AGRICULTURAL LAND LOSS
IN NEW BRUNSