way

Paul Simpson-Housley, York University

In a work of consummate scholarship entitled *The Solace of Fierce Landscapes: Exploring Desert and Mountain Spirituality*, Belden Lane examines wild terrain and spiritual life.¹ He considers the experience of mountains and deserts to exude the qualities of winter, and that they are more kenotic than pleromic. They convey us to our edges, and it is in these liminal places that people reflect on their antecedents, and consider their future. One geographer contended that definitions of mountains are as much a function of stories attached to them as their physical properties.² Mountains set personal limits and demand personal energy. They are areas of uncertainty. Psychogeographers argue that internal mental maps play a formidable role in defining mountains. Thus in addition to geodetic qualities there are also symbolic categorizations. Hillman argues that the ascent of a mountain embraces the puer aeternus, the child-like wonder which engulfs us and leads to glory. Their rugged fierceness also favours encounters with God and ecstasy. In addition, the God of Sinai demands absolute trust because of its location.

The vertical dimension has an enormous effect on Judeo-Christian theology. Its profound influence portrays a sense of increasing worth at higher elevations. This is especially true in a spiritual sense if we accept what Rudolf Otto defined as 'the holy' or 'numinous' or 'wholly other' as *mysterium tremendum et fascinans*.³ Mircea Eliade noted "the mountain occurs among the images that express the connection between heaven and earth."⁴ Mountains are detached from ordinary human life, they are realms seldom encroached upon, and are invested with mystery and

foreboding. God's spiritual characteristics are metaphysically expressed in mountains: inaccessibility, transcendence, awesomeness, immovability and eternality. We find this metaphor rendered explicitly in Psalm 125: 1-2

Those who trust in the Lord are like Mount Zion
which cannot be moved, but abides for ever,
As the mountains are
round about Jerusalem,
as the Lord is round about his people,
From this time forth and for evermore.

The aspirational aspects of the vertical dimension are expressed in Psalm 121: 1-2

I lift up my eyes to the hills
From whence does my help come?
My help comes from the Lord
Who made heaven and earth.

As noted, Judeo-Christian literature is replete with references to mountains. Suffice it here to mention a few. Sometimes they are the locus of specific significant events. Abraham bound Isaac on Mount Moriah, intending to sacrifice him, but this was averted by the provision by Yahweh of a ram caught by its horns in a thicket (Genesis 22: 9-14). The mountains of Gilboa were the site of another sacrifice for Israel, the deaths of Saul and Jonathan which David laments:

Thy glory, O Israel
Is slain upon thy high places!
Let there be no dew or rain upon you
(2 Samuel 1: 19, 21)

Mount Carmel is featured prominently in biblical literature. The Shunammite woman visited Elisha there (2 Kings 4: 25), and Elijah's victory over the prophets of Baal, in which his oblation

was consumed by fire in contrast to that of prophets of Baal, took place on this mountain (1 Kings 18: 20-40).

Mountains also form prominent locations in the Christian New Testament. Jesus was on a mount when he delivered the beatitudes (Matthew, 5). When Jesus met a Samaritan woman at a well, she made reference to the rival temple on Mount Gerizim (John 4: 20).

This chapter, however, will focus on three specific mountains in the Judeo-Christian literature, namely Sinai, Zion, and Tabor. All are of colossal importance in terms of their spirituality, and it could be contended they exceed all other mountains in this respect.

The first problem to be addressed is geographical, namely that of their precise locations. We will commence with Mount Sinai. An excellent discourse on this is provided by Hobbs.⁵ The Sinai

Peninsula, roughly triangular in shape is bounded by the Mediterranean Sea, the Gulf of Suez and the Gulf of Aquaba. Its northern latitude is approximately 31°10'N., while its vertex, Ras Muhammad, is 27°43'N. The south of the peninsula, the Upper Sinai massif, which rises to 2665 metres, contains Precambrian rocks, the most common of which is red Ikna granite, estimated to be 580 million years old. Uplift occurred in the Micocene Epoch approximately 25 to 10 million years ago. This uplift precipitated volcanic activity, and in places dicrite, ignimbrite, chryolite and syenite overlie the granite. The principal mountains include Jebel Katarina, and Jebel Musa.

May to mid-September is generally cloudless, and in July and August the mean maximum temperature is 34°C at Saint Katharine Monastery, whose elevation is 1600 metres. Snow comes in November, and in January and February on Jebel Katarina's summit (2665 metres) temperatures may fall to -14°C.

Hobbs discusses the meanings of Sinai and Horeb.⁶ Were they identical? In his discussion of the cosmic mountain in the Old Testament, Richard Clifford makes an interesting comment. He contends that in the Elohist and Deuteronomic sources, the equivalent of Sinai, Horeb, is located in diverse settings. In Exodus 33: 6, Moses went to Horeb, the mountain of God, and Kings 19: 8 reveals that Elijah spent 40 days at this mountain. In the 14 other references, mountain is not used as a term. It is an indefinite location

where Yahweh reveals himself, and not simply the counterpart of Sinai in the Yahwist and Priestly traditions.⁷

Various suggestions are made as to the meaning of Horeb including arid mountain, disintegrating mountain, and desert place. Jebel Musa and Jebel Katerina have been likened to breasts, *sine* in Persian.⁸ Bedouins affirm that the name Sinai is derived from the Arab word *sinn* (tooth) as a result of the jagged appearance. Another suggestion is that the name is derived from the Hebrew word *seneh*, which translates as bush or the burning bush.⁹ Perhaps this is because the shrub is located there or that pyrolusite provides tree-like patterns on Jebel Katarina and Jebel Musa. Another possibility is that Sinai's peaks mean 'mountains of the moon'. Sin was the Mesopotamian moon god, and this term was possibly provided by the Assyrians in the eighth century BCE, subsequent to their domination of the eastern Mediterranean.¹⁰

Other clues as to Sinai's location may lie in the biblical references to quail and manna which provided the Israelites with food. Numbers 11: 31 refers to quails (*coternix coternix*) being delivered by a sea-wind at Yahweh's fiat, and they lay two cubits deep on the ground for a distance of one day's march on either side of the camp at Kibroth-ha-Tavaah. Perhaps the scale is exaggerated but such birds currently are frequent on Sinai's Mediterranean Coast during their autumnal migration. In the 1930s Alexandria and Port Said were deemed to be invaded by quails.¹¹

Similarly manna may have been a natural resource of the area. *Trabatina mannipara* and *Najacuccus serpentina*s are two insect species, and in the mountainous highlands of Sinai's South and in its lowland North they infest tamarisk trees. They suck its sap which is rich in carbohydrates, and remnants of it form on the tree, and these small globules descend to the ground.¹² It is edible and currently Bedouins indulge in its taste.

These foods may provide clues as to the route of the Exodus and thus to the location of Sinai. Generally it is believed that the Exodus took place between 1500 and 1200 BCE. One suggested route is a northern one near to the Mediterranean Coast.¹³ Here quail are more abundant than in the south, and so is the tamarisk tree which has been suggested as a source of manna. This suggestion is strengthened by the fact that Serabit al-Khadim to

the south was heavily garrisoned by the Egyptians because of its mining, and this would deter the Israelites. Others do not concur with this view and argue that Pharaoh's troops would use the 'way of the Philistines' and that a southern route through the high Sinai mountains would provide more adequate water and pasture for large numbers of people and their flocks.¹⁴ There is yet a third school of thought which contends that the 'Way of Shut' provided a central passage for the Exodus since it was least used by Egyptians.¹⁵

Sinai still poses problems as to its location and height. Exodus 14: 1 relates that its location is in the desert of Sinai but makes no reference to its height or appearance. Perhaps its vagueness results from its celestial connections. Exodus 14: 17 affirms death of anyone who touches it, and contact with this sacred place is forbidden.¹⁶ Perhaps Jebel Musa is still its most likely location. To some the artwork in Serabit al-Khadim in west-central Sinai suggests it is Sinai, but Egyptian turquoise mining makes it an unlikely location for Hebrew refugees. It has also been contended that Har Karkom, 80 kilometres northwest of Eilat, is the scared mountain. Its rock art and remains suggest it was an important place of worship.¹⁷ However, its remains date to the Bronze Age, approximately 2900-2000 BCE, and thus it pre-dates the accepted dates for the Exodus, and thus it is an unlikely site. Some suggested Sinai is many miles from its traditional location. Included here are Petra and Jebel Baghir, northeast of Aqaba. Another unlikely location is in northwest Arabia between Wadi 'Araba and Wadi Ithm. Robertson¹⁸ argues for this location and cites St Paul (Galatians 4: 25) "Now Sinai is a mountain in Arabia" As we have noted, some aver a northern route for the Exodus, and thus potential locations are in southern Israel or northern Sinai. Jebel Sin Bisher and Jebel Halaal are suggested locations.

Most geographers and scholars, however, assume a southern route for the Exodus and assume a high peak in the southern part of the Sinai Peninsula to be the location.

The real Sinai demands three elements. First, it must be a mountain peak overlooking an area where people stood. Second, sufficient space for a multitude must be adjacent to it, and third this space must allow people to approach but not touch it. These criteria suggest Jebel Musa or Jebel Serbal as the true Sinai. The

latter is a sacred mountain to Bedouin. They take off their shoes in homage to it. Its ruggedness supports this claim.

Jebel Musa, however, is still the favourite. It is vindicated by the requirements of Exodus. The multitude of Israelites could have been accommodated on the Plain of ar-Raaha. But then which peak was Sinai? Was it the highest summit of Jebel Musa? The highest peak is blocked from view from ar-Raaha by Ras Safsaafa. Ritter argued that it was essential for the campers to see the place of the law-giving.¹⁹ Jebel Musa's highest eastern summit was favoured, and if this were the case the camping ground would be Wadi Asha'iyya and not ar-Raaha. The former could certainly support flocks.

The burning bush (seneh) may give further clues. It has been identified as *Loranthus acacia*. This is a parasite whose crimson flowers decorate acacia trees. When the sun blazes through its leaves it looks like a flaming fire. The plant is known in Sinai today.²⁰

Meteorological and geological phenomena may also suggest locations. A Sinaitic cumulus cloud, black in the centre and white at the edges, which extends from horizon to the zenith and frequently emits lightning could be the pillar of fire and cloud.²¹ This cloud precedes heavy weather in Sinai, and thus it is possible that it was responsible for the drowning of the Egyptian host. Moses may also have been aware as a result of his stay in Midian that porous limestone when struck with a stick would produce water.²² This phenomenon can be demonstrated in Sinai.

Perhaps the pyrotechnical theophany suggests Sinai was a volcano. This could generate fear and thus inhibit the Israelites from ascending it. However we contend that the most likely site for Sinai is Jebel Musa.

Although the location of Mount Zion has been subject to conjecture, there is a relatively short distance between its suggested sites, and certainly not the large geographical displacement that there is for suggested sites for Sinai. Levenson avers that Zion was a hill in eastern Jerusalem located between the Tyropoean and Kidron Valleys. What is currently called Mount Zion is located across the Tyropoean Valley from ancient Zion, and is to its southwest. The Mount Zion of today was only designated as such

in Byzantine times, and scholars deem it inaccurate. Perhaps this misunderstanding partly arises from the fact that many tourists consider the current city walls as very ancient but in fact they were constructed four and a half centuries ago in Turkish times. Current geography can help create false impressions. Jerusalem of the Hebrew Bible in the era of the monarchies was located at the current site of the village of Silwan, southeast of the old city. Biblical references to Zion generally refer to the Temple Mount which supports the highly impressive mosque, the Dome of the Rock. Complications arise from the fact that Jerusalem's name changed several times as a result of local geopolitics. For Jews the city is Jerusalem, for Arabs the term is Alquds, the name being derived from their word for holy. Prior to David's conquest the city was designated as the Stronghold of Zion (1 Samuel 5: 7) The conquest took place at approximately 1000 BCE. Letters from the Canaanite King of Jerusalem to his overlord, the Egyptian Pharaoh in the fourteenth century BCE, bear testimony to the fact that the name was Jerusalem, it being an important city state in the Late Bronze Age. Psalm 76: 3 refers to Salem as God's tent, and Zion as his dwelling place. Thus it is transparent that Jerusalem was also referred to as Salem, actually the name of a Canaanite deity. Abraham was also blessed by the priest-king of Salem (Genesis 14: 18), and Levenson considers this was possible in adumbration of regal and priestly functions commencing with King David.²³

What was the mountain of the Transfiguration? Was it possibly Mount Hermon? The scriptures' reference to intense whiteness may reflect Hermon's covering of snow. However, by the late fourth century CE Tabor had been identified as the mount of the Transfiguration in Mark 9. Thomas affirms that its name is derived from the Hebrew word *Tabbus* meaning navel.²⁴ Lowe mentions that it has a gentle rounded form, a shape similar to the Greek carved stone at Delphi, which was regarded by the Greeks as the centre of the universe.²⁵ Tabor is 1730 feet high but appears imposing because of its location on a plain north of Megiddo. Lane cites Elisaeus, an Armenian who made a pilgrimage to Tabor in the seventh century CE. It provides a major contrast to the desert barrenness of Sinai:

Around it are springing wells of water and many densely planted trees, which blossom from the rain of the clouds and produce all kinds of sweet fruits and delightful scents; there are also vines which give wine worthy for kings to drink ... The path by which the Lord ascended is winding, twisting this way and that; [but] whoever wishes to climb up to pray can easily make the ascent.²⁶

We now turn to the spiritual aspects of Sinai, Zion and Tabor. The theophany at Mount Sinai is perplexing. No metaphor is adequate to describe it. Exodus 19: 16-22 creates the impression of a hurricane with its attendant fire, lightning and cloud. Verse 18 suggests a putative volcano with its contingent fire and smoke. Fear induces quaking in the people.²⁷ The domains of God and Israel intersect here. Only the octogenarian Moses may ascend the mountain Yahweh has descended. If the people try to ascend Sinai, jeopardy and destruction await them. Sinai creates awe and mystery which Rudolf Otto aptly describes as *mysterium tremendum et fascinans* (a fearsome and fascinating mystery).²⁸ Nobody can explain the theophany granted to Moses. Some traditions affirm Sinai and Horeb as identical but we cannot be sure this is the case. Psalm 68: 8-9 and 16-19 are perhaps examples of Israel's oldest poetry, and probably predate the Pentateuchal narrative. These verses record a military march by Yahweh and his retinue²⁹ across wasteland which divides the mountain from Israel. The divide is significant. In this earlier narrative Sinai has a very close connection with Yahweh; it is his abode and has a closer association than simply a place where the law was revealed. In the earlier tradition it is Yahweh's favourite dwelling place, and interestingly not in Israel. It was here that two attributes of Yahweh combine, a bush and a fire. The Deuteronomistic homilist (4: 254) defines God as a devouring fire, but neither predominate. Perhaps the most important point is that God's disclosure occurs in a remote wilderness, detached from state authority.³⁰

In Psalm 97: 8 Yahweh's theophany and apparition have been transferred from Sinai to Zion. The latter has absorbed the former.³¹ Yahweh is no longer remote from human governance. Also post-

biblical rabbis revered its location. Solomon's Temple was deemed to have been built there, and Abraham's attempted sacrifice of Isaac on Mount Moriah occurred in the same place. Zion and Moriah are possibly identical. Both Sinai and Zion have attributes of the cosmic mountain which we must now consider. The identification is stronger in the case of Zion. Levenson designates five principal attributes defining the cosmic mountain.³² He confirms that centrality is possibly the most important of these. Primitive minds regarded geography as a manifestation of transcendent reality. Levenson posits this view so aptly:

It is difficult to imagine ... that ancient Israel possessed such a highly developed empirical geography that she could imagine Jerusalem as physically central, but geometrically peripheral. The notion that something can be spiritually central but physically peripheral is quite modern; it was rigorously attacked only four centuries ago, in the age of Copernicus and Galileo.³³

Eliade articulates the second attribute well: "The temple or sacred city, in turn, as the place through which the Axis Mundi (the axis of the world) passes is held to be a point of junction between heaven, earth, and hell."³⁴ The Temple Mount is a major locus of communication between God and man.

Thirdly Levenson considers the issue of perception of time on the cosmic mountain. In empirical or linear time each event has a predecessor, and does not return, and Eliade defines this succession as profane time. By contrast there is what Eliade defined as *illud tempus*. Temporality is unimportant and the moment transcends time. In this case divine creative energy endures. Time decay and its ravages do not impact upon the divine on the cosmic mountain.³⁵

Also the Temple Mount is very sacred space and is differentiated by this sacrality from the surrounding world. This latter cannot impinge on the holy. The perfection of the divine presence is guarded.

There are also associations with the Garden of Eden. J. Doehment in its creation narrative (Genesis 2: 4-14) makes

reference to precious stones in close proximity to Eden as does Ezekiel (28: 4-5, 13-14) in a reference to Eden on God's mountain. The primal beauty of Eden is preserved on the Temple Mount. The priordial river of Eden bifurcates into four distributaries, namely the Pishon, Gihon, Tigris and Euphrates. Some considered a miraculous stream to flow from the cosmic mountain. Springs were sacrificial in nature. David instructed that Solomon be anointed in the spring of the Gihon to express his kingship.

Mount Zion is conceived as the centre of the world, and it provides the junction between heaven and earth, a place of communication. There are, however, antecedents to the conception of Zion as a cosmic mountain which we must now consider.

A fascinating account of the cosmic mountain in Canaan and the Old Testament is provided by Richard Clifford.³⁶ He affirms that gods meet on these heights, and they are the meeting place of heaven and earth. Decrees are issued from them, conflicting natural forces use them as a battleground, and they are the source of fertility and water. In the Hebrew Bible the cosmic mountain is best exemplified on Mount Zion since Yahweh chose to dwell there. There are, however, as mentioned, Canaanite antecedents. In 1929 the Ugaritic tablets were found at Ras Shamra, and they reveal that Baal-Hadad, the Canaanite storm god, has his dwelling place on Mount Zaphon. Much of the lore which applies to the mountain applies to Mount Zion. Both are impregnable, the scene of battles and the abodes of gods. It is the divine presence which sets them apart.

The Canaanite concept of the cosmic mountain provides insight into the religious views of the peoples of the Syro-Palestinian littoral. Cosmic mountains were each associated with a different deity. El's mountain was a place of power and decree, but he did not decree a temple. Baal's Mount Zaphon was the locus of banqueting. He feted Koshar wa-Khasis prior to the latter's construction of his palace,³⁷ and when his temple was finished he gave a celebratory banquet to 70 gods.³⁸

The Ugaritic text shows the mountain of Baal and El to be cosmic. El's mountain was a locus for decrees, gods met to debate issues, and paradisiac water provided fertility. Baal's mountain

endured combat which determined life and death. It also commemorated victories.

Motifs were transferred from Canaanite Zaphon to a hill in Israel. Exodus 15 provides examples of this. In some cases Zion is a reflex of Zaphon, the site of the Lord's presence, and inviolability against action. Psalm 48 bears testimony to this. Zaphon traditions are clearly revealed in this song. Phrases such as "City of our God", "His Holy Mountain", "The Beautiful Height", "Mount Zion" and "The Reaches of Zaphon" demonstrate this. Ugaritic texts of the second millennium BCE portray El's mountain as the location where the divine assembly meets, Baal is seen as inhabiting a mountain which had to withstand attacks from fearful adversaries. Mount Zion was a repository for Zaphon traditions including monstrous attacks, impregnability and the celebration of kingship.³⁹

We now turn to a theoretical theological consideration of mountains in the Judeo-Christian tradition with emphasis on Sinai and Tabor.

Belden Lane discourses the apophatic tradition in Christian dialogue with relation to God as an inaccessible mountain.⁴⁰ The tradition began in the fourth century BCE as a criticism of theological presumption. He opines that it was a response to Neoplatonism advanced by Porphyry and Plutinus, but more importantly to Gregory of Nyssa's criticisms of the view of Eunomius. The latter was an advocate of the Arian heresy, and argued that the entire nature of the divine could be perceived by the human mind. Gregory thought God's nature could never be fathomed and cited Moses' Sinai experience of unknowing (agnosia) as an illustration of inability to have any comprehension of the divine mystery. It is impossible to create images for the deity. God may be a rock for Israel, but there are far more ways in which God is dissimilar to a rock. The apophatic tradition is a *via negativa*. Less is more. It stresses the incomprehensible and ineffable aspects of God.

The term apophatic is derived from the Greek, *apo* (beyond) and *phasis* (image). It is in direct contrast to the *kataphatic* view, whose genesis is *kata* (according to) and *phasis* (image). This latter sees metaphorical characteristics of God, who can be perceived as

lover, judge, father, still small voice, and raging fire. The kataphatic view is exemplified in Ignatian and Franciscan spiritualities which stress a love of nature and emphasize the five senses. The apophatic way embraces contemplative prayer, relinquishing naming and possessing, and following the *via negativa* which empties the self in silent contemplation. The apophatic way rejects all mental images from the natural world to portray the divine. It abandons the ego. As Saint Bonaventure noted *Ego dormio, sed cor meum vigilat*⁴¹ (As the ego sleeps, the heart remains vigilant). The external false self disappears.

Lane aptly cites John of the Cross to exemplify the apophatic way:

There in the lucky dark,
stealing in secrecy, by none espied;
nothing for eyes to mark
no other light, no guide
but in my heart: that fire would not subside

That led me on - that dazzle truer
than high noon is true
to where there waited one
I knew - how well I knew! -
in a place where no one was in view.⁴²

Sinai is within the apophatic domain. Thunder, lightning and a black cloud hide Yahweh. There is no divine image upon which to focus. It is a dark unknowing landscape of terror, but a theophany took place there, and this unknowing was extremely compelling to the imagination. The mountain is a disorienting place. It provokes both confusion and insight. It exhibits a fierce presence, and hides Yahweh's incomprehensible greatness. But he is covered by darkness, a canopy of thick cloud (Psalm 18: 17). Perhaps, most importantly, Sinai was barren and insignificant, and these were factors which recommended it as the locus of divine revelation.

In an excellent chapter Lane compares Sinai and Tabor as representing the apophatic and kataphatic ways.⁴³ The former exemplifies the apophatic approach to spirituality, and the latter

the kataphatic converse. However, they are interpenetrating and never totally dissonant. Sinai is fierce, barren, rugged and displays the divine's aniconic being. By contrast Tabor is light, green and clear, and lacks the disconcerting darkness of Sinai. The former possessed images, the latter lacked them.

Lane further affirms an overlaying of images for Sinai and Tabor.⁴⁴ The two mountains are juxtaposed in the synoptic accounts of the transfiguration in their overlay of Exodus 24 and 33. Both relate ascent of mountains and Moses and Jesus each take three friends up Sinai and Tabor respectively. Specifically, Moses ascended with Aaron, Nadab and Abiba, and Peter, James and John accompanied Jesus. There is also a double incorporation of the mountain of the old covenant into the mountain of the new. 2 Kings 1: 19 relates Elijah's theophany at Horeb/Sinai. The appearance of Moses and Elijah with Jesus on Tabor seals the overlay.

The glory, however, in both cases, is suffixed by suffering and loss. Moses had approached Yahweh on the mountain subsequent to his people's demands for a golden calf to worship (Exodus 32: 1). Elijah faced Jezebel's wrath and vengeance (1 Kings 19: 2). The transfiguration described in Mark 9 is deflated by announcements in the preceding and subsequent chapters of Jesus' rejection and suffering. The road from Tabor leads to Golgotha.⁴⁵ These apocalyptic visions give a taste of ecstasy and glimpses of future glory. As Lane avers:

It incorporates a theology of hope into a theology of abandonment and loss.⁴⁶

Both mountains are also challenges to established orders. Moses had experienced the defeat of Egyptian oppression, Elijah had challenged Jezebel, and Jesus had demanded opposition to the authorities in Jerusalem. These mountains also symbolized identification with society's marginalized.⁴⁷

As noted the mountains display opposites. The aniconic power of the apophatic tradition is found at Sinai. It is kenotic and there is a sparsity of images. (Lane aptly comments on spiritual poverty of postmodern culture in intentions to locate the iconographic

images of a parking lot and four-star restaurant at an assumed site of the burning bush).⁴⁸ Elijah at Horeb found no images of Yahweh in earthquake, wind and fire, but in the calm silence. By contrast Tabor exemplifies the kataphatic tradition with its clarity and provocative imagination giving rise to artistic expression. Its iconic character is revealed in its lucidity of image. Lane cautions that kataphatic approaches become over-confident and dogmatic without apophatic critique.⁴⁹

The two mountains provide, albeit simplistically, masculine and feminine landscape appraisals. Fierce remote Sinai could be conceived as masculine, and gentle Tabor as a sweet mother.⁵⁰ Yet women love wilderness too. Inaccessible mountains compel the imagination and dreams occur. Yet size is not the major factor. Mount Scopus and the Mount of Olives overshadow diminutive Mount Zion, but the latter is a hillock of great faith and deep longing. Perhaps it is the most important mountain in the Judeo-Christian tradition.

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Sacred Taoist mountains and the poet Li Po

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Mountains are often seen as places that are physically closer to the world of the gods or God, owing to their closeness to the heavens, their domination of the landscape, and the difficulty with which they are ascended. In fact, some religions denote the dwelling places of the gods either on or in the mountains. In the Taoist religion of China, some mountains are viewed as places from whence it is possible to communicate directly with, or meet with the gods or their messengers, or as a place to have a transcendental experience. The T'ang dynasty (618-903 CE) poet Li Po describes a meeting with a Taoist divinity on Mount M'ai-po, "Grand White," (a mountain which shares an epithet that was Li Po's cognomen as well), where he asks the divine being to impart his arcane teachings and give him the secret to an elixir that will conduce him to transcendent status:

(from his series of 59 "Olden Airs")

Grand White - so mottled misted-green!
The starry chronograms in thickset ranks above it.
Three hundred *li* away from heaven,
Aloof like this, it is sundered from the world.

In its midst here is a green-faxed gaffer,
Cloaked in clouds, he lounges with the pines and snow.
He does not laugh, does not converse either;
His tenebrous roost is located in a rugged cave.
I have come - and happened upon the Realized Person;

Kneeling long, I ask for his treasured acroama.
 So resplendent - he suddenly smiles freely at me,
 For conferral, takes up an exposition on refining drugs.

I shall transmit those remarks, engraved on my bones;
 Raising up his person, now he is gone in a lightning-
 flash!

Lifting my gaze far away, I cannot catch up to him;
 In hazy state, my five emotions are inflamed.

- But it is I in future who will devise cinnabar granules,
 And forever be separated from the persons of this world.
 (Kroll, 1986).

The Chinese landscape contributed greatly to the development of these concepts of mountains as conduits to the gods. The Chinese could hardly ignore the presence of these conspicuous geographical features. Seeing as:

The most remarkable feature of China's relief is the vast extent of its mountain chains; the mountains indeed, have exerted a tremendous influence on the country's political, economic, and cultural development. According to a rough estimate about one-third of the total area of China consists of mountains. China possesses the world's highest mountain and largest plateau, in addition to extensive coastal plains (Britannica, 1982).

Tibet and Nepal share Everest - Tibet is part of China. In fact, the world's highest mountain, Mt. Everest (8,848 meters), in Chinese "Chu-mu-lang-ma Feng," and the world's largest plateau, the Tibetan plateau (about 1,400,000 square kilometers) which are part of modern day China, were not part of the T'ang dynasty China of Li Po. However, the rest of China is not without its share of mountains; mountains dominate the landscape with such notable exceptions as the Tibetan Highlands, Turim Basin, parts of the Gobi desert (in the north), Tsaidom Basin, North China Plain and Manchurian Plain. The rest of China is and was (depending on where the border shifted at the time) covered by the following mountain ranges: the Himalayas in the southwest, Nan-Ling in the

southeast, Kunlun, Nan Shan and Tsinglin Shan (central west to east), Tien shan and Altai in the northwest, and the Greater Khingan Range in the northeast, as well as, a large part of China's islands are mountainous.

The Kunlun Mountains alone extend 2710 kilometers from the Pamirs in the former Soviet Union on the west to the Sino-Tibetan ranges on the east, constituting the longest mountain system in Asia, uniting dozens of ranges that are among the highest on Earth. Within the autonomous regions of Sinkiang Uighur and Tibet and the province of Tsinghai, the Kunlun Mountains form the northern wing of the geologically lifted region known as High Asia - the highest such region in the world. The position of this system causes a dramatically asymmetrical structure. Although the average elevation of the watershed ridges in the southern ridges is about 6500 meters, when viewed from the south, the ranges rise only from about 1006 to 1949 meters above the Tibetan Plateau, which itself has an average height of between about 4420 to 5030 meters. However, in the north, where the Tibetan plateau is much lower with average elevations of 792 to 1190 meters, the watershed ridges of the northern ranges, with an average elevation of 5990 meters, create the impression of gigantic mountains that tower up to 4500 meters above the plain.

Born within a country with such an impressive geographical topography, it is hardly surprising that one of China's best loved poets, Li Po, also known as Li Bai, Li Bo or Li Tai-Po (born 701 CE - died 762 CE) was greatly influenced by his surroundings. The influence of this landscape is an oft-repeated theme in his poetry. One example, amongst many, is his poem entitled "Green Mountain:"

You ask me why I dwell in the green mountain;
I smile and make no reply for my heart is free of care
As the peach-blossom flows down stream and is gone into
the unknown,
I have a world apart that is not among men.

This poem also refers to Li Po's ongoing interest in Taoism, with his reference to "a world apart that is not among men", which

was important to him throughout his life. Paul W. Kroll stresses the importance of Taoism and Taoist literature for T'ang poets:

For to Li Po, as to all other T'ang poets, "Taoism" meant the sacred scriptures, solemn practices, and holy mysteries comprehended in the religious sphere of the Shang-ch'ing and Ling-pao traditions - a well-developed and, for the most part, elite spiritual domain that had defined itself during the Six Dynasties period and assumed notable importance in the lives of the medieval literocracy (Kroll, 1986).

Li Po's early childhood certainly opened him up to the world since his father, Li Ke, was a trader at a time when the Silk Road was China's main trade route west and his mother was most likely of Turkish origin. He was born in the town of Sui Ye, near Lake Balkash, and he probably travelled as a five-year-old boy across modern Zinjing and Gansu until the river system of Sichuan could be contacted, and got to what was to be the family home in Jiangyou. The name of the locality then was "Qinglian" (Alley, 1980).

Li Po probably spoke a Turkic language with his mother and sister. This has been inferred from the fact that he was able to interpret for an embassy to the T'ang court in Chang'an many years afterwards. Li Po was sent to study Chinese at a Buddhist temple on Kuang Shan ("shan" means mountain), 15 kilometers from his home. Nothing appears to be recorded about his life prior to this. However, it is known that he spent the years from eight to eighteen, studying and at times travelling to Chengdu, Mount Emie (Omei), and elsewhere. Apparently, the mountains lured him even then, as well as in subsequent years, as Rewi Alley notes:

The monks in the temple called Zong He Da Ming, on Kuang Shan, did a very good job of teaching, and the boy was a great reader of every book he could get hold of. Sometimes he would take them up the scenic mountain called Doutuan, which is 22 km from the county city, to read. Here were some fantastic peaks and caves, which delighted the boy greatly.

When he was 20, he went to Chengdu, and wrote the poem 'Climbing up the San Hua Lou.' Then when 23 he spent some time on Mount Emei, and wrote another poem on 'Climbing Emie,' then, when he

left, another called ‘Song to the Mountain and the Moon at Emei’ (Alley, 1980).

In fact, Kuang Shan made such an impression on young Li Po that he wrote “Farewell to Kuang Shan,” when he was leaving in 718 CE:

Early morning and green mountain peaks
make a real picture, some being high
others low, wisteria vines swaying the
the wind then brushing the balustrade;
so often have I gone up this hill path
my dog following, and in the evening
returned along with woodcutters, seeing
temple visitors watching the clouds
and listening to the monkeys amongst forest
trees; in the near-by pond, monks washing
their begging bowls, the cranes there
flying away; blame me not for leaving
this quiet and beautiful place, for now
I would put the learning I have gained
to the service of our brilliant rule (Alley, 1980).

Li Po was not destined to leave his mark on the politics of China. In 742, he did go to Changan, at this time the capital, and was presented to Emperor Hsuan-tzung (emperor from 712-756, known as Ming Huang, “The Brilliant Emperor”), who bestowed upon Li Po the honourable academic title ‘Guang Fen Han Lin’ and gave him a position in the Hanlin Academy. However, this did not last long as, in 744, he fell victim to court intrigue and was banished. During his banishment, Li Po spent a decade travelling through the mountains in east and southeast China. Then, during the An Lu-shan rebellion (755-57), Li Po once again incurred the disfavour of the emperor by associating with the Prince Li Lin, who was commander of the anti-An Lu-shan forces and who plotted ultimately to take supreme power for himself. Thus, after the emperor defeated Li Lin, Li Po was exiled to Guizhou. However, he soon received amnesty and spent the rest of his life travelling along the Yangtze River.

Li Po died in Dangtu, Anhui, in 762, at the age of 62, probably from cirrhosis of the liver or from mercury poisoning due to Taoist longevity elixirs, but legend has it that he died while drunkenly embracing the moon's reflection on the Yangtze. Li Po's relationship to wine is well known and some say that it offers evidence of his "romantic" spirit or some sardonically applaud it as the agent that succeed in "illuminating a poet previously benighted by Taoist superstition" (Marsano, 1992). Nevertheless, there is no evidence that Li Po ever renounced his Taoist beliefs. In fact, in a poem packed with Taoist allusions, called "I Am the Original Madman of So," Li Po ridicules Confucius and proclaims his lifelong devotion to the Tao:

I am the madman of the Ch'u country
 Who sang a mad song disputing Confucius.
 Holding in my hand a staff of green jade,
 I have crossed, since morning at the Yellow Crane Terrace,
 All five Holy Mountains, without a thought of distance,
 According to the one constant habit of my life. (Li, 1998)

He stresses that the Tao is "the one constant habit" of his life.

Whatever is the truth about Li Po's death, there is no doubt that Li Po is one of China's greatest poets. This is an impressive accomplishment, seeing as Chinese literature is perhaps the oldest in the world with an uninterrupted history of more than 3,000 years, dating back at least to the 14th century BCE. It is considered that during the T'ang dynasty Chinese literature reached its golden age and in poetry all the verse forms of the past were freely adopted and refined, as well as, new forms were crystallized. Li Po used strange diction and rhyme and preferred older poetic forms such as songs or ballads, deliberately avoiding the *ló shih* poetic form (popular during his time), with its strictly regulated verse of eight lines with five or seven syllables, each set down in accordance with strict tone patterns.

Thus, Li Po's poems have a free, flowing quality, as he explores mystical Taoist and actual mountains in his poetry. His use of nature images has earned him comparisons to the 10th century

Italian poet Leopardi. To illustrate this point, Barricelli compares the concluding remarks of Leopardi's "The Solitary Thrush" to the conclusions of Li Po's "Climbing the Peak at Lin-hai:"

I turn aside for flowers, rest on rocks - suddenly it's night
 water soft-seething, sending up mists,
 and from the blue darkness, bottomless, vast and wild,
 sun and moon shine sparkling on terraces of silver and gold ...
 Suddenly my soul shudders, my spirit leaps,
 in terror I rise with repeated sighs:
 only the mat and pillow where now I woke -
 lost are the mists of a moment ago!
 All the joys of this world are like this,
 the many-vented past a river flowing east.
 I leave you now - when will I return?-
 to loose the white deer among green bluffs,
 in my wandering to ride them in search of famed hills.
 (Barricelli, 1987)

The nature images used by both poets are imbued with special significance that transcends the use of imagery to evoke a sense of physical surroundings or emotional state. Barricelli notes:

The moon and birds and mountains I have alluded to in the poetry of Leopardi and Li Po are endowed with such universal significance, and by representing something abstract they guide their poetry from compound imagism to symbolism. Particularly in its metonymic associations, their imagery reveals their personality more clearly than the case of traditional landscape poets. (Barricelli, 1987)

Certainly, Li Po's poetry is packed with symbolic significance. In that respect, it is impossible to ignore Li Po's Taoist connection. He often uses Taoist imagery and diction in his poems and makes innumerable allusions to Taoist literature of his time. For example, in a poem where he praises the superancy of Mount O-mei among the many eminent peaks of Shu, he declares:

Coolly indifferent, prizing the purple auroras,

Indeed I have gained the techniques of the damask satchel.

Here he mentions the “damask satchel”, a magical object reputed to belong to the goddess Hsi Wang Mu. This satchel was thought to contain a scroll, which was the sacred text of the *Wý?h chen-hsing t’u* (Plans of the True Forms of the Five Marchmounts), one of the most “celebrated periapts of medieval Taoism.” Taoists believed that it had the magical power to keep its possessor from harm, especially in alpine areas, through the help of spiritual emissaries sent by the deities of the Five Holy Mountains (Kroll, 1986).

Li Po’s attraction to Taoism is hardly surprising in view of his interest in nature, especially mountains, and the fact that Taoism encouraged the love of nature as well as the artistic depiction of deities and minor spirits. Also, Taoism proposed a less formal, more intuitive approach to life in general and this approach was carried over into the arts and into theoretical discussions of them. Taoism stressed that the Tao (the way) resides in all beings and that its realizations cannot be taught. Paradoxes were used to point to the truth and emphasis was placed on contemplation of natural life and on reclusive retiring to nature, ideally onto mountains, where transcendental experience would instruct one in the mysterious ways of the Tao. In fact, it is claimed that the founder of Taoism, the 6th century sage Lao-tzu (reputed to be the author of Lao-tzu or Tao-te-Chaing, although many scholars dispute his existence), wrote the sacred text of Tao-te-Ching at the request of Yin His, legendary guardian of the pass (Kuang-ling). He wrote it on the Hsien-ku pass, which was the entrance into the state of Ch’in, and then disappeared forever. T’ang emperors officially supported Taoism because of their claim to be descended from Lao-tzu.

Li Po did not claim to be Lao-tzu’s descendant, but he did however see himself as a banished immortal. He claims that the presiding spirit of holy Mount T’ai-po opened up the Barrier of Heaven for him, thus assuring that his name would be recorded in the fatidical rosters of immortality and certifying his celestial state. Some of his contemporaries fancifully regarded him to be the essential spirit of the star after which the mountain was named.

Mount T'ai-po, or "Grand White," held special significance for Li Po because it had the same name as he did. Li Po's kinsman Li Yang-ping says that on the night that Li Po was born his mother had a dream in which she was visited by the moving star (or planet) called T'ai-po, thus, the child was given the name Po, "White" and the cognomen T'ai-po "Grand White." Mount T'ai-po was located in the Wu-king township, present day Mei district, in Shensi, on the westernmost spur of the Chung-nan range. Kroll states that it:

... was clearly the alpine *doppelgänger* of the star and provided an earthly communication point with it. Indeed, one medieval text states unequivocally that the mountain contained the essence of the star, fallen to earth. This sidereal essence manifested itself as the lovely white stone slabs, resembling fine jade, that were miraculously discovered on T'ai-po Shan in 742 and out of which the emperor ordered carved a 20-foot tall image of Lao Tzu, plus flanking statues of himself and two of his high ministers, to be erected in the temple of the deified Lao Tzu in Ch'ang-an (Kroll, 1986).

Interestingly, it was in 742 that Li Po was honoured with a title and an academic post by the emperor.

Mount T'ai-po held a special significance for Taoists and was the retreat of several early T'ang recluses, alchemists, and adepts. It was believed that it concealed the eleventh of the 36 "lesser grotto-heavens", as is recorded by the Taoist teacher and cleric Szu-ma Ch'eng-chen (647-735 CE). Li Po, however, was the first writer to portray the mountain in verse, writing two poems about it; one of them was the fifth of his series of 59 "Olden Airs" (reprinted at the beginning of this paper) and the other was "Climbing T'ai-po's Peak:"

To the west I ascend the peak of Grand White -
In dusky sunlight finish with my scrambling and climbing.
Grand White grants to *me* a colloquy,
And for my sake opens up the Barriers of Heaven!

I will mount the cooling wind and be gone -
Breaking straight out through the floating clouds.

Lifting my hand, I may draw near the moon,
 Proceeding onwards, as if there is no mountain now!

Once parted and gone away from Wu-kung,
 What time would I come back here again? (Kroll, 1986)

This poem describes a transcendent experience that the poet has on the mountain, taking him away from the mortal world, away from the province of Wu-kung, where the mountain is located, and into the realm of immortals, past the Barrier of Heaven. Thus, upon his return to earth he becomes the banished immortal. The quest for physical immortality is considered to be the highest good, the ultimate goal, in the Taoist religion, with their elixirs geared towards prolonging life. Therefore, Li Po's attainment of immortality would be viewed as the greatest achievement.

Another magnificent example of Li Po's fascination with the Taoist concept of sacred mountains is portrayed in a poem titled "Seafarers Speak of Yei Island," which describes an imaginary visit by the poet to the sacred Taoist mountain T'ien-mu Shan. Here he sees many fantastic creatures and the immortals, the Lords of Clouds, descend in a long procession:

Half way up appears the sun in the sea,
 In midair is heard the Cock of Heaven.
 Among thousands of crags and ravines the road meanders

 Bears roar, dragons chant - the thundering cascade,
 Deep woods quake with fear and towering ridges tremble
 Clouds turn dark with a hint of rain;
 On the placid waters mists rise,
 Lightning flashes and thunder rumbles;
 Crags and peaks crash and crumble.
 The stone gate in the fairy cave
 Splits asunder with a shattering sound
 Its blue depth is vast, the bottom is invisible.
 The sun and moon shine on the Towers of Gold and Silver;
 Clad in rainbow raiments and riding on the wind,
 The Lords of Clouds descend in long processions,
 Tigers playing the zither and phoenixes drawing
 the carriages,

The fairies stand in rows like a field of hemp (Li, 1998).

Here Li Po takes us on a journey to a place where the physical world touches the world of the immortals. Perhaps, the Taoist sages in their quiet contemplation of nature, noticed the peculiar patterns formed by clouds around isolated mountains, noting the convective bands that can be traced upstream to individual mountain peaks (Sang, 1999). This phenomenon could have been viewed as an indication that mountain peaks were special places in physical connection to heaven, the realm of the immortals.

No doubt Li Po would have sat and pondered the significance of these unusual celestial phenomena around mountains, since as Arthur Waley points out, Li Po was always attracted to the “wilder aspects of Nature ... vast untenanted spaces, cataracts, trackless mountains and desolate ravines” (Li, 1998). High up in a lonely retreat, writing the poem “Alone Looking at the Mountain,” Li Po notices:

All the birds have flown up and gone;
A lonely cloud floats leisurely by.
We never tire of looking at each other -
Only the mountain and I.

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From Manila to Manitoba: family history and Filipino migration to Winnipeg

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Abstract: The “life-history” method has been used by social historians and historical geographers in the study of migration and settlement in an attempt to overcome the sterility of immigration history based solely on official census returns. A case study of regional and global migration patterns of Filipinos is presented here through the life-history of two Winnipeg Filipino families: the Ubaldo/Bautista and Udarbe families. They migrated to Canada in the later half of the twentieth century, but they did so at different times and under different circumstances. The migration histories of the Bautista and Udarbe families are broadly representative of the experiences of thousands of other Filipinos who have immigrated into Canada since 1960. Their experiences were similar in that inter-regional migration preceded emigration to Canada, but the role of chain migration in Filipino immigration is difficult to ascertain if we are to judge from these two family histories. The settlement of other Filipinos in Winnipeg helped dispel some of the anxiety from moving into a new social and economic environment, so this sense of community eased the transition into Canadian life. Yet, immigration to Canada is still a difficult experience for people coming from the less developed regions of the world.

Introduction

People migrate in response to push and pull factors. They are pushed to move by dissatisfaction with their social, political or economic situations; they are pulled to specific destinations by better opportunities for employment, education, and improvement in living conditions. The story of human history is one of migration.

Patterns of global migration have shifted over the last century. In the late nineteenth and early twentieth centuries movement was from the industrialized heartlands to rural hinterlands as migrants sought agricultural land in lands opened to European colonization. In the last half of the twentieth century local migrations were rural to urban and global migration patterns were from the third world hinterland regions to the industrial heartlands of the developed nations.

It has been said that the greatest export of the Philippines is its people, who have pursued their economic goals through internal and international migration (Aranas 1983). By 1996 there were 234,195 Filipinos residing in Canada, mostly in the major urban centers of Toronto (99,115), Vancouver (40,715), Winnipeg (25,715), Montreal (14,383), Calgary (11,795), and Edmonton (10,495) (Statistics Canada 1996). With about four per cent of its population Filipino, and with almost eleven per cent of the total Canadian Filipino population, Winnipeg is an important center of Filipino life in Canada.

This paper analyzes aspects of both the regional and global migration patterns of Filipinos through the life-history of two Winnipeg Filipino families: the Ubaldo/Bautista and Udarbe families that migrated to Canada in the later half of the twentieth century, but at different times and under different circumstances. The "life-history" method in the study of migration and settlement has been employed by social historians and historical geographers in an attempt to overcome the sterility of immigration history based solely on official census returns (Eyles and Perri 1993; Lehr 1996; Le Bihan 1997; Lehr and Picknicki Morski 2000). Life histories capture some of the uncertainties of migration, an event that, for most participants, was the most important decision of their lives. Whereas there is a considerable literature devoted to the pioneer period of migration and settlement in Canada, and a growing literature describing the immigration of more recent arrivals, the immigration of Filipinos, who arrived in Canada following a change in Canadian immigration policy in 1962, has not yet received much attention in the academic literature (Avenuerly 1995, Hiebert 2000). Certainly there has been little attempt to employ the life-history method to illustrate the diversity of experience encountered by

Filipinos immigrating into Canada. This paper attempts to fill this void.

The Ubaldo/Bautista Family

Delia Ubaldo [now Bautista] lived in Angono, Rizal. This town lies within the national capital region of Metro Manila. In 1975, Angono's population existed at 17 thousand people; Metro Manila then had a population of nearly four million (Figure 1) (United Nations 1986). Born in 1949, Delia Ubaldo was the fourth child of her family's eight surviving children.¹ Her mother, Juana, was a housewife and caregiver. Her father, Victorio, was a hired seasonal rice farmer and fisherman. Necessities such as food and shelter took most of his earnings. High tuition fees put secondary school beyond the reach of his eldest children, including Delia. Nevertheless, Delia taught herself English by reading English language magazines with aid of a dictionary. At the age of 16, she applied for a job as a seamstress in a Chinese-owned local garment factory in order to supplement the family income. Technically employees were required to be eighteen or older, but her "mature appearance" enabled her to pass herself as eighteen after misrepresenting her age on the application for employment. As a seamstress she earned four pesos a day, (twenty five cents Canadian at the current rate of exchange), but then enough to purchase a simple meal of fish and rice sufficient to feed a family of eight for an entire day. That same year, the rice field on the outskirts of Angono, on which her father worked, was sold to a subdivision developer for the expansion of the town. The loss of her father's income put the family under economic pressure.

Changing jobs in 1969 at age twenty, Delia continued to work in the garment industry at a factory in Pasig, Rizal. Here she first learned about Canada through a co-worker. At the time, Canadian Immigration and Manpower was recruiting garment workers to fill labour demands in a growing sector of the Canadian economy (Bellan 1978). Since the Canadian dollar was, and still is, significantly higher in value than the Philippine peso, Delia believed that working abroad was the most effective way to help support her



Figure 1: Location of Angono, Philippines.

family. She traveled to Makati, Rizal to obtain an application for immigration from the Canadian Embassy in 1972.

The application and screening process was quite rigorous and certainly seemed unhurried, since over six months elapsed before a response was forthcoming (Hiebert 2000). Inviting her to a series of several interviews with Canadian consular officials. Immigration officials were most concerned about linguistic ability, level of education, and the type of occupation sought in Canada. Delia referred to her first interview as “pleasant” and the Canadian consular official as “very considerate” speaking “Taglish,” a mixture

of Tagalog and English, when quizzing her about her motives for migration and her intentions in Canada. Following this interview Delia, along with fifteen other aspiring immigrants took a garment-sewing skill test. Her test required her to successfully create three circles on three separate sheets of paper using three levels of high-speed factory-style sewing machines with Canadian garment-factory recruiters looking on.

Her notification of success on the test informed her that she was selected for employment with the garment industry in Winnipeg. She was required to attend another meeting with the Canadian consular official with whom she had initially met. He informed her of her requirements before entering Canada, such as a medical examination, passport, and N.B.I. (National Bureau of Investigation) clearance. After completion, Delia found that she lacked the money to purchase a plane ticket to Canada. Accordingly she applied for a “fly now pay later” travel plan created by *CP Air Manila* and *Canadian Pacific Airlines*. The Canadian embassy supplied a list of legitimate travel agencies who offered this plan, and emphasized that all services through the embassy were free of charge.² Finally, near to her departure date, along with other recruits she attended an orientation meeting at the Canadian embassy. Through films, they were introduced to Winnipeg’s cold climate and general appearance. On May 3, 1974 Delia and approximately twenty other garment industry recruits from throughout the Metro Manila area, departed from Manila International Airport to Winnipeg via Hong Kong and Vancouver.

Delia arrived in Canada on May 3, 1974. Arrival in Winnipeg was filled with a mixture of excitement and fear. The Filipino workers were met at Winnipeg airport by a representative of *Midwest Garment Industry*, the company that had recruited them. He informed them of their new workplace, its location, company expectations and its work hours. The representative also arranged accommodations for immigrants who did not have a place to stay. Delia stayed with acquaintances from Angono who had previously immigrated through garment industry recruitment in 1969, though they had not influenced her decision to migrate. She lived on Bannerman Avenue, east of Main Street in the West Kildonan area of Winnipeg. She found the area as multicultural with Italian,

Chinese, and Filipino immigrants. Within the workplace she felt comfortable since most of the workers at *Sylpit Industries*, a division of the Canadian-owned *Midwest Garment Industries*, were immigrants and all “pretty much the same,” in that they shared the same fears and problems. Her only complaint about Canada was the homesickness she felt.

She recalls the factory as a “nice working environment” where she was paid \$2.35 an hour, the minimum wage at the time. They were also given pay incentives for their piecework if they produced more than the factory quota. Delia was able to easily adjust to Canada since she spoke English and worked in a multicultural environment. In order to provide her family with better opportunities in Canada, and to fill the social void she had felt when isolated from her family Delia sponsored her younger siblings in 1977. They were later denied, due to changing requirements in the Canadian immigration system. As a landed Canadian immigrant, Delia returned to the Philippines later that year where she married Eliodoro F. Bautista. In 1978, she sponsored him and became a Canadian citizen. Eliodoro was accepted into Canada, and immigrated in 1978 where he also worked in the garment industry.

The Udarbe Family

In 1970-1975, there were approximately 263,058 in-migrants into Metro Manila (United Nations 1996). As elsewhere in the less-developed world, large cities attracted people from the rural areas and smaller towns, offering the prospect of better access to jobs, educational opportunities and entertainment facilities. In the outlying rural areas inadequate water supplies, medical facilities and access to consumer goods in rural areas pushed people to the city (Lewis 1982). The migration history of the Udarbe family reflects these regional trends and also illustrates a new phase of Filipino trans-national migration.

Born in Cordon, Isabela Province in 1953, Naomi Mariano moved to Manila in 1969 at age 16 to pursue higher education at the Philippine School of Business Administration. Her future husband, Steve Udarbe had migrated from Vigan, Ilocos Sur Province to Manila, a few years earlier, to finish elementary, to

attend high school, and eventually, to attend the University of Santo Tomas. After finishing their university education, both found employment: Naomi as a secretary in the Media Department at the Baptist Mission, Steve as a Medical Representative/Field Trainer with Zuellig Pharma Corporation, Wander Division in Makati, Metro Manila.

Naomi and Steve married in 1977 and then moved to Quezon City, one of the cities within Metro Manila. Two years later their first child was born and Naomi left her job at the Baptist Mission for a higher paying position as a Registrar/Secretary with the Philippine Christian University.

In 1983 Steve went to Jeddah, Saudi Arabia, to work for two years as a Medical Sales and Marketing Specialist and Bio-Medical Engineer, before accepting a position in Manila with Wisconsin-based Swan Sales Corporation where he was employed as an Area Manager for the Philippines and Pacific. In 1986, after the birth of her third child Naomi left her job to care for her children. In the next few years, she had a further three children.

Disputes within the Udarbe extended family in the mid-1990s changed the social dynamics of the family, causing Steve and Naomi to relocate within Quezon City. After this, Steve decided to explore emigration to Canada. His motives for this decision are unclear but it is probable that his previous experience working overseas had broadened his horizons and eroded any reluctance to relocate abroad in search of economic betterment. He had first learned about the opportunity of migrating to Canada from a close friend who had migrated to Winnipeg several years earlier but his attention was caught by advertisements in the local newspaper by *Immigration Network Services* [INS], which offered to facilitate the application process for entry into Canada.

For a fee of about \$38.00 Canadian (970 pesos) Steve and Naomi viewed tourism films and videos about Canada and were given a preliminary assessment by INS. Eventually INS compiled, processed, and submitted the family's papers to the Canadian embassy. These processing and consultation services cost more than \$2,800.00 Canadian, with no guarantee that their application would be successful.

The Udarbes' application for independent immigrant status was approved in 1996. Before their landed-immigrant visas were issued, Steve and Naomi had to attend orientation sessions at the Manila office of International Organization for Migration to prepare them for life and work in Canada. All family members were required to register with the Commission on Filipinos Overseas and attend its pre-departure orientation seminars after they had undergone a full medical examination. Although the family applied together, Steve left for Canada alone, early in March 1997. On July 20, 1997, after the end of the school year, his family followed.

Winnipeg was chosen as a destination likely because of kinship ties. Although the family had no blood relatives in Winnipeg, they had friends there. Upon arrival, they stayed in a rented house on Morley Avenue, which was located near schools and their Filipino friends. Having close family friends in their neighborhood eased their apprehensions and helped with their adjustments. After two years, the property was sold by its owners, and the Udarbes relocated into a townhouse in a different area of Winnipeg.

Like many other immigrants, the Udarbes faced many difficulties including securing employment at a level commensurate with their education and skills. Their Philippine education and training is not immediately recognized in Canada. Many Filipinos accept jobs either in "lower categories" of their profession, or jobs that are totally unrelated to their field (Aranas 1983, Buduhan 1972). Steve had difficulty in finding employment related to his sales profession. In order to provide for the family, he took low-paying jobs and endured substandard working conditions working as a Telephone Representative, a convenience-store clerk, and finally in 1999, as inventory clerk at a Pharmaceutical Company. Presently, he is a full-time student, studying computer engineering. Naomi worked as a health care aide before becoming a medical secretary at a private clinic.

Conclusion

The migration histories of the Bautista and Udarbe families are broadly representative of the experiences of thousands of other Filipinos who have immigrated into Canada since 1960. Their

experiences were similar in that inter-regional migration preceded emigration to Canada. In the case of Steve Udarbe, this was temporary residence overseas. In both cases, motives for migration were primarily economic. It is safe to say they were pulled into Canada rather than pushed out of the Philippines. The labour needs of Canada, specifically the demand for skilled workers in Winnipeg's garment industry clearly played a vital role in the Bautista migration. It was Canada's changing labour demands that denied Mrs. Bautista's younger siblings immigrant status. The Udarbe family, on the other hand, had a less difficult, yet costly time applying for immigrant status. At the time of their application, there were professions or skills outlined by the Canadian Embassy that were in demand. This included sales, which in Steve's case, was his forte. Despite their high level of education in the Philippines, the Udarbe family was unable to find their qualifications accepted as equal to those granted by Canadian institutions.

The role of chain migration in the Filipino immigration appears cloudy if we are to judge from the family histories reviewed above. Although migration was not undertaken to join relatives already settled in Canada, the example of others who preceded them made the decision to migrate easier. The presence of other Filipinos in Winnipeg helped dispel some of the anxiety from moving into a new social and economic environment. This sense of community eased the transition into Canadian life. The path of migration and settlement in Canada over the past century has clearly changed little. Despite greater involvement from the government in almost all stages of the migration process, it is still a difficult road for those coming from the less developed regions of the world.

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End Notes

¹ Six children in the Ubaldo family died in infancy and youth to various illnesses including pneumonia.

² Some travel agencies added additional illegal charges. Delia received an invoice for her plane ticket three months after arriving in Canada (August 1974). She made installment payments to her local bank, where it was then forwarded to *CP Air Manila* in the Philippines.

International ramifications of the “Reformists” triumph in the recent Iranian elections

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Abstract: As a result of the globalization processes, national elections often have considerable influence on a state’s foreign policy and international relations. This is particularly true for the states with geopolitically strategic locations and in control of vital resources. The Islamic Republic of Iran is one of the largest states in the Middle East in terms of area and population. It is the second largest oil producing country with a commanding control over the strategic Persian Gulf waterway. With over 65 million inhabitants and billions of dollars annual hard currency exchange, it is also a dynamic trade partner in the global economy. In 1997, Iranians elected Mohammad Khatami, a moderate cleric as the president, with a landslide victory. They also voted overwhelmingly in favor of the “reformist” political groups in the February 2000 parliamentary elections. The triumphant president and the reformists in the parliament (Majles) promised a new era in national democracy and substantial improvements in the foreign policy. This study examines the ramifications of the “reformists” victory over the “conservatives” in the presidential and parliamentary elections for Iran’s foreign policy and international relations since 1997. So far, mainly because of power struggles between the reform-minded and the hardliner groups, the government’s success in ending Iran’s international isolation and re-establishing full integration into the global economy and political system has fallen short of its potentials and expectations. Possible changes in the internal Iranian political system and the international situations in the new millennium are also discussed.

Introduction

In the last several decades, the Iranian internal political events have often involved other states, sometimes with far-reaching consequences (Ghods, 1989). Iran is one of the largest states in the Middle East with a population of more than 65 million and a commanding control over the strategic Persian Gulf waterway. It is the second largest oil exporting country in the world, producing 3.7 million barrels per day, more than half of which is exported. Iran is also an active partner in the global economy in areas of industrial technology, communication equipment, military hardware, and foodstuffs. A stable and prosperous Iran can contribute to the peace and stability of the Middle East region. After almost two decades of enduring sanctions and isolation, Iran is trying to enter the international scene with a new image. The election of Mohammad Khatami, a reformist as the president in May 1997, promised a new era in national democracy and improvements in the international relations. The impact of Iran's presidential (1997) and parliamentary (2000) elections on the state's foreign policy is the focus of this paper.

Backgrounds

Iran's first experience with popular political election was as a result of success in the constitutional movement of 1906-11. After more than two thousand years of absolute monarchy, the political system was changed to a constitutional monarchy. However, the monarchs (shah/king) rarely allowed the first constitution to be fully implemented. The 1979 Revolution, for the most part, was a reaction to decades of interference by the government in the constitutional rights of people to hold free and fair election of their representatives.

The advent of the Islamic Republic of Iran put an end to the monarchy, but the theocratic nature of the regime adopted a "unique brand of democracy" which is different from those practiced by the European states and North America (Takeyh, 2000). In the Islamic Republic, the ultimate power is in the hands of the supreme leader, Ayatollah Ali Khamenie, who supports the conservative groups. He has the ultimate power and is not responsible to anyone

or limited by any laws (Hunter, 1992, p. 18-23). He is not appointed and his responsibilities are not clearly defined, nonetheless he has a commanding influence in matters of religious law and national affairs. Another layer of political authority is the Guardian Council, which can reject legislation approved by a majority of Majles (Parliament) representatives if it decides that they do not confirm to the rigid definition of Islam. Thus, the powers of presidency are sharply limited by the Iranian constitution, which entrusts commands of the police and armed forces, as well as control of the judiciary, to the supreme clerical leader. At present, the conservatives also control the state's powerful broadcasting systems.

Since 1979, Iran has held twenty elections including four presidential elections. The two previous presidents relinquished their powers after the period stipulated in the constitution. This is in sharp contrast to other Middle Eastern republics such as Egypt, Libya, Iraq, and Syria where presidents have managed to stay in power for life. The relative openness of recent elections is further proof that the Islamic Republic is one of the most pluralistic countries in the region. The elections have been relatively free of serious fraud allegations and public participation and engagement have been unprecedented. The election for the Sixth Islamic Consultative Assembly (Majles) was held in February 2000. In this election 83% of the eligible voters (38.7 million) cast their votes to elect 290 deputies (Maloney, 2000). Since the minimum age of eligibility for voting is 16 years, the youth along with women were the most significant groups to vote. The pattern of support for the reformist is not uniform among the 28 provinces (Figure 1). In addition to the core-periphery variations, large urban centers also voted for reforms. Even Qom City, the center of religious seminaries and a stronghold of conservatives elected one reformist and two conservatives. The five officially recognized religious minorities each elected one representative. The Zoroastrians and Jews have one representative each; Assyrian and Chaldean Christians collectively have one representative; and the Armenian Christians of the south and the north each have one representative.

The president is elected directly by the electorates for a four-year term and it is possible to be reelected for a second term. President Mohammad Khatami was elected with a landslide in 1997.

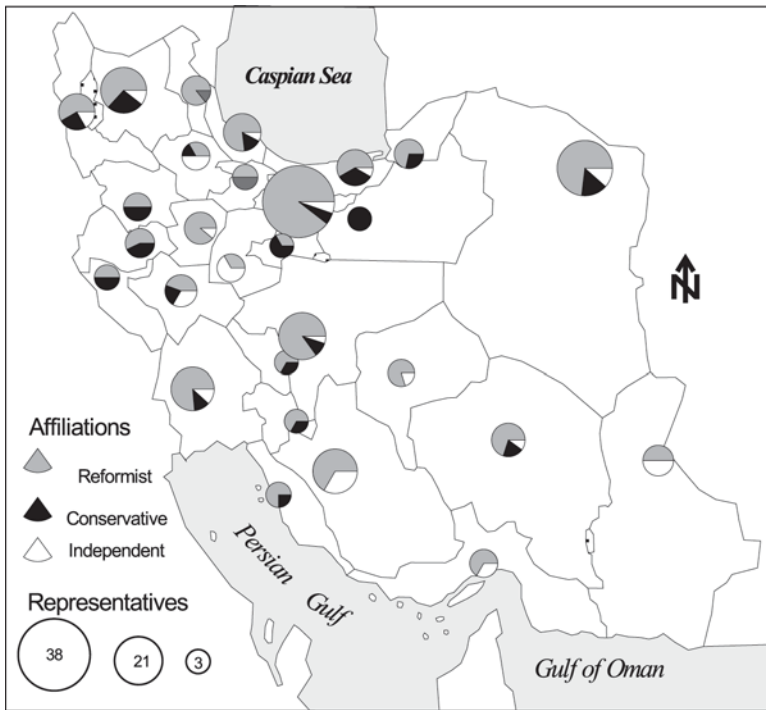


Figure 1: Number of representatives and their political affiliations in the 2000 elections.

He is considered the leader of the “reformist” political groups in comparison to the “conservatives” who support hardliners in state affairs. The reformists’ strong showing at the presidential ballot boxes was repeated in the local elections held in 1999 and the parliamentary elections of February 2000 (Abdo, 1999). These elections have brought some of the differences in ideology and approaches to governance to the surface of the political arena. This study examines the ramifications of the reformists’ triumph in the presidential and parliamentary elections for Iran’s foreign policy and international relations since 1997. These election outcomes are significant not only for Iranian society and politics but also for the region and beyond.

Role of the President

Because of the many layers of the power structure, especially the role of the supreme leader and the Guardian Council, the president and parliament are hampered from initiating and implementing fundamental reform policies. Khatami's government has made instituting a "rule of law" one of his political priorities. Although the President is still popular inside and outside of the country, he has had only a limited success in energizing the national economy and improving Iran's international relations. He blames the conservatives for lack of success in fulfilling his obligations and progress in his economic development programs. On November 26, 2000, the president, addressing a conference on the constitution expressed his frustration by saying: "I declare that after three and half years as president, I don't have sufficient powers to implement the constitution, which is my biggest responsibility. In practice, the president is unable to stop the trend of violations or force the implementation of the constitution" (Agence France Presse, Nov. 26, 2000). Since April 2000, the judiciary, which is controlled by hardliners, has closed down 30 publications—all but one of them pro-reform newspapers. Khatami said that the closed-door, no-jury courts that were being used to try journalists and political activists were an example of how the constitution was being trampled.

The conservatives' tendency toward economic and political isolation at a time of growing globalization trends also hinder the country from achieving tangible economic development. Consequently, there are a great number of disillusioned Iranian youth who may spread the recent isolated unrest to a dangerously wider circle. Lack of economic opportunities and double-digit unemployment rate force thousands of Iranians to seek work and residency outside of the country. After more than two decades, still Iran is among the top ten countries with the highest origins of refugees and asylum seekers in the United States, Canada, and Europe (Yungk, 2000).

The Parliament

The parliament has a significant role in the foreign affairs of the Islamic Republic of Iran. Articles 77 and 82 of the constitution state that the Majles must approve international treaties, protocols, contracts, and agreements. Employment of foreign experts is forbidden, except in cases of necessity and with the approval of the parliament. According to the Constitution, the Majles is the main institution conducting the Islamic Ummah (community) towards independence, growth, and freedom. It is also entitled to obstruct 'infiltration of imperialism' by approving or disapproving all political, economic, and cultural relations with foreign countries.

In order to attract foreign capital investment, the new parliament passed a landmark trade law. Since 1950s the laws have prohibited foreigners from holding more than 49 percent of companies in Iran. The new law permits ownership of over 50 percent and the government guarantees the foreign investments against nationalization and takeover. During late August 2000, Karrubi, the head of the Majles and pro-reform cleric was in the New York City for a UN visit. He organized a meeting with the major US oil corporations to invite them to invest in Iran's oil and gas industry. However, continued internal power struggles and the ensuing failed Arab-Israeli Peace process prevented Iran from attracting any substantial foreign investment (Gasiorowski, 2000). Although the reformists are in a majority in the Sixth Parliament, still they are unable to support the President to muster enough power to implement his policies. The legislators are also subject to the power of the supreme leader and the Guardian Council members.

The new Majles has approved several socially significant pieces of legislation such as raising the age at first marriage to 16 for girls and 18 for boys and the right to have a lawyer present in court plus it intends to modify the penal code put in place by conservatives in 1996. The remainder of this study is devoted to the foreign policy and international relations of Iran since the election of President Khatami.

International Relations and Foreign Policy

President Khatami suggested to the United Nations General Assembly to designate the year 2001 as the “***International Year of Dialogue among Civilizations***.” Following its approval by the Assembly, a new center with the same name was created in Tehran to promote the President’s foreign policy of dialogue and peaceful co-existence along with mutual respect and sovereign equality of states. A series of events since the 1979 revolution led to Iran’s isolation at the international scene. In an effort to end the country’s international isolation, Tehran hosted the Eighth Summit of the Islamic Conference Organization (OIC) in 1997 (Ramazani, 1998). As a show of support for the newly elected moderate reformist, 56 heads of Islamic states including the Saudis, Egyptians, Iraqis, and Palestinians attended the meeting and elected Khatami as the president for 1997-2000. So far president Khatami has visited Rome, where he met Pope John Paul II, France, Japan, Qatar, Kazakhstan, Venezuela, and the United States to attend the UN Millennium Summit.

a. The Arab World

The revolutionary Pan Islamic rhetoric uttered by the Shiite clerics alarmed the Sunni governments of the region leading to Iraqis invasion of Iran in 1980. During Khatami’s government the relations between Iran and Iraq have improved somewhat, despite major problems such as unresolved border disputes, prisoners of war (POW), Iran’s demands for war reparations, and the presence of dissident groups in both countries. In recent years both governments have returned hundreds of POWs, pilgrimage to the holy Shiite shrines of Karbala and Najaf is resumed, and high-ranking government officials have visited the capitals in search of avenues to reduce tensions. Although the overall relations between these archenemies are improving, substantial problems still remain to be resolved.

The relations with the Gulf Cooperation Council (GCC) states have also notably improved (Ramazani, 1998). Saudi Arabia and Iran have better relations on many fronts; especially by cooperating at the OPEC meetings on oil export quotas and pricing matters. A

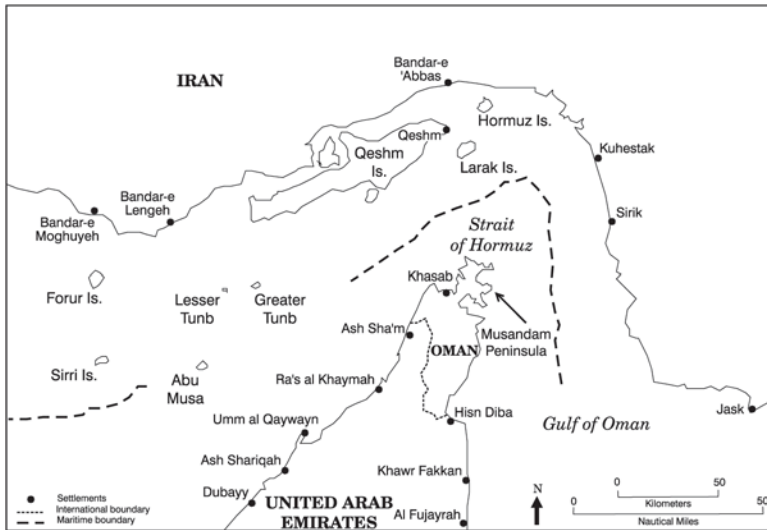


Figure 2: *The disputed islands of Abu Musa, and Greater and Lesser Tunbs.*

thorny issue is a dispute between Iran and the United Arab Emirates (UAE) over the islands of Greater and Lesser Tunbs and Abu Musa, near the Strait of Hormuz in the Persian Gulf (Figure 2). Mehr summarizes the current diverging points of views as follows: "Iran has always maintained that the question of the three islands -- Abu Musa and the Tunbs -- is purely an Iranian domestic matter and that the Arab League, the Gulf Cooperation Council (G.C.C.) or the U.N. have no jurisdiction over it. The United Arab Emirates continues to insist that the matter be referred to the International Court in The Hague, or submitted to international arbitration" (Mehr, 1997, p. 214). Although the dispute over the islands has the potential of causing open hostilities between Iran and UAE, the existing economic and cultural ties between the two countries, despite occasional tough rhetoric, remain strong (Amirahmadi, 1996). In 1998-99, UAE ranked first among the Asian countries in import of non-oil commodities (28%) from Iran (SCI, Table 20-10).

The friendly relationships between Iran and Syria, Lebanon, and Palestinian people continue. Iran helps the Palestinians' cause by supporting resistance groups in southern Lebanon, providing financial aid and medical care to the Palestinian refugees and

victims, and urging the OIC members to act more decisively against Israeli occupation. However, the reformist government of Iran seems less vocal in its opposition to Arafat's efforts to reach a peace deal with the Israelis. An effort is under way to improve the ties with Egypt as well.

b. Non-Arab Middle East

The relationship between Iran and Afghanistan is special in several ways. First, Iran has tried to resolve the conflict between the Taliban and opposition groups with little success. Second, there are still more than one and half million Afghan refugees in Iran whose fates are uncertain. Third, Afghanistan is the major producer and trafficker of all kinds of narcotics into and through Iran to the region. So far, Iran has failed to stop this flow that is a major source of inter-state difficulties.

Turkey and Iran have maintained friendly relations despite occasional differences in a number of regional issues. President Demirel's visit to Iran is a sign of keeping the mutually beneficial relations alive (Aras, 2000). On the other hand, Iran and Israel are not on good terms. A passport issued by Iran prohibits the holder from traveling to Israel. Furthermore, the emergence of a military alliance involving Turkey, Israel, and the United States is watched with apprehension in the region. The alliance constitutes a strong military power centered on the Eastern Mediterranean Sea, which makes Arab and non-Arab states, such as Greece, Iran, and Afghanistan, feel very uneasy.

c. East Asia

Because of Western sanctions, Iran has turned to Asian countries, especially China, Japan and the Koreas for assistance in technology and investment. Japan has had a long history of financial involvement in Iran's petrochemical industry. This trade partnership was given an added boost by the president's visit to Japan and the signing of a deal to give priority negotiation rights to exploit Iran's recently discovered massive oil field at Azadegan. Similarly, China continues to be a source of military hardware, industrial products, and technological "know-how." South and North Korea are other beneficiaries of sanctions against Iran. South Korean car

manufacturing, for example, supplies a lion's share of the state auto industries. North Korea provides military hardware.

d. Russian Federation

Historically, Iran has always been wary of a strong military power at its northern borders. Since the revolution, an ever-present slogan has been that "neither West nor East" domination will be tolerated. Iran has kept its friendly but distant relationship with Russia and its former republics. In recent years, trade with Iran has been very helpful to the troubled Russian economy. Their most visible presence is in the commercial air travel, where a number of rented Russian planes are operating between Iranian cities. They have also been involved in Iran's nuclear energy industry by providing technology, inputs, and training of the technicians. However, despite billions of dollars of investment and decades of delays, the nuclear power project is still far from completion. Bilateral treaties on energy resources, and fishing and pollution control in the Caspian Sea region are some of the other areas of close cooperation. When Khatami was the head of OIC, he frequently expressed the organization's concern for the plight of Muslim Chechens who resisted Russian domination. Of course, his efforts and other national and international organizations proved to be ineffective in protecting them from Russian military assaults. Iran maintains a close relation with the former Soviet Republics in the Caucasus and Central Asia. Khatami has already exchanged official visits with many of them. Since most of them are landlocked, their potential for further cooperation and transit trade through Iran is substantial.

e. Europe

During the last two decades the European Union (EU) members have expanded their economic ties with Iran. In the absence of the US, some EU members found greater chances to increase their exports and imports. A recent example is France's TotalFinaElf oil company signing a deal worth \$550m contract for the Siri oil fields that could have gone to the US oil firm Conoco (Kerr, 2000). In the fiscal year 1998-99, 52% of Iranian imports originated in Europe, 33% in Asia, 11% from Americas mainly from Argentina, Brazil,

and Canada (Statistical Center of Iran, 2000). As a part of their general policy of openness, the reformists are interested in expanding foreign trade and attracting investments. Khatami's visits to Europe are indicative of the government desire for greater international cooperation and commercial exchange. On the other hand, the conservatives are determined to keep Western states out of Iran.

f. The United States

Iran-US relations have been the toughest to improve for both countries. The United States claims that Iran's policies and involvement in three activities harm its national interests: desire to have weapons of mass destruction, support of terrorism, and lack of support for the Middle East Peace process. Of course, Iran rejects these as allegations and states its own reasons for the failed relations. They include US's interference in Iran's national political process since the 1950s (Risen, 2000), decades of economic sanctions, frozen assets, and partiality in the Middle East Peace process (Fuller, 1998). Nevertheless, since Khatami's presidency cultural and sporting exchanges are promoted, the United States has lifted its embargo on imports of non-oil products, and American tourists and scientists visit Iran (Eiland, 1998; Ramazani, 1998; Sciolino, 2000). Yet, the general sanctions on oil are still in effect and opening of embassies is not on the agenda.

The reformists realize that in the growing global economy, lack of access to a huge market such as the US hampers their national development efforts. On the other hand, there is a growing realization in Washington that Iran, a major regional power that straddles the oil and gas wealth of the Middle East and Central Asia, is no longer a country it can afford to neglect. American businesses have lost many opportunities to invest in the Iran's lucrative energy resources, and export industrial and food products. American oil giants such as Mobil, Conoco, and Chevron all lobbied the Clinton administration to improve relations by lifting the ban on investments in Iran (Washington Post, April 9, 1999). Their argument along with some of the European states (e.g., British) is that two decades of sanctions has been ineffective in changing Iran's behavior (Amuzegar, 1997). An alternative approach is engaging

rather than continuing failed old policies (Eiland, 1998; Brzezinski, 1997). Besides oil and economic interests, there are over a million Iranian professionals and businesspersons living in the US, as well as many Americans who are interested in the Persian civilization and culture who strongly support closer ties between the two nations. However, in both countries there are groups who do not want the relations improved and so far have been successful in preventing it from happening (Kurzman, 1998).

Summary

Undoubtedly, the Iranian democracy is going through the growing pains of maturing, mainly because of difficulties in changing a system that is based on religious doctrine. The 1979 constitution was amended in 1989, and it seems to be headed for another overhaul in the coming years. Substantial changes are needed in the distribution of power in the state apparatus. Recently, Khatami complained that the president's power is so limited that he is not able to safeguard the implementation of the constitution or accomplish his development policies. Many Iranians believe that too much power is allocated to the positions of the unelected supreme leader, the Guardian Council, and other unregulated foundations (*bonyads*). The President who is also a cleric and a devout Muslim lamented that "Our country emerged 20 years ago from the weight of dictatorship, but unfortunately we are not yet completely delivered from it, and dictatorship continues to haunt us all" (Agence France Presse, Nov. 30, 2000).

Although Iran's foreign policy, under the reformists, has moved toward the center, it has fallen far short of its potential and expectations. Relations with Israel remains unchanged with little hope for any improvement in the near future. The ties with the US also remain cold, mainly because of severe opposition of conservatives in Iran and some of the American officials. While it is difficult to predict future political events in the Middle East, a resolution of the Arab-Israeli conflict could significantly reduce the tension in the region and pave the road to further improvement of Iran's foreign policy (Fuller, 1998). Iran hopes that the Bush-

Chaney team, with close ties to the American oil companies, will lift sanctions against oil imports and investments in Iran. Despite his failure to improve relations with Israel and its strong ally, the US, President Khatami has been successful in reintroducing Iran to the rest of the world with a new image and friendlier posture. Currently Iran has good relations with the major economic powers such as China, Japan, the European Union members, Russia, the Koreans, and Saudi Arabia. Iran is also an active member of the group of Developing Eight Countries (D8), founded in 1997, consisting of Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan, and Turkey. They are determined to accelerate economic integration of member states and double their intra trade volume in the coming five years (Bernama, Feb. 26).

This paper has shown that the results of national elections often influence the international relations of states. The difference for Iran has been a policy of isolation and anti-Western rhetoric versus a policy of cooperation, exchange, and mutual respect. In the prevailing globalization process, the overall trend seems to be toward integration and cooperation, even though the pace may be slow and road often bumpy. Iranian democratic forces are on the move while encountering stiff resistance at every step, yet change in the power structure is imperative if the state is going to prosper in the global economy of the new millenium. The moderate President and the pro-reform Majles representatives struggle to establish a democratic political system where powers remain with the people elected representatives rather than personalities. When they succeed, Iran will be a stronger democracy with a more stable foreign policy and amenable international relations.

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The state of the Organization of the Islamic Conference (OIC) at the dawn of the new millennium

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Abstract: An ever-increasing number of inter-governmental organizations (IGO) exist to promote political, defense, economic, and scientific cooperation among member states. The Organization of the Islamic Conference (OIC) is a unique IGO with the primary objective of promoting “Islamic solidarity” among the member states. A majority Muslim population qualifies a state for inclusion in this Organization, whose voluntary membership has more than doubled since its inception three decades ago. Yet, the processes related to globalization, the influences of nationalism, and the differences in the relative levels of social and economic development among member states often prevent deepening their cooperation in the 21st century. This study examines the state of the OIC at the end of the millennium. To assess levels of development and policy options for future cooperation, the OIC states were ranked on the basis of their composite development index scores. As expected, many of the states registering a high development index are the oil-exporters located in the Middle East, North Africa, and Southeast Asia. At the lower end of the spectrum are the majority of the least developed Islamic states in sub-Saharan Africa and South Asia. Successes and failures of the Organization and policy options are also discussed.

Introduction

In the last half of the twentieth century, the growth in regionalism and a declining role for the traditional nation-state are indicative of the global change in the political and socio-economic

perspective (Cusak 1998; Miyoshi 1993). The economic, political, and geographical processes of globalization are redefining the base of power. There has been a proliferation of IGOs and non-governmental organizations (NGOs) in recent decades. Within the context of the global society, the objectives of these IGOs are to coordinate relations among member states to achieve common goals (Cusack 1998). After thirty years, the OIC remains unique among IGOs; its primary purpose is to promote “Islamic solidarity” among members, as well as to consolidate cooperation in social, political, economic, cultural, and other areas. This study examines the relative development levels among the OIC member states at the end of the millennium. It also analyzes the Organization’s successes and failures in fulfilling the goal of “Islamic solidarity” in the context of reducing gross disparities in the quality of life among member states and managing political challenges. These will follow a brief historical background to this potentially powerful supranational organization.

The Formation of the Organization of the Islamic Conference (OIC)

The OIC is an inter-governmental organization comprised of Islamic states with its headquarters in Jeddah, Saudi Arabia. It was founded in September 1969, following an appeal from the former Mufti of Jerusalem to all Islamic states to join the First Islamic Summit at Rabat, Morocco. The summit was held in response to the August arson attack on the holy al-Aqsa Mosque in Jerusalem. This historic meeting was instrumental in the formation of the OIC, and Islamic solidarity became the framework to increase cooperation and exchange among the Islamic states. In 1971, the Islamic Foreign Ministers Conference formally established the OIC by approving the Charter, which a majority of member states had ratified by February 1973 (Selim 1997; Baba 1993). Under the Charter, the objectives of the OIC are:

- to strengthen Islamic solidarity among member states;
- to consolidate cooperation in the political, economic, social, cultural and scientific fields;

- to safeguard the dignity, independence, and national rights of Muslim peoples;
- to safeguard the Holy Places and support the struggle of the Palestinian people;
- to eliminate racial discrimination and all forms of colonialism; and,
- to promote cooperation and understanding between member states and others (OIC Permanent Delegation to UN Web Site, 18 Aug. 2000).

The principal institutional framework of the OIC is comprised of three parts. First, the Conference of Kings and Heads of State and Government defines the strategy for Islamic policies. Second, the Islamic Conference of Foreign Ministers examines the progress on implementing the Islamic Summit's decisions. Finally, the General Secretariat is the executive organ of the OIC and headed by a Secretary General, who executes the decisions of the Islamic Summit and the Islamic Conference of Foreign Ministers (SESRTCIC Web Site, 18 Aug. 2000).

The OIC has created a number of committees to promote cooperation among member states in various fields. Included are: the Jerusalem (Al-Quds) Committee; the Committee for Information and Cultural Affairs; the Committee for Economic and Trade Cooperation; the Committee for Scientific and Technical Cooperation; and the Islamic Peace Committee (SESRTCIC Web Site, 18 Aug. 2000).

Twenty-five member states comprised the OIC in 1969 at its formation, increasing to the present 56 members. These Islamic states stretch from Guyana in the northeastern part of South America to Indonesia in Southeast Asia, and from Kazakhstan in Central Asia to Mozambique in East Africa. They account for approximately one-sixth of the world land area and one-fifth of the world population. According to Article 8 of the Charter, every Muslim state is eligible to join the OIC. Although not clearly defined by the Charter, the term Muslim state implies where Muslims are a majority. To become an OIC member, a Muslim state submits an application expressing its willingness to adopt the Charter (Sarwar 1997).

Development Studies

One of the major goals of the Organization is to promote the socioeconomic development of Muslim communities. The United Nations Development Program (UNDP) has defined human development as a "process of enlarging people's choices" (UNDP 1990, 10). Within this context, meeting the basic needs of people constitute but one of the objectives of the development process; a significant component includes people's participation in this dynamic process. With increasing globalization and proliferation of IGOs, the roles of the states and the international community are continuously being redefined. As global markets and technology become more integrated, "more people are being pushed to the periphery—and the markets are not taking care of those who lose" (UNDP 1995, 119). To ensure the well being of all, the focus should be people and their productive potential in the expansion of global opportunities.

Measuring development as a dynamic process has posed challenges to researchers. One of these challenges involves the use of objective and subjective components as indicators of development. In general, objective socioeconomic variables, such as labor force and employment, income, and education, are published for geographical areas and social groups. Although less commonly reported, subjective measures should include how people feel about their own lives (personal well being) and the world around them (social well being). Measures of social well being appear "to provide useful insights into the state and fate of nations" (Eckersley 2000, 22). The present study of the OIC incorporates objective socioeconomic variables as indicative of the relative levels of development among the member states.

To broaden the perspective on development, researchers have made concerted efforts to generate composite indexes with greater numbers of relevant variables. The techniques to develop composite indexes include rankings of places, calculation of standard scores, scaling methods, and factor or principal component analysis (Guveli and Kilickaplan 2000; Mazumdar 1999; Weng 1997; Hemmasi 1995; Dasgupta and Weale 1992; Stover and Leven 1992; Ram 1982). Since 1990, the UNDP's *Human Development Report* has

constructed several composite indexes to measure aspects of human development. The Human Development Index (HDI) measures development in terms of longevity, knowledge, and income sufficiency (UNDP 1990). The Human Poverty Index (HPI) measures the different dimensions of deprivation in human life (UNDP 1995). The Gender-related Development Index (GDI) and Gender Empowerment Measure (GEM) are composite measures reflecting gender inequalities in human development (UNDP 1997).

Besides the above-mentioned composite indexes used in the Human Development Reports, scholars have constructed other measures of development. For example, Morris (1979) developed the Physical Quality of Life Index (PQLI) for comparison at the international level. The PQLI combined three indicators—life expectancy, infant mortality, and literacy—into an equally weighted composite index to complement measures of income. The Human Suffering Index measured the living conditions in 130 counties by using 10 human-welfare factors associated with demography, health, economics, and governance (Camp and Speidel 1987). The Social Development Index (SDI) was a weighted composite index employing eight social indicators of human well-being (Mazumdar 1996). The Development Index (DI) is a composite weighted index computed from factor scores in order to rank states on their levels of development (Weng 1997). Recently, the United Way developed a “caring index,” which compares 32 key indicators to measure overall well-being in the United States (United Way Web Site, 30 Nov. 2000).

Development studies reveal that this type of research has focused on populations at various spatial scales, including international, national, subnational, and city. Guveli and Kilickaplan’s (2000) study assessed the levels of socioeconomic development for 40 OIC states in 1996. Their study used principal component analysis and 33 variables (14 economic and 19 social indicators), which produced six factors accounting for 74.5 percent of the total variance. They argued that the 23 variables loading highly on the first dimension, Socio-economic Development Factor, which accounted for 41.6% of the total variance, could be used as a “yardstick” for development among the OIC states. The factor scores for this first component were ranked, resulting in three

groupings of states. These groupings consisted of the seven oil-rich Gulf States plus Malaysia, the 14 North African and Southeast Asian states, and the 19 states in West Africa. The findings of Guveli and Killickaplan (2000) suggest that the differences in the economic and social structures of the OIC states may hinder economic integration.

Mazumdar (1999) measured the well being for 68 developing states of Asia, Africa, and Latin America from 1960 to 1990. In addition to the three indicators of the Physical Quality of Life Index (PQLI), two additional variables—percentage of urban population and per capita calories—were incorporated in the study. Over the time periods, the author found that the highest achieving states were located in Latin America, while those that performed the worst were sub-Saharan African states. During the 1960s and 1970s, there was evidence of improvement for almost all the developing states, but the 1980s were “disastrous” (Mazumdar 1999).

Principal component analysis was utilized to identify spatial economic patterns and to evaluate change over time in the Zhujiang Delta in southern China, post-Mao development strategy (Weng 1997). Ten variables were included to reflect the levels of economic development in the Delta between 1980 and 1992. The findings indicate a change in the spatial economic pattern from a single core to two separate areas. Further, the results of the development indices divides the Delta into three classes of areas—developed with high ranking in both 1980 and 1992; developing with ranking in between; and underdeveloped with low ranking in both years. This study also uses principal component analysis to assess relative development among OIC member states.

Data and Analysis

As basic indicators of development, the four variables comprising the Human Development Index (HDI) reflect longevity, knowledge, and a decent standard of living. However, its shortcomings in measuring worldwide achievements in development have been acknowledged by the *2000 Human Development Report*, which states that the HDI “must be

Table 1: *The variables used in the OIC States level of development index.*

Variable	Description
<u>Demographic:</u>	
U5mr	Under-five mortality rate
Imr	Infant mortality rate
Tfr	Total fertility rate
LifeExpect	Life expectancy at birth
Urban	Urban population as percent of total population
<u>Educational:</u>	
Literacy	Adult literacy rate
Fliteracy	Female adult literacy rate
Enrolment	Combined first-, second-, and third-level gross school enrolment ratio
<u>Economic:</u>	
Ex/Import	Global Exports/Imports ratio
GDPpercap	Gross domestic product per capita
Indus/ser	Percent employed in industry/services
Agrlabor	Percent employed in agriculture
<u>Others:</u>	
Tphone	Main telephone lines per 1,000 people
Location	Sub-Saharan Africa <u>0</u> , non sub-Saharan Africa <u>1</u>
Oilstate	Oil exporter <u>1</u> , non oil exporter <u>0</u>

supplemented with other indicators of human development” (HDR 2000, 148). While our study includes the above-mentioned HDI variables, additional relevant social and economic variables are incorporated that may better reveal inequalities among the OIC member states. We constructed a weighted composite index of development based on 15 latest available variables (Table 1).

All member states of the OIC are potential observations. Thus, membership in the organization qualifies a state for inclusion, provided the necessary data are available. However, due to lack of comparable data, only 42 of the 56 OIC states are included (Figure 1). Excluded are the Central Asian republics, which recently joined the OIC after their independence from the Soviet Union, and therefore, lack comparable data. Furthermore, reliable data are unavailable for war-torn states, such as Afghanistan and Albania. A geographic data matrix consisting of 15 variables for 42 states were analyzed using principal component techniques. Most of the

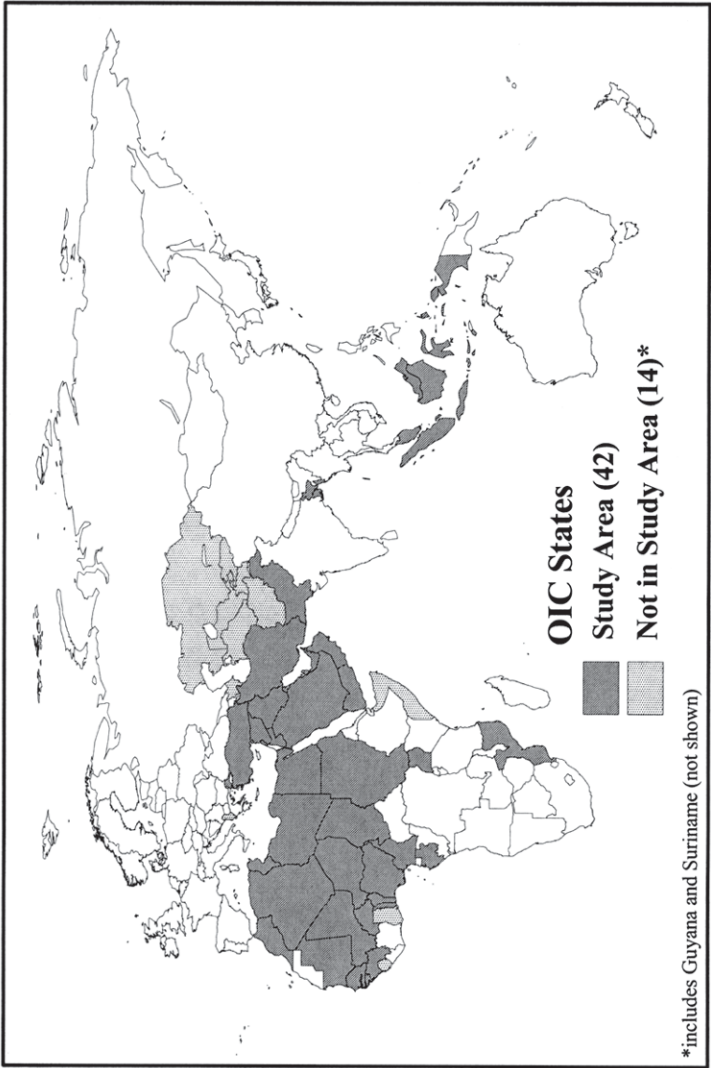


Figure 1: Location of the OIC States.

data are secured from United Nations sources, such as the Human Development Reports 1999 and 2000. A very informative site <www.sesrtcic.org> established by the OIC also provides some of the latest data for member states, as well as valuable information about different aspects of the Organization.

Principal component analysis reduces a larger set of initial variables to a smaller, more manageable set of derived indicators without assuming that all variables are of equal importance. The overall procedure is based on the statistical reduction of the original indicators to their “principal components,” based upon mathematical covariance relationships among all original variables. A varimax rotation of the extracted principal components produces orthogonal factor scores. These factor scores indicate the relative rankings of observations on the derived composite measures (Hair, Anderson, Tatham, and Black 1998).

Using a minimum eigenvalue of 1.0 criterion, principal component analysis of the data matrix containing initial indicator values for the 42 OIC countries yielded two factor solutions (Table 2). These two factors (principal components) together accounted for 79 percent of the total variance, indicating their significance as explanatory variables. Factor one, the most important dimension, accounted for 69 percent of the total variance. As shown in Table 2, this factor is comprised of variables with high positive loadings, such as life expectancy (LifeExpect), female literacy rate (Fliteracy), percentage of urban population (Urban), and percentage of industry/services labor (Indus/ser), plus variables with high negative loadings, such as under-five mortality rate (U5mr), total fertility rate (Tfr), and percentage of agricultural labor (Agrlabor). The combined effect of these variables implies a dimension of socioeconomic development. This first factor can be labeled an “Urban Socioeconomic Development” component. High positive factor scores on this component were recorded for Lebanon (1.64), Brunei (1.48), and Malaysia (1.42), suggesting their leading role in the socioeconomic development among the OIC states. Larger negative scores belonged to states in sub-Saharan Africa, including Niger (-1.82), Burkina Faso (-1.36), and Guinea (-1.33), further implying a weaker performance on this component.

Table 2: Varimax rotated factor matrix and final communalities, 1998.

Factor	Factor Pattern Loading		Community
	I	II	
Variable	Urban Socioeconomic Development	Global Trade	
U5mr	-0.927		.89
LifeExpect	0.903		.89
Literacy	0.836		.77
Fliteracy	0.826		.76
Imr	-0.924		.89
Enrolment	0.837		.79
Indus/ser	0.806	0.506	.91
Agrlabor	-0.806	-0.506	.91
Location	0.833		.71
Tfr	-0.812		.66
Urban	0.696	0.570	.81
Tphone	0.771		.69
GDPpercap	0.612	0.548	.68
Ex/Import		0.861	.74
Oilstate		0.797	.70
Variance			
Explained	8.781	3.012	
Cumulative			
Percent of			
Variance	69.18	78.62	

Factor two describes an important aspect of the spatial economic landscape among the 42 OIC countries (Table 2). Accounting for nine percent of the total variance, this factor relates positively to those variables depicting trade with the rest of the world, such as the global export/import ratio (Ex/import) and the presence of oil-exporting countries (Oilstate). Thus, the second factor can be termed “Global Trade,” since high loading variables are reflecting the greater integration in the global exchange. High positive scores were registered for states heavily relying on oil exports for their survival, such as Iraq (2.31) and Kuwait (1.77) in the Middle East and those located in Africa, such as Gabon (2.05) and Nigeria (1.68). Large negative scores were found in areas not participating in the oil exporting industries. For example, Comoros had the largest negative score (-1.41), followed by Bangladesh (-1.14) and

Egypt (-1.12). Furthermore, several variables have positive loadings greater than 0.50 for factor two, including the percentage of urban population (Urban), percentage of industry/services labor (Indus/ser), and gross domestic product per capita (GDPpercap), plus a negative loading on percentage of agricultural labor (Agrlabor). Both dimensions of our study imply that an ever-widening gap divides the “haves” and “have-nots” of the OIC member states.

The factor scores from principal component analysis are used to compute a development index (DI). This is a weighted composite indicator used to determine differences or degrees of development among the OIC states. It is mathematically expressed as:

$$DI = \sum_{i=1}^I X_i f_i$$

where: X_i represents the i^{th} factor score and f_i percentage of the total variance the i^{th} factor explains (Weng 1997). A state with a higher positive development index has a higher level of development.

Discussion

The levels of development among the OIC states were examined by ranking their DI scores (Figure 2). Overall, the DI scores range from a positive 1.1 in Brunei, a small oil-rich state located in Southeast Asia, to a negative 1.3 for Niger, a landlocked state in sub-Saharan Africa. Twenty of the OIC states recorded positive DI scores, indicating relative high development. These states were further grouped as 11 highest-development and 9 high-development (Table 3). As expected, many of these states have achieved higher levels of development and higher incomes, primarily due to their substantial oil revenues. These oil-exporters are located around the Persian Gulf and in North Africa (Figure 3). Included in the more developed group are non-oil states such as Malaysia, Turkey, and Jordan, which owe their relative prosperity to industrialization and social welfare efforts in recent years.

The remaining 22 OIC states registering negative DI scores have relatively weak socioeconomic resource bases, and can be easily differentiated from the states with positive DI scores. These

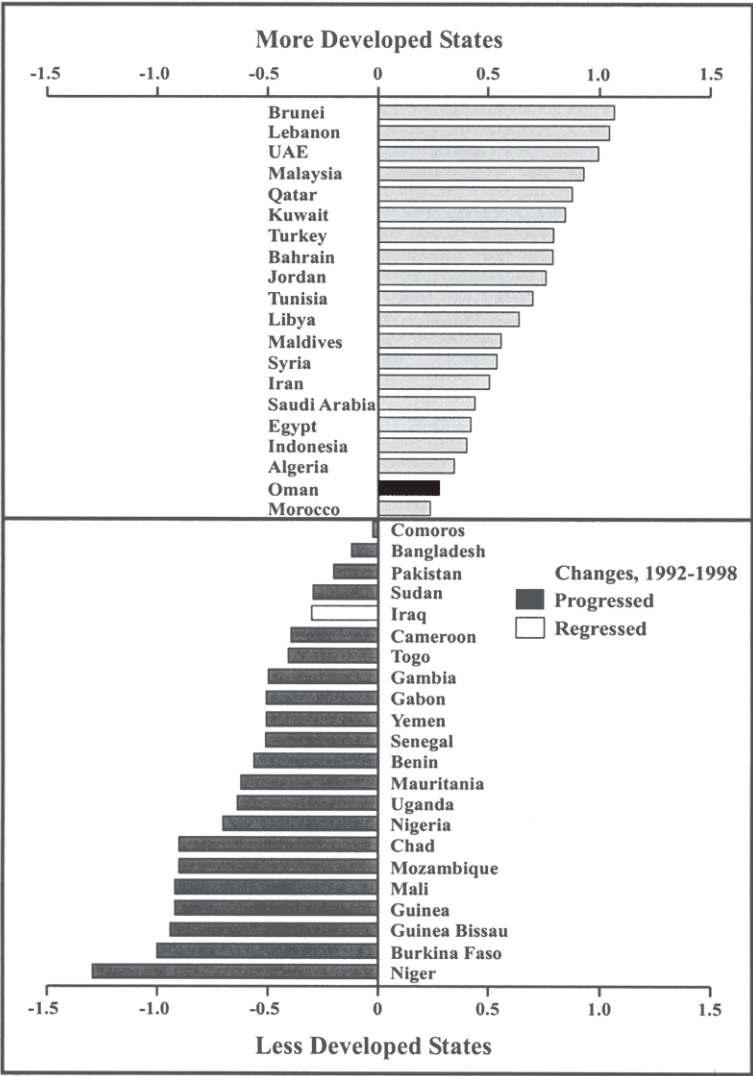


Figure 2: Development index (DI) scores, 1998.

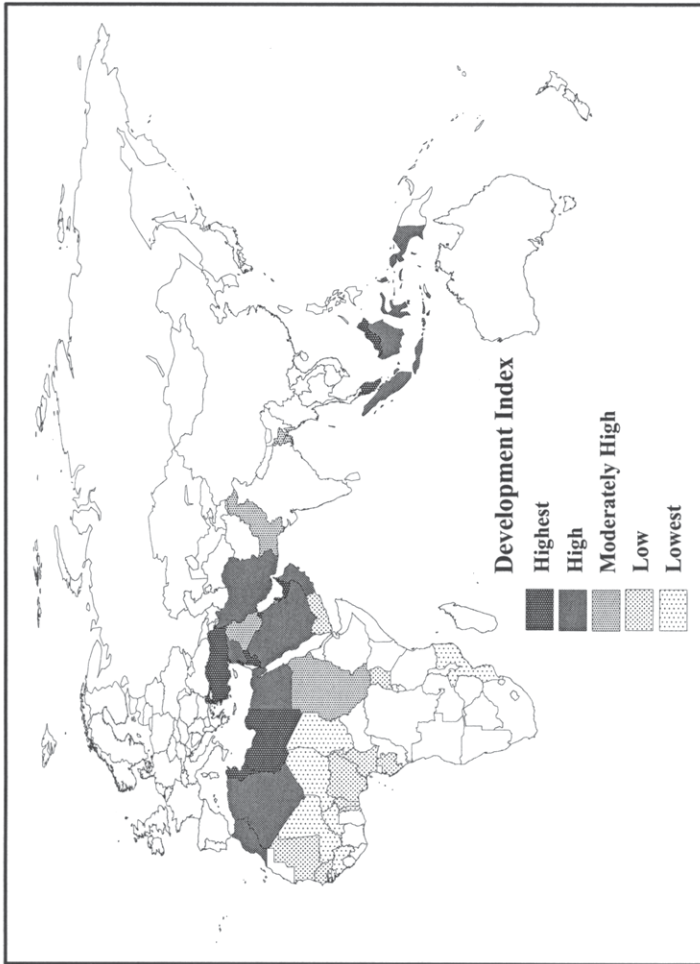


Table 3: Summary statistics for the OIC state groups, 1998.

State Groups	No. of Countries	Population (millions)	Percent of Total	Intra-OIC Trade*		Non-OIC Trade*		GDP Per capita
				Percent Exports	Percent Imports	Percent Exports	Percent Imports	
<u>More Developed:</u>								
Highest	11	115.7	10.0	46.5	63.4	46.0	53.7	11,657
High	9	433.8	39.0	44.9	24.0	42.9	36.4	5,111
<u>Less Developed:</u>								
Moderately Low	5	323.8	29.0	5.1	9.4	3.8	4.5	1,813
Low	10	182.3	16.0	3.1	2.6	6.8	4.2	1,698
Lowest	7	66.8	6.0	0.4	0.6	0.5	1.2	904
Total	42	1,122.4	100.0	100.0	100.0	100.0	100.0	4,910
* Data for 1997								

* Data for 1997

states were divided into three distinct subgroups: five moderately low, ten low, and seven lowest development. They are all in sub-Saharan Africa, with the exceptions of Iraq, Yemen, Pakistan, and Bangladesh. Iraq has suffered over the last two decades because of its involvement in international wars, military expenditures, and subjugation to a decade of economic sanctions and isolation. Throughout most of the eighties, Iraq was engaged in a war with Iran. In 1990 Iraq invaded and annexed Kuwait in a dispute over boundaries and oil extraction activities, and the Gulf War followed. The plight of Iraqi people is reflected in the declining trend in life expectancy, from 66 in 1992 to 63.8 years in 1998. Likewise, Iraq's under-five child mortality rate has increased from 85 in 1992 to 125 in 1998.

A recent UNICEF study focused on the under-five mortality rate as the principal indicator of the state of the world's children. This rate measures the end result of the development process, indicating the outcome of factors such as the nutritional health of mothers, maternal and child health services, immunization levels, and clean water and sanitation (UNICEF 2000). The moderately low-, low-, and lowest-development groups register very high under-five mortality rates, and fall well behind those for the highest- and high-development groups.

The OIC states are not an economically homogeneous group. Although the oil industry plays a significant role in the economy of some OIC states, agriculture continues to be the main productive sector for many others. For example, agricultural labor exceeds 75 percent in nine of these 22 countries, ranging from 77 percent in Chad to 92 percent in Burkina Faso. States in the low- and lowest-development groups have experienced conflicts, droughts, floods, and have very fragile economies. Sub-Saharan Africa's poor economic performance has been a function of structural problems in its leading productive sectors, inefficient resource use, low levels of technology, poor export performance, low levels of investment, and severe debt burdens.

Furthermore, the United Nations designated 43 states worldwide as least developed in 1998; 16 of these are OIC member states (UNDP 2000). By most socioeconomic characteristics, these 16 states are considered among the poorest and the least developed.

For example, ten of these recorded life expectancies below 51.9 years, which is the average for all least developed states. As an indicator of development, life expectancy at birth reflects a state's level of health, nutrition, and income. Low life expectancy values may reveal a large percentage of a state's population face "poor living conditions" and a "lack of proper health facilities" (Mazumdar 1996).

The summary statistics in Table 3 shows the diversity that exists in the demographic and economic structures of the OIC states. For example, 10 percent of the total populations of the 42 OIC states reside in the highest-development group with a GDP per capita of nearly \$11,700. While at the other extreme, six percent of the people live in states of the lowest-development group, where the GDP per capita is about \$900. As stated in the *Annual Economic Report on the OIC Countries 1999*, the income differences among the populations of the OIC states "may constitute one of the basic factors that hinder intra-OIC economic cooperation" (SESRTCIC 2000, 13).

It is evident from the summary trade statistics that the three groups of OIC states registering negative DI scores, and especially the lowest-development group are "benefiting little from expanding markets and advancing technology" of globalization (UNDP 1999, 2). These groups have had only marginal participation in world markets. In contrast, the highest- and high-development groups accounted for roughly 90 percent of the OIC global trade. The uneven distribution of these global opportunities and benefits become more pronounced for the intra-OIC trade. The lowest-development group had an even smaller share of the trade among the OIC states than their share of the global trade.

There is an urgent need for infrastructural facilities, better health and educational institutions, and especially, economic development aimed at poverty alleviation in the less developed, poorer OIC states. It is a sad reality that neither the West nor the prosperous OIC member states have been eager to invest in these states. The OIC member states have the necessary capital resources, technical know-how, and moral obligation to assist the poorer members in order to create a stronger supranational organization. Yet, the existing OIC bureaucratic structure, the preoccupation of members with their

national interests, and the attitude of crisis management, prevents the OIC from growing into an effective engine of development. It seems wishful thinking to expect “Islamic solidarity” to take root among states with such wide gaps in their level of well-being and life chances.

Convergence/Divergence Trends

One of the main goals of the OIC is to reduce the gross inequalities among the Islamic member states. This objective is similar to one held by the European Union (EU) regarding the disparities that exist among its member states. As a supranational organization uniting 15 states with 376 million people, the EU has reached a plateau achieved by no other IGO. It constitutes one of the world’s richest markets and generates roughly 40 percent of all world exports. A recent study investigated the convergence/divergence process across the member states of EU, where convergence was defined in terms of economic, social, and quality-of-life factors. The use of economic indicators alone to evaluate the convergence across states and regions have received far greater research attention than the inclusion of social and quality-of-life variables. Yet, concern for the well-being of all people makes it imperative that quality-of-life factors be a part of any evaluation of the relative inequalities between states (Giannias, Liargovas, and Manolas 1999).

Our study investigates the convergence/divergence trends in development across the five subgroups of the OIC states by calculating a coefficient of variation defined in terms of the 13 ratio socioeconomic variables for 1992 and 1998. The coefficient of variation is used to measure and compare the relative variability in the data, and is expressed as a percentage of the mean:

$$C.V. = s / \bar{x} * 100$$

where: s and $\bar{x}$ represent the standard deviation and mean, respectively. Convergence between the socioeconomic variables occurs when the coefficient of variation decreases over time.

An analysis of the 13 variables indicates that the convergence occurred in the spread of literacy, urbanization, and communication

(Table 4). The divergence, however, was a result of disparities in mortality, fertility, global trade, and especially GDP per capita. These results are alarming because they indicate a widening gap between “haves” and “have-nots” of the OIC members. Contrary to the stated policies of the Organization, the least developed states have experienced setbacks in areas of human survival and economic prosperity during the 1990s. In recent years, an increasing number of scholars have expressed concern over these persisting interstate gross inequalities, as well as Organization’s ineffectiveness in the world political arena (Dabour 2000; Guveli and Killickaplan 2000; Alibabai 1997; Hamour 1997; Zeinelabdin 1996).

Successes and Failures of the OIC

The OIC’s successes and failures must be evaluated in the context of two interrelated dimensions: (1) promoting security and well-being of the member states and people; and (2) resolving political disputes/conflicts. As a major component of the “Islamic solidarity” concept, the OIC Charter envisaged cooperation in a

Table 4: *Changes in the coefficient of variation, 1992-1998.*

Variable	1992	1998
<u>Convergence:</u>		
Literacy	38.03	34.53
Enrolment Ratio	38.94	34.84
Female Literacy	51.59	46.74
Urban	52.62	46.78
Industry/Service Employment	55.36	51.85
Telephone	135.60	127.59
<u>Divergence:</u>		
Life Expectancy	17.02	17.38
Total Fertility Rate	26.62	30.98
Infant Mortality Rate	56.24	65.66
Under Five Mortality Rate	61.21	74.18
Agricultural Employment	61.81	66.48
Global Trade Ratio	77.59	85.61
GDP Per Capita	117.69	119.91

variety of fields among the member states. However, an assessment of the Organization's successes and failures reveals tendencies toward ineffectiveness rather than bold successes.

The mere existence of the OIC is considered a remarkable achievement. The formation of the OIC, based on the concept of Ummah identity, reflects the desire for unity among Muslims, irrespective of political, economic, cultural, or racial differences. However, the commitment to national sovereignty often hinders the Islamic states' full cooperation in areas that may adversely influence their national interests. Sarwar poses a crucial question pertinent to the identity issue: "Will the secular nation-state or Ummah identity command the supreme loyalty of Muslims?" (Sarwar 1997, 92). A critical evaluation of the Organization's overall achievements and weaknesses seems to indicate that "nationalism" has played a greater role than "Islamic" brotherhood in their decisions. Overall assessment of the successes and failures of the OIC concur with Selim's conclusion:

The OIC still has a long way to go, if member states want to be an effective framework for achieving the declared objectives. It needs to develop a reform agenda designed to deal not only with past deficiencies, but also with new global challenges (1997, 57).

The OIC has set up various committees and institutions to encourage economic cooperation among member states. Twenty-five years ago, the OIC established an international financial institution, the Islamic Development Bank (IDB), with its main office located in Jeddah, Saudi Arabia. The purpose of the IDB is to assist the economic and social development of its 53 member states and Muslim communities in non-member states, all in accordance with the principles of Shariah (IDB, 5 Feb. 2001). The Bank's main operations include project financing, technical assistance, trade financing, and special assistance. In 1999, nearly US\$2.1 billion was approved for these operations, which was an increase of 21 percent over the previous year. Included were 77 projects (US\$973 million) and 35 technical assistance operations (US\$10 million), which involved 42 member states (17 least developed). In the same year, the gross disbursements for all

operations totaled US\$1.2 billion, less than 60% of the approved budget (IDB 2000). The Bank's success in providing financial assistance to the poorer states has been generally limited and hampered by bureaucratic delays, lack of firm commitments, and often insufficient capital. While the member states expect the OIC institutions do many things for them, they are reluctant to pay their dues with an annual shortfall of 70 to 50 percent (SESRTCIC Reports 1997).

At the 8th Summit of the OIC held in Tehran, Iran in 1997, the Bank outlined the Ummah's "preparation for the 21st Century" in areas of economic, trade, and financial cooperation. The OIC recommended the expansion of intra-OIC trade by 3 percent during 1999-2001. This would only increase the intra-OIC trade from 10 to 13 percent of their total trade. During the 9th Summit of the OIC in Doha, Qatar in 2000, the leaders of the member states reaffirmed their commitment to a "long-time dream" of establishing an Islamic Common Market.

The goals of the OIC include the resolution of political disputes and conflicts among member states and those involving Muslim minorities in non-member states. In this area, however, the Organization has had only limited success. Under the Charter, the OIC professes 'to coordinate action to safeguard the Holy Places and support the struggle of the Palestinian people.' As previously noted, the Palestine issue was the major force in the founding of the OIC. A 15-member Al-Quds Committee directs the implementation of its policies toward the Palestine problem. However, the "Peace Process" for the resolution of the Arab-Israeli conflict is being pursued mainly through the mediation by the United States and close consultations with the major Arab states. While, there is no direct role for the OIC in these negotiations, indirectly it adds some weight to the position of the Palestinians. Rarely have the member states been unanimous in their policies and actions toward this issue. As reiterated at the 2000 Arab League meeting in Cairo and the 9th Islamic Summit in Doha, Qatar in 2000, some OIC states advocate cutting all Muslim ties with the Jewish state, while others that benefit from economic and political relations with Israel want to maintain ties. However, the OIC's financial, political,

and moral assistance has been vital to the Palestinians struggles for a universally recognized state.

In the peaceful resolution of interstate disputes, the Charter defines the OIC's role as 'the settlement of any conflict that may arise by peaceful means such as negotiation, mediation, conciliation, or arbitration.' The OIC has intervened in several disputes: the Pakistani-Bangladesh dispute in 1971-74; the Iranian-Iraqi conflict in 1980-88; the Senegali-Mauritanian dispute in 1989; the Iraqi-Kuwaiti conflict in 1990-91; and the Afghan civil war since 1989, but failed to arrive at their peaceful resolutions (Selim 1997). Furthermore, the Charter of the OIC professes 'to strengthen the struggle of all Muslim people to safeguard their dignity, independence, and national rights.' Yet, the OIC has taken basically a rhetorical stance in dealing with the issues in Afghanistan, Bosnia, Kashmir, Azerbaijan, Chechnya, the southern Philippines, Kosovo, Lebanon, Algeria, Sudan, and Iraq. In some instances, such as Bosnia and Palestine, the OIC has been more involved. Overall, it is very difficult to find many instances where the Organization has successfully assumed the roles and implemented the ideals stated in its Charter in ameliorating inequalities and resolving political conflicts.

Summary

Three decades of experiment have shown that religion affinity alone is not sufficient to create an effective international organization within the complex global context. Glassner states that "Nationalism ... is a more powerful influence on most people in the world than religion ..." (1996, 502). In other words a group of economically powerful, politically democratic states with shared interests may have a better chance of forming a successful supranational organization than very diverse states sharing only religious foundations. Scholars are vigorously debating the inherent problems and structural obstacles that prevent OIC from becoming an effective viable organization. They suggest policies and structural adjustments at both nation-state level and supranational level to adapt to the global realities of the new millennium (Dabour 2000;

Sarwar 1997; Taeb 1997; Zeinelabdin 1996). Initiatives include pushing for an Islamic Common Market to promote trade/economic integration, adapting effective policies for alleviation of poverty, and having a consultant firm study ways “to ensure that the OIC renewed both its relevance and effectiveness” (New Straits Times, January 15, 2001).

To succeed in reducing the existing gross inequalities, the member states must act resolutely rather than just supporting resolutions in their summits. They must support common programs of the Organization even if they do not have an immediate and direct influence on their national interests. It is imperative that member states maintain a balance between their national interests and their obligations to the supranational organization. While fundamental changes in policy and planning development have to begin at the nation-state levels, OIC could significantly facilitate the process. Whether the Islamic states and the OIC, as an umbrella, have the vision and the will to meet the challenges presented to them by the global economy and world politics remains to be seen.

Acknowledgment

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A GIS-based methodology for landcover reconstruction utilizing Dominion Land Survey Township diagrams

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Abstract: Dominion Land Survey (DLS) township diagrams and surveyor notebooks represent the most comprehensive documentation of pre-European settlement landcover for much of western Canada. The intent of this research is to develop a GIS-based methodology for utilizing these data in conjunction with contemporary physiographic and edaphic data to objectively reconstruct pre-European settlement landcover. The relationships between known pre-settlement landcover from DLS township diagrams and contemporary landform and soil characteristics are established and logistic regression analysis utilized to predict landcover type. Two alternative approaches to applying the resulting regression model were evaluated resulting in overall classification accuracies of 60 and 73 percent.

Introduction

One must understand the past in order to appreciate the present and predict the future. This adage is certainly germane to an understanding of the complex relationships between landcover and landuse change. An understanding of the ways in which landuse practices have evolved and influenced landcover over time is a prime concern of the resource management community. Characteristics of landcover have important impacts on climate, soils, hydrology, and the diversity and abundance of biotic organisms (Hastings and Turner, 1965). Therefore, the ability to

reconstruct past and predict future landcover change is essential for managing the natural environment.

The Dominion Land Survey:

The first survey of Canada's prairies under the Dominion Lands Survey commenced in 1869 and within 30 years most of the arable land had been parceled out into farm-sized quarter sections (MacGregor, 1981). Although the physical subdivision of the land was of primary concern, surveyors had a number of other tasks to perform. The most notable of these tasks was the collection of data in the form of surveyor's field notebooks and the closely related township diagrams (Figure 1). These were probably the finest and most comprehensible data collected by the Department of the Interior during its administration of the Dominion Lands Survey (Tyman, 1995).

Surveyors' notebooks and original township diagrams provide a valuable source of information for landcover reconstruction. Considering the amount of qualitative and quantitative data they provide, the resolution at which they were collected, and the immense area they represent, the records of the Dominion Land Survey must be considered the most comprehensive set of data available regarding pre-settlement landcover conditions in western Canada.

Methods of Landcover Reconstruction Using DLS Data:

Landcover reconstruction is a very intricate part of trying to understand how landuse and management affect the environment. Therefore, the scientific methods underlying landcover reconstruction must be objective and replicable. Research on landcover reconstruction using DLS township diagrams and surveyor notebooks has historically been subjective and very much influenced by the Gestalt method. This method is based mainly on visual interpretation with little or no objective consideration of associated factors such as physiography, soils, or vegetation; producing regions based on subjective judgment rather than explicit rules (Bailey, 1996). This methodology relies heavily on the researchers artistic ability and an intimate knowledge of the area in

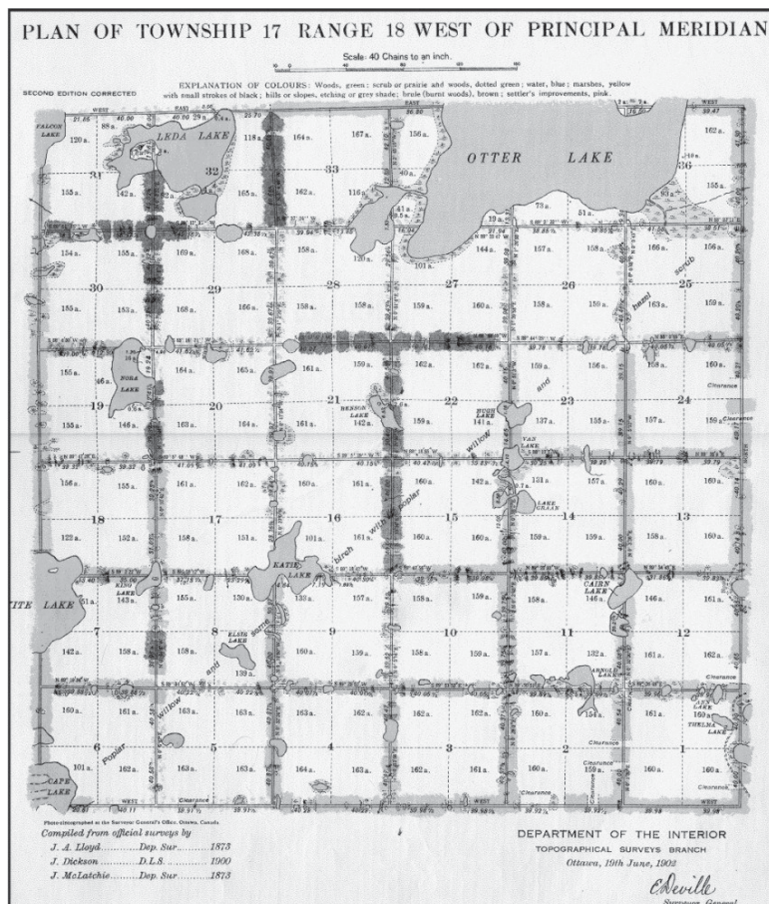


Figure 1: Example of first edition DLS township diagram.

question and, provided this is the case, may produce valuable results (Sobkowitch, 1998; Hamilton and Nicholson, 1999; Hanuta, 2000).

Bailey (1996) suggests that the result of such methods, where no rules exist for recognizing regions, are essentially toponymic regions, classified by the places themselves rather than by objective criteria that characterize individual regions. Further, he argues that regions established without acknowledging the criteria examined in their classification are difficult to convey effectively to others

and essentially impossible to evaluate or duplicate. Methods that consider explicit criteria for distinguishing between regions of differing landcover are required to produce results that are both comprehensible and easily repeated. That is, objectivity must be exercised if a state of scientific predictability is to be attained by research in landcover reconstruction (Bailey, 1996).

Toward this purpose, more objective methods of landcover reconstruction using DLS data have evolved. Tracie (1992) and Archibold and Wilson (1980) employ original DLS township diagrams and notes to aid in reconstructing pre-settlement landcover. Although at differing resolutions, both methodologies used the north-south transects on township diagrams depicting actual pre-settlement landcover to calculate the proportion of grassland, woodland, scrub, wetland, and so on. From this, the landcover composition of each transect segment was determined and the adjacent sections classified accordingly. While the spatial detail attainable on the resulting landcover reconstructions was relatively low, and the final product arguably less aesthetically pleasing than more artistic subjective renditions, these methods are replicable and objective, and results from different geographic areas may be compared statistically.

Objective

Contemporary researchers have access to technologies not available to earlier investigators. One of the most valuable tools at their disposal is geographic information systems (GIS). Not only does GIS facilitate the integration and interpolation of compiled data, but also promotes objectivity. The successful application of GIS for landcover reconstruction and landuse change analysis represents an alternative approach that supports the development of an objective and replicable research methodology.

The objective of this research is to develop a methodology for reconstructing pre-settlement landcover utilizing GIS technology. The study incorporates ancillary data to guide the landcover reconstruction. The parameters that are considered are those related to characteristics of the environment that have remained relatively unchanged since European settlement; specifically, landform and

soil characteristics. The relationships between landcover type and landform and soil characteristics are established through the use of logistic regression analysis to identify areas that possess a combination of edaphic and physiographic characteristics favorable to the occurrence of a specific landcover type. Once the relationship between independent variables (i.e. physiographic and edaphic parameters) and the dependent variable (i.e. landcover) is established in a training area, it is hypothesized that the type and distribution of pre-settlement landcover can be predicted in adjacent test areas where similar relationships between landform, soils, and landcover type exist.

Study Area

The study area consists of two adjacent municipalities located south of Riding Mountain National Park in southwestern Manitoba (Figure 2). These are the Rural Municipality of Clanwilliam (Twp. 17 and 18, Rng. 17 and 18, W 1) and the Rural Municipality of Harrison (Twp. 19 and 20, Rng. 16, 17, and 18, W1).

The area is characterized by elements of the Mid-Boreal Uplands, Boreal Transition, Aspen Parkland, and Lake Manitoba Plain ecoregions and includes highland plateaus, rolling forested hills and meadows, wetlands, lakes, and streams (Canadian Biosphere Reserve Association, 1998).

According to Ahrens (1994), the climate is humid continental with cool summers and cold winters. Mean daily temperatures range from approximately 15.5°C in July and August to -20.6°C in January. Mean annual precipitation is approximately 476mm, the majority of which falls in July and August.

Surficial geology is dominated by extensive end moraine and ground moraine deposits with intermittent lacustrine and glaciofluvial deposits (Klassen, 1979). Three dominant soil associations occur throughout the study area. These are the Onanole/Rackham Association of glaciolacustrine origin, the Granville/Waitville Associations developed from deep, moderate to strongly calcareous moraine deposits, and the Bog/Half Bog soils occurring in depressions and low lying areas (Erhlich, 1958).

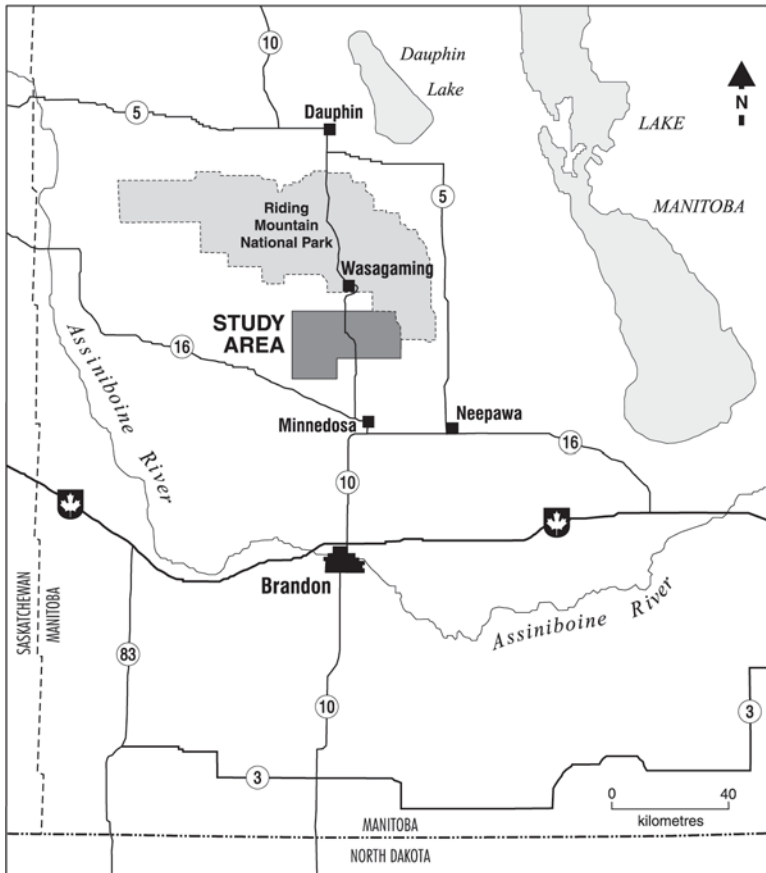


Figure 2: Location of study area (modified from McGinn, 2000).

Methodology

The methodology used is comprised of four principle stages. First, data are collected and compiled to create the themes for both dependent and independent variables. Secondly, the relationships existing between landcover and edaphic and physiographic parameters are calculated through logistic regression. Next, these relationships are utilized to create a series of predictive grids and, finally, these grids are subsequently incorporated into two different landcover reconstruction approaches.

In order to evaluate the resulting regression model and overall landcover reconstruction methodology, the regression model was first developed utilizing landcover, landform, and soil data assembled for the R.M. of Clanwilliam. The resulting regression model was then evaluated using landform and soils data assembled for the adjacent R.M. of Harrison. The overall classification accuracy was then evaluated by comparing the predicted landcover against actual landcover derived from DLS township diagrams and surveyor notebooks.

GIS Database Development:

The data used to identify actual pre-settlement landcover along survey line transects was extracted from DLS township diagrams. A scanner was used to digitally acquire the diagrams and prepare them for entry into the GIS. The images were then rectified and actual pre-settlement landcover depicted adjacent to survey line transects was on-screen digitized to produce a vector polygon theme in the GIS. The resulting polygons were classified using nominal values of “forest,” “wetland,” and “prairie/grassland” to describe the type of landcover occurring at specific locations along section lines.

Data from reconnaissance soil surveys were combined with existing soil coverages acquired from Agriculture Canada to produce the soil theme of the study area. The attributes that have a perceived effect upon the distribution of landcover were appended to the existing soil coverage. The attributes selected were: 1) average solum depth or the average depth of the upper horizons (usually horizons A and B) of a soil above the parent material in which the processes of soil formation are active; 2) estimated permeability or hydraulic conductivity (cm/hr), which is the effective flow velocity or discharge velocity in soil; 3) depth of engineering division 1 (cm) or the depth of the first major soil division or horizon; 4) average soil pH of engineering division 1, and; 5) percent organic matter (Eilers and Lelyk, 1990). These five edaphic attributes were then individually converted into their own independent grid themes in ArcView.

Physiographic variables were derived by digitizing contour lines from 1:50,000 topographic maps of the study area. A TIN, or

triangulated irregular network was generated from the resulting contour theme, which in turn was converted to a grid coverage with a 4 m grid cell resolution. The grid was then used to create themes depicting slope, aspect and a measure of local variability of topography determined by calculating the standard deviation from the mean elevation of the study area.

Logistic Regression Analysis:

In logistic regression, the magnitude of occurrence of the phenomenon being modeled by the dependent variable is unknown. Instead, the dependant variable is nominal and dichotomous; that is, the form of the dependant variable is, in this case, the presence or absence of forest, wetland, or prairie/grassland. The independent variables are interval or ratio level data describing the characteristics of, in this case, the eight independent variables previously described. Logistic regression is then used to predict the probability with which a phenomenon will exist at un-sampled locations; in this case, the areas of unknown landcover between section lines.

The eight grid coverages representing the independent variables were combined into a single multivariate data structure referred to as a stack using ArcInfo GRID module MAKESTACK command. This stack and grids representing each of the dependant variables, that is, the presence or absence of forest, wetland and prairie/grassland, were then entered into the SAMPLE function of ArcInfo's GRID module. The SAMPLE function was used in order to generate a random sample of points each possessing a particular value for the eight independent variables and one independent variable. This was performed three separate times, once for each of the three different dependent variables. The resulting ASCII files created using the SAMPLE function were then entered into the REGRESSION command using the LOGISTIC option.

The results of the REGRESSION command are a regression constant and eight coefficients, one for each independent variable included into the sample file. These coefficients estimate the effects of the independent variable on the dependent variable across the levels of the other independent variables (Jaccard et al., 1990). Thus, these coefficients represent the relationships that existed between

landcover and physiographic and edaphic variables (independent variables) in the R.M. of Clanwilliam.

Predictive Grids:

The coefficients and regression constant produced for each dependent variable through logistic regression were then entered into a predictive equation to create three probability grids, one for each of the three landcover types. The calculated cell values for each grid theme indicated the probability of occurrence of forest, wetland, or prairie/grassland having existed there prior to European settlement.

Alternative Methods For Landcover Reconstruction:

Two alternative approaches to applying the resulting regression model were evaluated. Each approach differed only in terms of the estimated probability at which a particular grid cell was assigned to a specific landcover class. The first approach used a 70 percent rule in which the estimated probability of a grid cell belonging to any landcover class had to be equal to or greater than 70 percent to be classified, or it would be left unclassified. In the second approach, called the original proportions approach, the proportion of each landcover type indicated along survey transects was determined. The regression equation was then applied such that different probability levels were selected as “cut-offs” for each landcover type. By selecting such “cut-offs” a landcover composition comparable to estimated proportions of original landcover would be reconstructed.

Results

Once landcover was reconstructed for the R.M. of Clanwilliam the model was evaluated by applying it to the R.M. Harrison. The reconstructed landcover maps produced by both the 70 percent rule and original proportions approaches (Figures 3 through 6) were evaluated for their accuracy by comparing predicted to actual landcover for the R.M. of Harrison derived from DLS township diagrams and surveyor notebooks. In addition, the distribution of predicted landcover for the R.M. of Clanwilliam was evaluated by

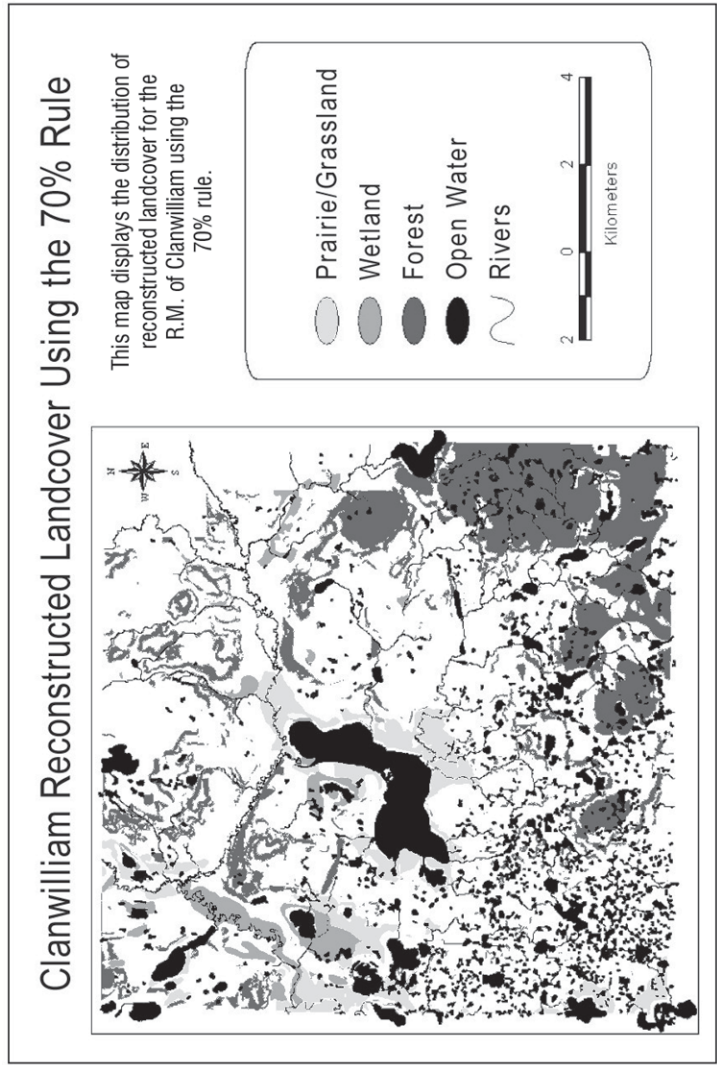


Figure 3: Clanwilliam landcover reconstruction, 70% rule.

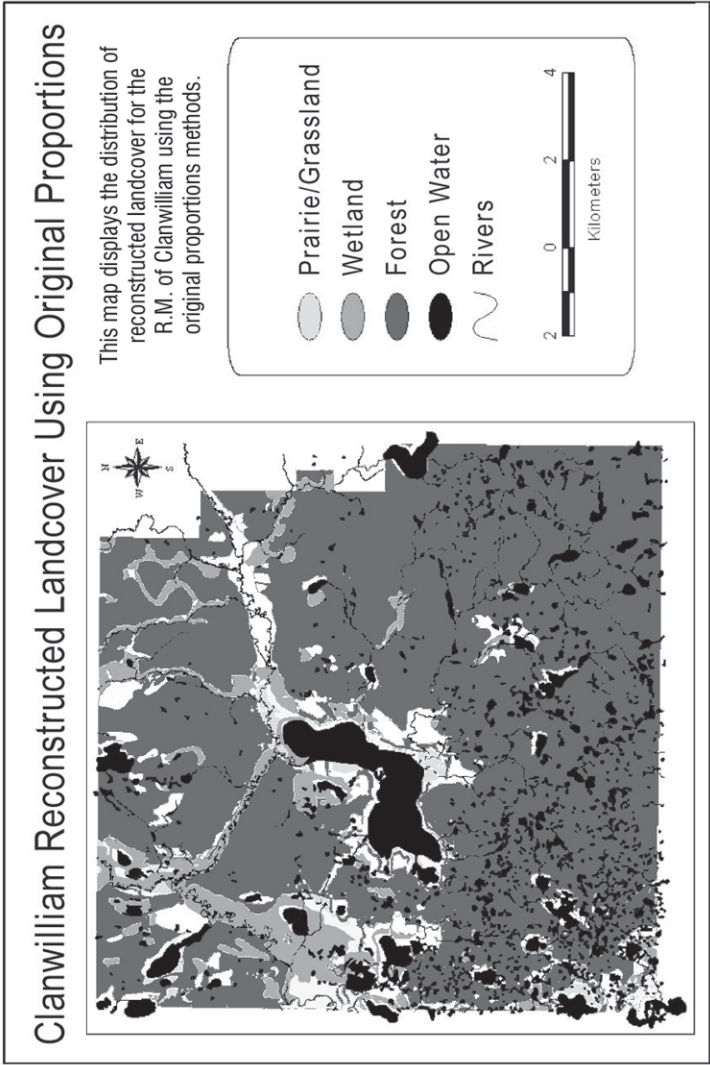


Figure 4: Clanwilliam landcover reconstruction, original proportions method.

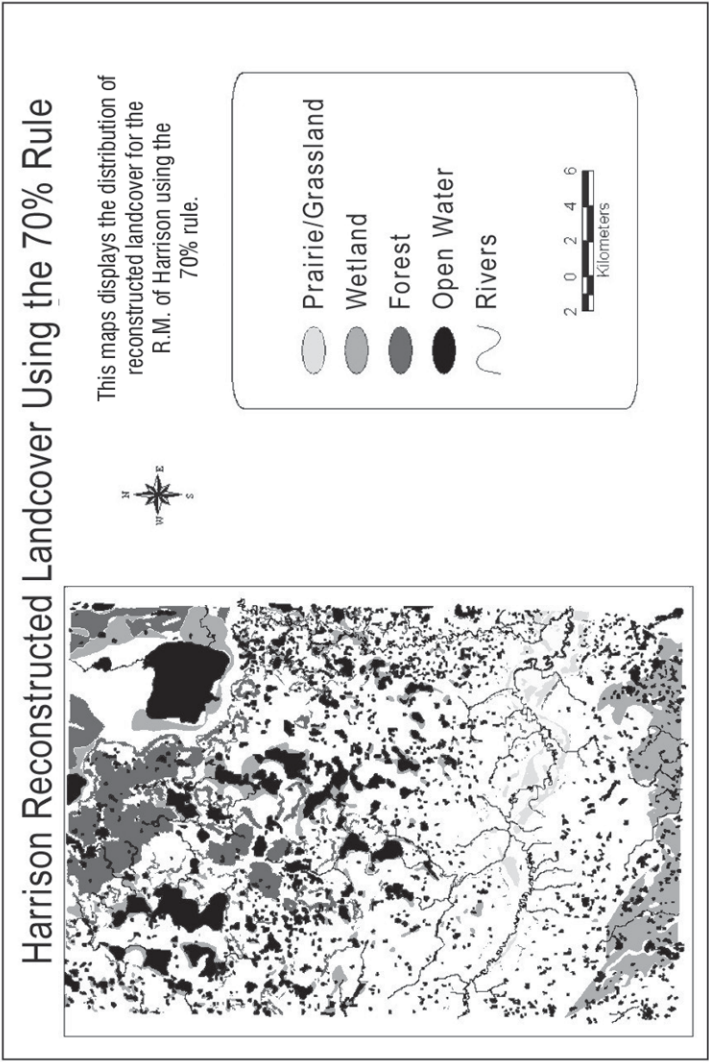


Figure 5: Harrison landcover reconstruction, 70% rule.

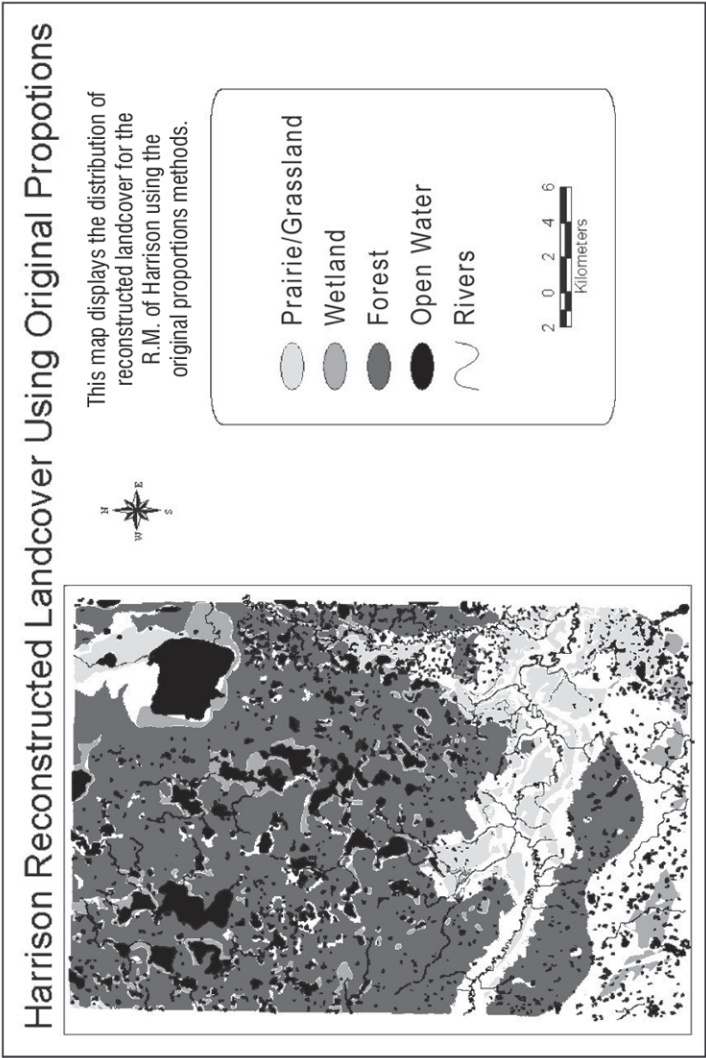


Figure 6: Harrison landcover reconstruction, original proportions method.

comparing it with the calculated proportions of original landcover from the DLS township diagrams.

Application of the regression model using the 70 percent rule resulted in an overall classification accuracy of 56% for the R.M. of Harrison (Figure 5). In general, the performance of the 70 percent rule is felt to be less than satisfactory since it failed to predict landcover for nearly half of the total area of Harrison and Clanwilliam municipalities (Figures 3 and 5). As well, the proportion that each landcover type encompassed differs greatly from the original landcover composition. For example, the predicted landcover in Clanwilliam municipality consists of approximately 53% forest, 19% wetland, and 28% prairie/grassland while original landcover depicted along transect lines consisted of 82% forest, 17% wetland, and 1% prairie/grassland.

Further examination revealed that despite an incomplete reconstruction of the landcover, the 70 percent rule did reconstruct landcover in a realistic manner. That is, forest is predominantly found in areas higher in elevation, wetland coincides well with the distribution of wetland areas, and prairie is interspersed throughout.

Evaluation of the original proportions approach resulted in an overall classification accuracy of approximately 68% for the R.M. of Harrison (Figure 6). Examination of the predicted landcover for Clanwilliam using the original proportions rule suggests that a more comprehensive reconstruction has been achieved (Figure 4). The predicted landcover clearly shows a realistic distribution of landcover classes similar to that depicted on the original township diagrams. That is, forest dominates, particularly in areas of higher elevation, wetland is distributed in close proximity to lakes and streams, and prairie is sparsely distributed throughout the area.

Conclusion

The results of this study suggest that the application of GIS technology and logistic regression analysis for reconstructing pre-settlement landcover from DLS township diagrams is promising. The overall accuracies of the two approaches used were 56% and 68%. The original proportions method, in which the original proportions of each landcover type were used to select "cutoffs"

for assigning grid cells to landcover classes, seemed to perform better than the 70% rule.

Despite the accuracy levels produced, weaknesses in the methodology were evident. In particular, the selection of predictors and the quality of soil data used seem to significantly affect the overall performance of the model. For original landcover to be correctly predicted each landcover type needed to have its 'determining' parameters included in the analysis. Therefore, it is suggested that more background research be conducted to determine precisely which physiographic and edaphic features are most important in determining or controlling landcover in a particular area.

In addition, it was found that the resolution and quality of soil data were less than adequate. Data collected at coarse resolutions systematically affects the accuracy and resolution of results. Therefore, it is recommended that soil data at a suitable scale or resolution be used to ensure the most accurate results.

Further, at this point the proposed methodology may be more appropriate for local or landscape scale reconstructions as opposed to regional reconstructions. The current lack of digital high-resolution soils and physiographic databases necessitates a significant investment of labour for assembling and compiling these data. However, these preliminary results certainly warrant further investigation and as the variety and quality of these databases improves the utility of such methods for pre-settlement landcover reconstruction will become increasingly apparent.

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Mapping pre-settlement landscape in southern Manitoba, Canada

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Abstract: Original Dominion Land Survey (DLS) township maps from the 19th century provide information to characterize pre-settlement surface conditions across the Canadian Prairies. The earliest township plans of the DLS in Manitoba are available beginning in 1871. A township plan covers a six-mile by six-mile square area and depicts topographical and hydrological features, and vegetation cover. Roads, trails and existing settlement are also mapped.

Township maps yield high spatial resolution environmental information and can be accurately dated. These maps were consulted to reconstruct pre-settlement landscape in part of southern Manitoba, including the mapping of locations and extent of wetlands in the 1870s. A Geographic Information System (GIS) was used to electronically capture, analyze and map historical landscape features from township maps. A total of 194 townships have been captured in the GIS. Landscape polygons have been classified as prairie lands, wooded areas, wetlands, scrub vegetation, or water. Streams and locations of springs have also been digitized. Township maps provide useful baseline information to assist tracking environmental changes through time and improve understanding of these natural or human-generated changes.

Introduction

Because instrumental measurements of natural phenomena cover a short period of Earth's history, a record of environmental change is often obtained from various proxy sources. Ice cores, geological and biological evidence, and historical records are some examples of proxy evidence (Bradley, 1999). Past environmental conditions provide valuable baseline information that can be used

for analysis of trends in natural processes, sensitivities to environmental changes and identification of extreme events. Using historical cartographic material, namely Dominion Land Survey (DLS) township maps from the 19th century, landscape cover change over the past century will be illustrated. A township covers a six-mile by six-mile square. The DLS township maps were produced at a scale of one inch to half a mile.

Historical Evidence of Environmental Conditions

The fundamental limitation of historical evidence is the brevity of the period of time in which it is available. However, the strengths of historical evidence lie in the accuracy with which it can be dated and the high resolution of the information it yields. Only ice core and tree ring data compare in quality with historical evidence in terms of accuracy of dating and resolution (Bradley, 1999).

Historical evidence is limited to primarily the last two centuries in the prairies. In prairie Manitoba, the DLS written records begin in the late 1800s. These records are suitable in providing a representation of conditions prior to mass European settlement and modification of landscape. For example, historical documents have been interpreted to reconstruct climate for the past 200 years by Alsopp (1977), Catchpole (1978), Rannie (1983; 1990) and Blair and Rannie (1994). Rannie (1999) recently completed a reconstruction of floods in the Red and Assiniboine Rivers over the past couple of centuries and has investigated prairie fire occurrence (Rannie, 2000). Watts (1960) produced a generalized distribution of pre-settlement vegetation for the prairies but did not use individual township maps. Instead vegetation information was found on maps compiled from township plans produced at scales of 1 inch to 4 miles or 1 inch to 6 miles. Archibold and Wilson (1980) consulted township maps to map percent cover of prairie, woods, scrub, marsh, open water and brule or burned land for each township in Saskatchewan. Tracie (1992) analyzed surveyors' field notebooks to map pre-settlement vegetation on a quarter section basis (1/4 of a mile) for a small area near Grand Prairie, Alberta. And, Joss and Wiseman (2000) utilized a GIS to reconstruct pre-

settlement land cover in the Riding Mountain National Park region of west central Manitoba.

Study Area

After an original DLS survey was completed, recorded land information was mapped onto a standardized, township base plan. Original Manitoba township plans, bound in volumes, are available at the Provincial Archives of Manitoba (PAM). ArcView GIS is used to digitize original township maps surface cover information, create a database of landscape information, and to analyze and map data. A total of 194 townships have been digitized in the Red River drainage basin region of southern Manitoba (Figure 1). Nearly 90% of the surveys in the study area occurred between 1872 and 1877.

Methods

Definitions of Terrestrial Landscape Categories:

All graphic and written descriptions of any landscape polygon on original township maps were placed into one of five landscape categories: Prairie, Wetland, Woodland, Scrub or Water. These category names are almost identical to original plans category names and similar to categories used by Archibold and Wilson (1980) and Hildebrand and Scott (1987). To assess consistency of landscape description terms used by different surveyors, content *analysis* of root words and phrases was undertaken. *Content analysis* refers to the derivation of scientific (quantitative) information from textual material through interpretation of meanings and grouping of similar words or phrases. Much uniformity existed among the root words used by surveyors to describe any particular landscape or environmental phenomenon. This consistency appeared over all the townships in the study area and from surveyor to surveyor. Numerous descriptive adjectives of root words also appeared. Because of the variability and number of adjectives accompanying root words, most of these descriptors were not used in determining classification of a feature.

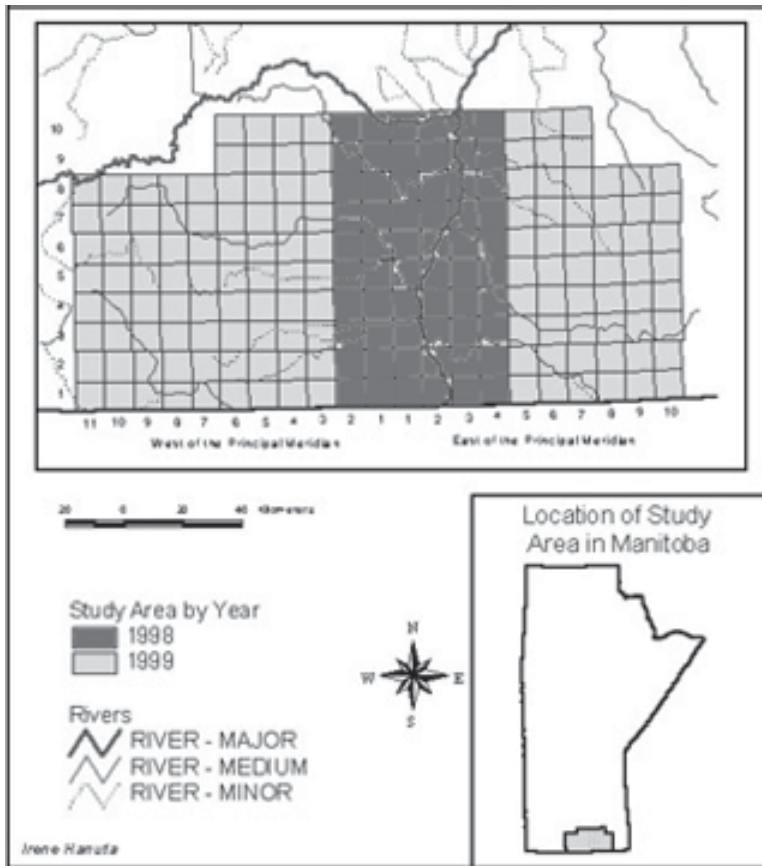


Figure 1: Location of study area.

Prairie Landscape Category: In a sample of 60 township plans in the study area, the most common root word to describe prairie was *prairie* (Appendix 1a). Written references to prairie on the sampled maps appeared 223 times. *Open prairie* was the most commonly used phrase, with *high prairie* and *low prairie* being the next most common. Of the four categories, the Prairie category also contained the most adjectives (20), individual words or phrases, to describe different types of prairie conditions (Appendix 1b).

Wetland Landscape Category: Many different root words described wetlands (Appendix 2a) while few descriptive adjectives were used (Appendix 2b). Some example root words include: *marsh*, *swamp*, *bog*, *slough* and *muskeg*. References to *hay marsh* or *hay land* were also placed in this category. *Marsh* and *hay land* were the most commonly used words to describe wetland areas.

Woodland Landscape Category: Dominant tree species were typically identified on township maps because supply and quality of timber was important for settlement purposes. The species identified most frequently in the Woodland category was *poplar* (Appendix 3a) found within and bordering the prairies. *Oak* was the next most commonly mentioned tree and was found in gallery forests along streams. No dominant adjectives accompanied the woodland root words. *Poplar Bluffs* were the most frequently mentioned features (Appendix 3b).

Distinguishing wooded areas from the scrub category was sometimes difficult. Identified tree species, density of cover and indication of stand age aided classification. For instance, when species was provided with a clue that mature trees were present (*thick*, *grove*, or *bluff*), the Woodland category was applied. Often, in the written description of wooded landscape, several tree varieties were listed, or a list consisted of one or more tree varieties and other vegetation types. In the former case, with a list of multiple tree species such as *Oak*, *Ash & Poplar* or *Ash Basswood Oak*, the Woodland category was applied. In the latter case, vegetation type appearing first in a mixed list was used as the overall indicator of landscape. For example, with phrases such as *poplar & scattered willow* or *thick poplar*, *scrub oak & willow*, the Woodland category was also applied. It was assumed that the most visible or dominant species would take precedence in a list of multiple vegetation types.

Scrub Landscape Category: The Scrub category included vegetation described as a mixture of prairie grasses interspersed with immature woodland or bush-type vegetation. This category also included areas with a low tree distribution density. That is, if adjectives

such as *scattered*, *clumps*, or *scrub* preceded a tree species name, then the Scrub category was applied. Willow vegetation was commonly labelled on township plans and was classified as Scrub unless it was identified as *willow marsh* or *willow swamp*. Since willow can thrive in saturated soils, regions of willow brush could denote areas of lower elevations receiving runoff or prone to flooding. In the scrub designation, willows were the most common vegetation type (Appendix 4a). Accompanying adjectives to scrub terms varied greatly (Appendix 4b). Some typical descriptors were: *scattered*, *brush* and *thicket*.

Data Capture:

Data collection involved electronic capture, digitizing, of township maps' landscape features as polygons, lines or point symbols. ArcView GIS was employed to enter original township map information into electronic format. First, digital base maps were acquired for each of the townships of the study area. Second, the maps were "geo-referenced", that is, the "real world" coordinates of each township map were established. To geo-reference a township map, the four corners of each paper township map are correlated with the four corners of a spatially accurate digital township map. Next, using a portable digitizing tablet, landscape features were captured electronically by tracing the outlines of each feature within the township. Landscape features and water bodies were drawn as polygons, streams as line symbols and spring water sources as point symbols.

Figure 2 shows an example of a township plan captured electronically with ArcView. Two attributes, information about the feature, are captured for each feature as it is digitized to create a database of landscape information. For vegetation and water bodies, the first attribute, a classification code, is assigned to each feature identifying the landscape category. To ensure consistency in the database, all attribute data were entered using a form designed specifically for this project. The form, presenting landscape classification options in a list, is designed to appear once digitizing of a feature was completed. Assigning a classification to a feature was achieved by pointing and clicking on the appropriate

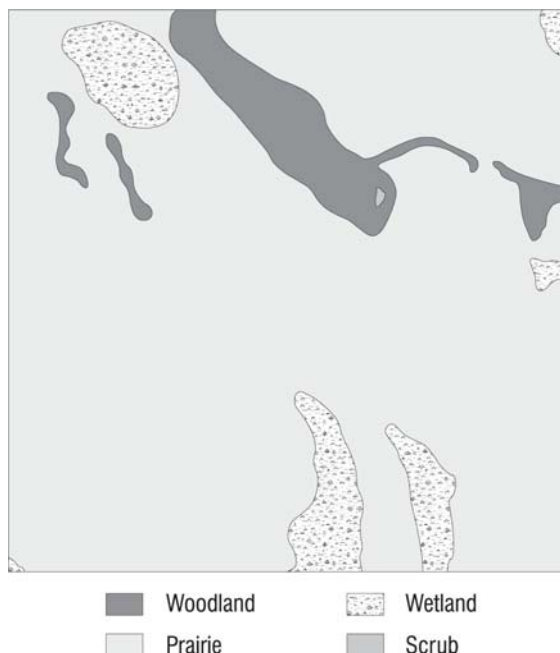


Figure 2: Township plan captured electronically using ArcView.

classification on the form. This ensured classification consistency and that there were no typographical errors. The second attribute on the form allows the capture of any textual information relating to the landscape polygon in a space designated *Detailed Class*. The same process and a similar form were applied independently to a stream (line symbol) layer in the GIS database. Stream attributes included permanent or intermittent designations.

Comparing Reconstructed Landscape with Modern Environmental Monitoring Data

After large-scale European agricultural settlement, many land use changes occurred: agricultural crops replaced prairie grasslands; major drainage schemes were initiated and woods were cleared. Instrumental data sources used to compare 19th and 20th century

landscape include digital air photographs or orthophotographs, classified satellite imagery from the Prairie Farm Rehabilitation Association (PFRA) and the Manitoba Forest Resource Inventory (FRI) interpreted air photography. Spatial analyses can be conducted with a GIS, overlaying and comparing the 19th century reconstructed landscape with some modern resources documenting surface conditions. This type of analysis is useful for tracking changes over time.

Figure 3a shows an area in southwestern Manitoba with a small prairie pothole lake, Lizard Lake. This lake contained water and was surrounded by wetland when it was surveyed in the later summer of 1872. When re-surveyed in 1917, water levels were much lower and Lizard Lake was labeled as *hay marsh* on the township plan. Another survey in 1919 mapped this lake as dry land. The area enclosed in the box on Figure 3a is depicted in Figure 3b, an orthophotograph from 1995 with the reconstructed 1872 lake and wetland boundaries superimposed. Open water area for the lake has contracted and a portion of the former marsh is cultivated. A former lakeshore scar is also visible. Two areas of woods present in the 1872 survey have been cleared.

Figure 4a illustrates a portion of a “Great Hay Marsh”. This soggy terrain was surveyed between June and August 1872. The field notebook report cautioned: “Cattle and horses cannot cross these parts except in the month of August, and then some spots must be avoided”. The surveyor speculated on the formation of this vast wetland: “The marsh is produced by the water of the Riviere aux Islets de Bois [Boyne River] having no channel through the Marsh to connect it with the Scratching River [Morris River], and until such channel is made these wet lands will be useless except for grazing and hay”. The industrious surveyor did recommend and plot a path for a drainage channel through this extensive wetland. Construction of this drainage channel and much of its original, proposed route did occur more than 30 years later resulting in the Norquay Channel. Figure 4b highlights part of this former wetland. Not a trace of the wetland appears on the 1995 orthophotograph.

Township 3, Range 3 East (Figure 5a) contained some forest cover in the 19th century comprised primarily of oak, elm and ash, which was of “large size” along the Roseau River. Other trees

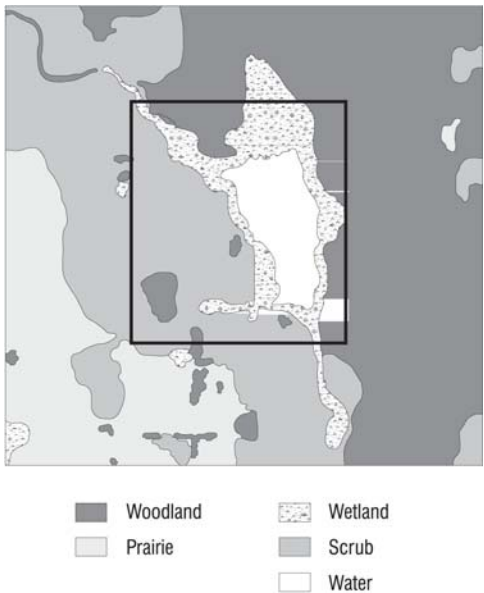


Figure 3a: Lizard Lake, southwestern Manitoba.

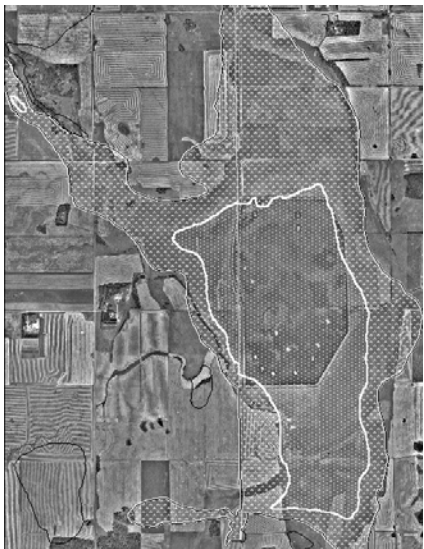


Figure 3b: Orthophotograph of Lizard Lake, 1995.

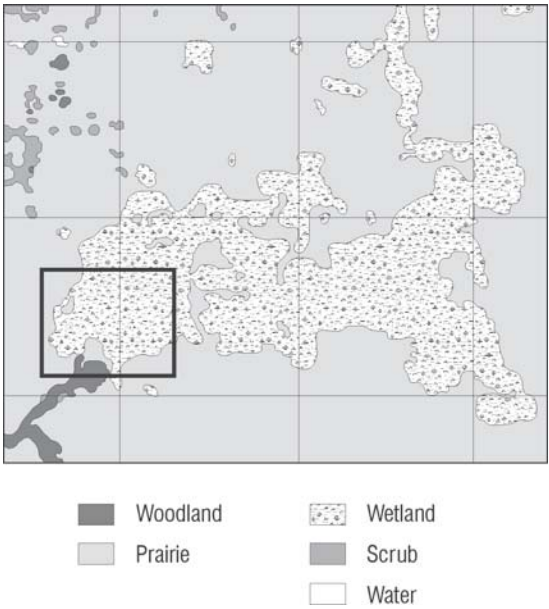


Figure 4a: Portion of the “Great Hay Marsh.”



Figure 4b: Orthophoto of Figure 4a (boxed area, lower left). White line indicates boundary of the “Great Hay Marsh.”

identified along the river were basswood, maple, balm of gilead (balsam), poplar and willow. On June 5, 1872 the depth of the Rosseau was recorded at 18 feet. The surveyor reported the river teeming with fish: “buffalo fish, channel cat, both very large 10 to 35 pounds and easily caught. Also: pike, goldeyes and shiners”. Figure 5b shows the same township in 1995 based on the FRI air photograph classified data. Practically all of the timber has been cleared and the land now classified as agricultural.

Summary

Original DLS township maps, field notebooks and other archival data can be valuable proxies in characterizing landscape in the recent past. The DLS plans are particularly useful for providing some very detailed baseline landscape data because of their systematic nature and the short time span over which they were conducted. Township maps yield high spatial resolution information (township level and even section level) and can be accurately dated. Utilizing a GIS to capture individual township data and to generate maps produces a digital database of landscape information that has potential future uses for other applications such as hydrological modeling or energy budget studies. The 19th century reconstructed landscape can be compared with instrumental media used today, such as air photographs or classified satellite imagery to evaluate changes over the past century. Changes can be graphically represented and also be quantified in the GIS through spatial analysis functions.

Acknowledgements

I must thank Dr. Harvey Thorleifson, Geological Survey of Canada and Dr. Erik Nielsen, Manitoba Geological Survey who were instrumental in activating this research through genuine interest, enthusiasm and initial funding. Also thanks to Mr. Bob Halliday, with R. Halliday and Associates who was so influential in assisting with funding to continue this research. My gratitude to



Figure 5a: Township 3, Range 5E, 19th century.

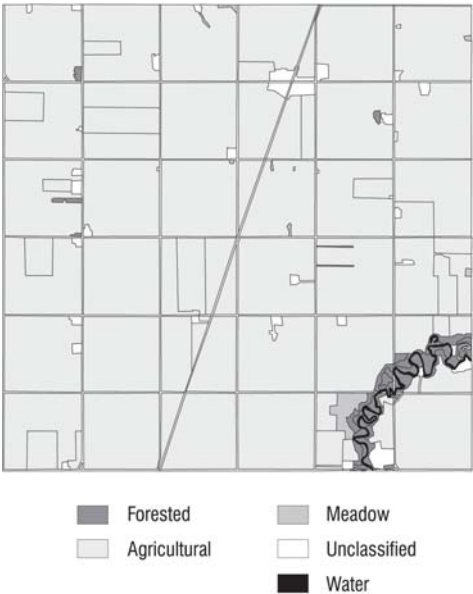


Figure 5a: Township 3, Range 5E, 1995.

the Provincial Archives of Manitoba, especially Chris Kotecki, for access to the original township maps and field notebooks. Thanks to John Teillet for assistance in preparing graphics. And, finally, I am happy to have Dr. Jim Gardner as my thesis advisor.

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Appendix

Appendix 1a:

Prairie Landscape Category and Root Words Assigned

PRAIRIE	Frequency of Root Words
Prairie	223
Grass	4
Field	2

Appendix 1b:

Prairie Landscape Category and Descriptive Words (Adjectives)
Accompanying Root Words

PRAIRIE	Frequency of Descriptor (Adjective)
Open	66
High	44
Low	29
Dry	24
Level	22
Rolling	13
Clear	6
Good	6
Excellent	4
Undulating	4
Flat	3
Hard	3
Rich	3
Poor	2
Ridge	2
Wet	2
Burnt	1
Fair	1
Inferior	1
No. 1	1

Appendix 2a:

Wetland Landscape Category and Root Words Assigned

WETLAND Frequency of Root Words

Marsh	73
Hay*	67
Weeds	39
Slough	3
Bog	3
Meadow/Beaver Meadow	3
Swamp	2
Wet Land	1
Muskeg	1
Coteau	1

*includes Hay Land, Hay Marsh, Hay Ground, Hay Swamp, Hay Grass

Appendix 2b:Wetland Landscape Category and Descriptive Words (Adjectives)
Accompanying Root Words**WETLAND Frequency of Descriptor (Adjective)**

Good (Hay Land)	9
Tall (Weeds)	6
Wet	5
Low	4
Burnt	2
Dense	1
Dry	1
Fine	1
Great	1
Floating (Bog)	1

Appendix 3a:

Woodland Landscape Category and Root Words Assigned

WOODLAND Frequency of Root Words

Poplar	171
Oak	77
Elm	12
Ash	7
Balm of Gilead (Balsam)	7
Trees	7
Woods/Woodland	4
Basswood	2
Maple	1
Tamarack	1
Timber	1
Windfall	1

Appendix 3b:Woodland Landscape Category and Descriptive Words (Adjectives)
Accompanying Root Words**WOODLAND Frequency of Descriptor (Adjective)**

Bluff	11
Small	8
Thick	8
Grove	6
Burned/Burnt	5
Dry	3
Dense	2
Green	2
Line of	2
Principally	2
Thinly	2
Dead	1
Fallen	1
Islands	1
Thicket	1

Appendix 4a:

Scrub Landscape Category and Root Words Assigned

SCRUB	Frequency of Root Words
Willow	170
Scattering/ Scattered Poplar	9
Brush	5
Scattered Trees/Timber	3
Scattering Oak	2
Scrub Oak	1
Oak and Poplar Clumps	1

Appendix 4b:Scrub Landscape Category and Descriptive Word (Adjectives)
Accompanying Root Words

SCRUB	Frequency of Descriptor (Adjective)
Scattered	67
Brush	21
Thicket	12
Clumps	7
Dry	5
Thick	5
Burnt	4
Large	4
Scrub	3
Dense	2
Green	2
Few	2
Bush	1
Fire killed	1
Low	1
Line of	1
Small	1

Exploring the use of self-directed photography as a tool in neighbourhood analysis

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Abstract: The use of visuals in geography has had a long-standing tradition. This has included the use of maps, photographic material and other multi-media sources to explain and interpret spatial phenomena on the urban landscapes. However, the gathering of such information has been, for the most part, the domain of those with the technical expertise and equipment. The exception to this has been in such areas as cognitive mapping where participants have been prompted to develop mental representations of the landscape in the form of line maps that represent cognitive images of cities and neighbourhoods as they envision them. This paper explores the use of self-directed photography as an innovative means to solicit images of neighbourhoods as captured through the lenses of cameras, in the hands of the residents themselves. This method not only empowers residents to photograph positive and negative aspects of their neighbourhood, but it also allows them to be in direct control of the experiment and its outcome. This technique has been successfully used in numerous studies of tourist destinations sites. However, it has not been used to any great extent within the neighbourhood setting. The critical objective of this research is to highlight the key attributes of this technique and consider their applicability for use in neighbourhood analysis. Expected data from a preliminary field experiment are reviewed to support this use of this innovative research tool in neighbourhood analysis.

The use of visual graphics in the form of maps, photographs and more recently, computer simulations, have provided geographers with the keen ability to interpret the urban landscape from many vantage points. The use of maps, in the form of land use, historical or bioregional have traditionally been used to display relevant information about a given location. The domain of

producing such maps has primarily been attributed to cartographers and those with the prerequisite skills. Furthermore, the interpretation of the urban landscape has also been for the most part, limited to those who control the images being investigated. In many instances, local residents are involved in the decision making process, and in the final stages, where they are asked to comment on possible solutions to urban development issues. Many times, photographs, maps, and future renditions of projects are displayed and residents are asked to comment on positive and negative aspects of the proposed project or issue. In so much as this method is essential in the process of urban interpretation and project development, it does not give the residents an avenue for direct control of the issue being examined.

The present research attempts to address this shortfall by exploring an innovative method of urban interpretation that empowers residents, and places them at the frontline of tackling and uncovering urban issues. Moreover, it forwards an argument that the use of self-directed photography provides a new urban analysis tool for urban geographers to employ. The method will be explored along side of the traditional measures in order to assess the potentialities of this procedure being incorporated in future urban research.

Perception Indicators

Strauss (1961) delivered a poignant but still a relevant backdrop in his examination of perception studies and the city, by noting, “how difficult it is not to *feel* in some way about cities in general, for cities are such a tremendous phenomenon as to call forth an enormous range of human sentiment and emotion” (Strauss: vii). Feeling about place is a powerful expression that can create a strong or weak sense of place, contributing to people’s emotions to the image they form about a particular area. In thinking about the city in general, many residents hold feelings about certain neighbourhoods—be they the posh neighbourhoods of the wealthy districts, or the neighbourhoods situated on the proverbial “wrong side of the tracks.” This simple thought holds some merit, as the

images and perceptions generated locally do not only impact the local residents but the entire city with respect to what the overall perception a particular neighbourhood is. It is on this level, that it becomes essential to tap into the emotions of the residents to truly understand how they feel about the neighbourhood. However, being able to quantify those feelings is a difficult task that presents important considerations for both the researcher and the residents.

In the salient literature, environmental perception studies are enormous in breadth and focus. It is in this body of literature that researchers have aspired to understand how people feel about places and how the ordinary urban landscape is interpreted by them. Knox (1996) provides a useful breakdown of the two main fields of perception study, describing them as designative and appraisive approaches. The designative approach focuses on people's imagery and mental cognition of the organizational spaces of cities. Here the emphasis is on people's orientation within the urban environment. Appraisive approaches take the view that urban imagery reflects people's feelings about the city and that these feelings in turn impact decision making about the urban environment (Knox: 261). The main difference appears to lie in the understanding of what impact space has on people's perception of place. It should be noted that the purpose of the following section is to briefly explore the history of perception studies and to extract possible methodologies and support for the present research. In order to assess the applicability of self-directed photography it is necessary to incorporate a wide breadth of literature so as to build a sound foundation for future studies.

Measures of Perception: Designative Approaches

The seminal study in the designative approach is considered to be that of Lynch (1961). Lynch's landmark work, entitled *The Image of the City*, transformed perception studies. Lynch focussed on the use of cognitive or mental mapping procedures to produce images of the city and its parts. The method used included extensive interviews along with mapping exercises to solicit mental images from the residents. This was done by having people produce a mental

map from memory that depicted the city from the images they held in their minds. What was produced from this method was a wealth of relevant spatial information about the city and its parts. Lynch found that the maps produced by people included similar themes and components. He cited five critical elements that were essential to understanding the images being produced—paths, edges, districts, nodes, and landmarks. These key features allowed Lynch to create a general mental image of the city as a whole by incorporating multiple images into a single representation. Lynch also attempted to better interpret the image of the city through an analysis of the meaning and legibility of space, striving to comprehend the look and feel of cities and to determine if these qualities were of importance. “The urban landscape, among its many roles, is also something to be seen, to be remembered and to delight in. Giving visual form to the city is a special kind of design problem, and a rather new one at that” (Lynch: 1).

In the final analysis, through mapping and interview techniques, Lynch procured people’s mental representations of the cities and neighbourhoods. From these simple procedures, Lynch assembled a complete image of the area that encompassed the varied cognitive images of the residents into a single representation. This image contained a wealth of information about the perception of place, patterns of movement, interaction and much more. The information was then synthesized into a picture of place that incorporated Lynch’s notion of the ‘whole’.

In discussing the element types, there is a tendency to skim over the interrelations of the parts into a whole. In such a whole, paths would expose and prepare *districts*, and link together the various nodes. The nodes would join and mark off the paths while the edges would bound off districts and the landmarks would indicate cores (Lynch, 1960: 108).

Lynch’s work became the starting point for understanding the image of a city or a neighbourhood. Since the 1960’s, numerous researchers, including Downs and Stea (1973), Spencer (1973), Gould (1974), Tuan (1974), Clark (1977), Pocock and Hudson (1978), Hayes (1980), and Stein and Sutherland (1989), have all used and furthered Lynch’s principles in imagining the city through cognitive mapping.

More recent studies, such those by as Kitchin (1996), Kuo (1998), Peron et al. (1998), Sadalla et al. (1993), Nasar (1994), O'Neill (1991), and Sheets et al. (1991), have also forwarded the designative approach of cognitive mapping by focussing on smaller specific areas of research. However, Kitchin concludes that most mental maps have been weak in terms of reliability and in the ability to incorporate testable hypotheses (Kitchin: 79). Nevertheless, he still considers the use of this method critical in being better able to interpret the ordinary landscape. Whether or not perception can produce testable results remains open for debate, but what is important is that useful qualitative information can be retrieved and used to understand people's feelings and perceptions about the urban environment. Moreover, in many urban projects, it is also imperative, to give people some sense of control over the project being undertaking.

Kuo et al. provide a practical designative approach in a study which examined the role that changes in the landscape had on transforming images of inner city neighbourhoods. The objective of the study was to determine if the incorporation of trees and grass in the neighbourhood had an effect on improving the image of the neighbourhood. The authors argued that the traditional stance that treed areas actually promoted fear in many inner city settings was false. The results supported their claim as sense of safety and preference actually increased when residents were exposed to a variety of landscape simulations. Furthermore, the approach was innovative and intriguing as they relied on computer-simulated photographs to derive from the residents a preference for what type of setting would best suit the area and their needs (Kuo et al.: 29). It should be noted that the study area consisted of an urban public housing complex in Chicago that included 28 16 storey buildings. There were approximately 15,000 residents that lived in the complex which contained two acres of courtyard space per 1,500 residents. The spaces consisted of basic concrete slabs with very limited recreational amenities.

Sheets et al. examined the cognitive impact that vegetation had when added to urban landscape. In his study, Sheets explored the addition of trees along streets through the use of a variety of line drawings that represented different vegetation levels. Again,

residents were asked to evaluate the drawings with respect to whether the trees added an improved perception of the area. The results appear to support the idea that vegetation can have a positive effect on people's feelings about the neighbourhood. The authors also concluded that vegetation scenes were seen as better, safer, and cleaner places to live in (Sheets et al: 301).

In a similar study, Peron et al. focussed on the relationship between cognitive processing and the preference responses to outdoor scenes. The authors used twelve scene types indigenous to Australia, Italy, and the Netherlands, including both rural and urban settings. The goal was to determine preference for scene types, familiarity, and judgements for each scene type by residents of the three countries (Peron et al.: 283).

The main result of the above cited research projects was that perception appeared to be measurable through the use of illustrations and photographs to gauge whether or not an area was positive or negative and whether the impact of simulated features affected overall perception of place. For neighbourhood studies, it appears possible that photographs of different neighbourhood features could be used to gauge a sense of how the residents feel about certain aspects of the area and how this can impact how confident people are about their neighbourhood.

Sadalla et al.; Foley et al.; and Nasar and O'Neill focussed their research more on assessing the perception of the physical components of the city. This was evident in Nasar's study of the evaluative qualities of building exteriors. In this research, the author examined three key aesthetic variables: formal, symbolic, and schemas. Again, the designative approach was used to determine the desirability of different types of exteriors. Nasar concluded that naturalness, upkeep, intensities of use, and style were key factors that determined what an individual will experience when exposed to different types of building styles (Nasar: 389). Directly related to Nasar's work is that of Sadalla et al. (1993), who detailed the impact of building materials on cognition. They attempted to determine the symbolism in building materials used in home construction and the impact it had on perception. The emphasis was on uncovering the cognitive meaning of the landscape through the use of perception measures. More important, Sadalla et al. noted

that there were cultural meanings in material selection and that this could impact social identity (Sadalla et al.: 155). This study incorporated the use of slides to determine a sense of feeling about particular material types and how individuals felt about each.

O'Neill (1991) pondered the idea that there is an architectural legibility in the landscape. This was similar to Lynch's work in the *Image of the City*. However, in this more recent work, O'Neill examined how people produced mental or cognitive maps of the spatial relationships within a building and the ease of way finding within this environment (O'Neill: 259). Although this is a departure from previous works noted, the idea that an examination of the built environment, through cognitive mapping and mental imaging, remains important in that it leads supports to smaller scale studies such as neighbourhoods and the smaller areas within them, such as park areas, community centres, or even spaces along main streets.

Measures of Perception: Appraisive Approaches

The appraisive methods of perception studies include recent works from Mesch et al. (1998), Nasar et al (1995), Woolever (1992), and Weeing et al. (1990) to cite a few. Appraisive studies explore the critical aspects of people's feelings about the environment. Within this context, Mesch provided a key example in his study of local attachment and environmental perception. Mesch and his coauthors sought to understand the determinants of place attachment through two theoretical perspectives: the community of limited liability, and the liberated community. The limited community model argues that local attachment results from the local relationships that develop over time. The liberated community model contends that only a small fraction of the neighbourhood population experiences local attachment, as only a small number of social ties develop locally (Mesch et al.: 504). A fundamental point is that the attachment to place may result from a positive perception of the neighbourhood environment. From this stance, it is assumed that the physical aspect of the neighbourhood may be as important as the social ties that develop within the area.

In a study that attempted to link urban problems with a declining sense of community, Nasar et al. (1995) examined the psychological sense of community in the neighbourhood (Nasar et al.: 178). In this research, the authors described an eleven-item scale to assess the sense of community possessed by the residents. The study examined three suburban neighbourhoods in Columbus, Ohio. They found that there was a higher sense of community in the neighbourhood that exhibited a higher level of mixed uses. They further noted that there was a higher sense of community in the apartment complex that contained a courtyard as opposed to the complex without (Nasar et al.: 179). The implication for the present research is that perception appears to play a significant role in the dynamic nature of the neighbourhood and that there appears to be a strong connection between the resident and built environments as noted in the use of these techniques.

Related to Nasar's work is that of Weeing et al., who attempted to produce a categorization of neighbourhoods that would assess sense of community through a four-type classification system based upon the level of neighbouring and social networks. The authors used indicators such as: measuring the level of interaction in conversation, visiting, and the provision of social support to friends and neighbours. The goal of the research was to determine the level of neighbourhood cohesion that existed. They found that neighbourhoods consisting of mainly multi-storey apartment blocks tended to exhibit a lower sense of community and were less cohesive than the less dense single-family neighbourhoods, which is contradictory to Nasar's findings noted above (Weeing: 27).

The work of Woolever provides the final examination of perception measures. In this research, the author examined the complexities of neighbourhood attachment. What is important about this study is the fact that Woolever examined attachment not only from the traditional perspective of the behaviour of the residents, but she also included the impact that the physical characteristics played in influencing the level of attachment (Woolever: 99). The most relevant conclusion in her work is that, "neighbourhood perceptions and evaluations are better understood by a model that includes more than individual socio-demographic predictors" (Woolever: 112). Furthermore, her research concluded that a

measurement of neighbourhood attachment levels needs to consider both the individual residents as well as neighbourhood characteristics (Woolever: 100).

From the topical study of the role perception plays in the understanding of neighbourhood dynamics, it is evident that not only is the role of the residents central but so is the impact of the physical surroundings. This is the fundamental contention for the present research, which is attempting to demonstrate that neighbourhood analysis would be better understood by a method that explores the human and physical environments of neighbourhoods in order to assess how confident residents are about their neighbourhood. The research outlined so far has also demonstrated that there are many potential methods that could be used in understanding perception, these ranging from the use of cognitive mapping and photographic interpretation to the use of surveys to measure the sense of community and neighbouring. Each method appears to add a new dimension to the two key theoretical perspectives outlined by Knox. More importantly, it is also evident that many studies crossed over the hazy boundary between designative and appraisive measures of perception.

It is assumed that the measurement of the human environment is a complex and equally subjective task that involves the selection of a methodology and the ensuing interpretation of the data collected by the researcher. The use of survey material in the form of a questionnaire can prove to be a useful tool, but supplemental research techniques are important both to balance this material and to widen the scope and impact of the research.

As noted at the outset, the use of photo-interpretation is an example of a supplemental technique that can be employed. Yet, the selection of a particular type of photo-interpretation methodology is also a complex issue. This research endorses a method of photo-documentation called self-directed photography, as a secondary measurement tool of the physical and human environment of the neighbourhood. This measurement will serve to gauge the residents' perceptions and feelings about the neighbourhood and assist in evaluating their confidence about the area. This method also aides in the development of an overall image of the neighbourhood, grounded in a balance between the human

and physical environments. Furthermore, it will provide a strong representation of both the appraisive and designative measures noted above, as the cognition of space and how people's feelings about place impact decision making in the urban environment are evoked through this innovative approach.

Measures of Perception: Self Directed Photography

The use of self-directed photography has become more represented in the geographical literature, including Markwell (2000); Crang (1997); Sternberg (1997); Rose (1996); Aitken and Wingate (1993); Haywood (1990); Larkham (1986); and Foote (1986). In the majority of these studies, research subjects were provided with a camera and asked to photograph pre-determined target areas. For the most part, this research has centred on the use of this technique as a means to interpret tourists' perceptions of various destination sites. In these exercises, participants were asked to photograph positive and negative aspects of chosen tourist destination sites. The purpose was to determine which sites garnered the most attention and why and also to determine areas that evoked negative feelings about the destination site and why. The use of self-directed photography has also been used, with success, to explore residential areas and the images generated by the residents. However, this methodology is the least represented in the literature but offers the greatest potential for urban application.

Markwell (2000) explored the concept of photo-documentation in a study of tourist destination areas. He noted that understanding the importance of place is critical for this type of research, referring to it as an important component of interpretive human geography. Furthermore, he noted that other disciplines have used the photo-documentation techniques with great success and that the use of visual imagery is a vital aspect of geographical research. To this, Markwell wrote this technique "allows the subjective experience of place to be critically uncovered and understood" (Markwell: 91). The technique is also important in understanding the intrinsic attachment that people have to place, and how these relationships

act as a guide for understanding which aspects of a place are most evident in people's cognitive representations of the urban landscape.

It is important to note that Markwell acknowledges that, although self-directed photography has been used with success in other disciplines, "few geographical studies have been carried out using self-directed photography" (Markwell: 92). The reasons for this lack of interest include the high costs and also the difficulty in finding participants. In the end, Markwell concludes that the empowerment given to the participants is a useful and effective means of obtaining a good sample of the intended project. However, he stresses the need to combine this method of data collection with other forms, such as interviews, survey, or personal observation techniques (Markwell 98-97).

In a study of residential areas, Aitken and Wingate (1993) discussed the importance of the use of self-directed photography as a tool to understand the images of places as seen through the eyes of middle-class, homeless and impaired children. As with Markwell, Aitken and Wingate saw the use of this method as a means of empowering residents to produce images of their neighbourhood as they envisioned it. Furthermore, they linked the use of self-directed photography to cognitive mapping and to the work of Lynch, noting that "self-directed photography, then may be viewed as cognitive mapping which serves to reaffirm the *self* by partially apprehending the *real* (Aitken and Wingate:66-67).

Crang (1997) explored the strong relationship between the use of visual interpretation and geography. He concluded that "geographers have shown the centrality of representations of landscape to understanding social geographies" (Crang: 359). Crang also cited the importance of envisioning as a key part of how people interpret and understand the world, writing that "there is here the possibility to employ the ways people normally envision places and use the practice of picturing to relate to them" (Crang: 370). Crang also observed the pitfalls in the use of this method in geography and cautioned that the careful selection of method of interpretation is essential, as the practice of picturing opens up possibilities for looking at the ways images are embedded in time and space and how they play with space and time (Crang: 370). He concludes that "addressing the practices of seeing, in this case

photographic ones, may prove a useful approach, not a panacea” (Crang: 371).

In the discussion thus far, it has been noted that the use of photo-interpretation offers a secondary and supplemental perspective on the use of perception as a measurement tool in the neighbourhood. What is also clear is that the selection of a self-directed method of photo-interpretation may yield some important findings with respect to understanding the importance of place through the eyes and feelings of the residents. However, there are some important considerations for the use of this type of research. First of all, the obvious cost of this method is a central issue, as the majority of studies provided subjects with a disposable camera and then had to absorb the costs for processing the film. This limits the number of subjects, due to the expense of purchasing cameras and processing the results. A second issue related to this shortfall is the selection of a representative sample from a neighbourhood, as it will not be feasible to use a large number of subjects due to the costs. A third limitation of this type of research is the availability of participants willing to engage in this time-consuming exercise. This method should then be considered an essential but a supplementary data source that provides a visual interpretation of the neighbourhood. The method also helps in understanding the importance of place and sense of neighbourhood as seen through the cognitive aspirations of the residents what they perceive to be both strong and weak places and images within their neighbourhoods.

In terms of a defined methodological approach, Haywood (1990) provides some an important framework. In this work, Haywood employed an urban visit assessment methodology. The purpose was to determine which areas of Toronto tourists found to be the most enjoyable and the most distressing during their visit. The author used the disconfirmation model of customer satisfaction as a framework for understanding the feeling being generated. Based on the principles of the model, people were asked to consider the attractiveness and attributes of the city based on the “visitor’s evaluation of the quality of the urban experience” (Haywood: 25). The main objective of the project was to understand the positive and negative aspects of the visit to the city. In terms of some

important considerations for the present research, Haywood notes some important shortcomings of the use of this technique including:

- Some people did not feel comfortable using a camera.
- Some did not feel comfortable taking pictures in certain instances when they did not feel safe.
- The use of amateur photographers means that some of the images may be distorted due to inexperience taking pictures.
- The short period of time for taking the pictures limited the range of pictures that could be taken over a longer period of time.
- Due to the fact the some people had limited time, the photographs came from only major destination sites, or in fact were limited to only one or two places that they visited.
- The amount of time that is involved in overseeing such a project is a hindrance (Haywood: 27-30).

Despite the noted shortfalls, the overall benefit of using this technique seemed to outweigh the negative aspects. In the final analysis, Haywood points out that this technique can serve as a means of involving citizens in the planning and design process. Furthermore, he also notes that self-directed photography can also be used as a means of comparing two areas of the city, or in fact, two cities (Haywood: 29).

It is clear that there is a need to select a methodology to ensure that the use of self-directed photography becomes a tool and not a hindrance to geographical research. Rose (1996) attempted to address this issue by exploring a methodology for the geographical interpretation of visual materials. Rose cited the importance of cognitive interpretation as a central issue in which the human geographer must attempt to decipher a coherent assessment of the intended visual subject area. Therefore, unlike Haywood, the need to select specific areas becomes critical in being able to manage the outcome more efficiently. Furthermore, this structure allows for a more organized survey of the desired site and also the ability to compare the findings of a number of visitors because they are all evaluating the same region of the city. Therefore, if the project is limited to the smaller boundaries of the neighbourhood and

employed with the local residents, the outcome should produce a more detailed account of the area based on a higher knowledge of the geography. This may be a key difference in the use of this technique from those undertaken in tourist areas where the participants have no knowledge of the area or its geography. However, whether this contention proves to bias the participants remains an unanswered question.

Geography of the Proposed Fieldwork Area

For the present research, the proposed field work incorporates the methodologies cited in this chapter. However, a critical departure is grounded in the fact that the urban evaluation will take place on the neighbourhood scale and it will use the neighbourhood residents themselves. This will allow for the evaluation to be conducted by those who know the area's geography, history and its potential strengths and weaknesses.

The neighbourhood that will be evaluated using this framework is Riverview, which is a medium density neighbourhood consisting mostly of single family homes that range in age from new - 100 years old. The neighbourhood contains 1780 dwelling units, of which 70% are single family and 68% are owned-occupied. In terms of period of construction, 47% were built pre-1946 while 85% of homes were constructed prior to 1960. Predominately, the neighbourhood's housing stock is considered to be in good condition with some homes having undergone extensive renovations and upgrading. There are also pockets of homes in the neighbourhood that are considered to be in need on minor repairs (32%) and homes that are in need of major repair make up 14% of the housing stock (Statistics Canada: 1996).

In terms of neighbourhood amenities, Riverview contains extensive green space and a well-developed park system. The overall spatial organization of the neighbourhood was highly influenced by the concept of the Neighbourhood Unit which was advanced by Perry. This is evident in the location of schools and parks in the neighbourhood. One of the most important features of the area is that fact that it is relatively isolated from other sections of Winnipeg.

This is the result of the fact that Riverview is bounded by the Red River and Osborne street. These two features effectively cutoff this neighbourhood and provide an isolated test area.

It is anticipated that the majority of positive confidence markers in the neighbourhood will be derived from such aspects as the distinctive character of housing, the numerous parks, and the thick canopy of elm trees that envelop the majority of the residential streets during the summer months. Another key feature is the river walk system that has created an extensive and scenic walkway that encircles the neighbourhood, connecting it with the downtown region of the city. In terms of some of the possible sources of negative images, there are pockets of housing that are quite dilapidated in the neighbourhood. Also, some of the commercial area is experiencing a transition and there are high levels of vacant storefronts. There are also higher than average traffic volumes on Osborne Street as the area is a major thoroughfare to the suburban neighbourhoods of south Winnipeg.

Major development in the area is the Riverview Health Centre, which is a major hospital complex that occupies a large section of the neighbourhood. Over the last few years, the previous hospital buildings dating back nearly 100 years were torn down. The ensuing reconstruction project may have caused some residents to consider this area as negative due to the high traffic and noise from construction.

Summary

This paper has attempted to address some of the pertinent issues with respect to the selection of a methodology that will provide an innovative measure of the perceptions and neighbourhood confidence levels of neighbourhood residents. As noted, there are both positive and negative aspects of selecting self-directed photography to accomplish this task. However, it is hoped that this technique will prove to be a rich source of textured data that will provide a glimpse into the thoughts and feeling of the neighbourhood residents. It is on this cognitive level, that the true images of the neighbourhood will surface in colour and detail which are not

attainable in the blue ink of survey forms, or in the voices of opposition at community meetings. In the end, it is hoped that through the lens of the camera, the residents will be able to focus their actions and reactions to complexity of the urban landscape of their territory, ultimately expressing a sense of true territoriality.

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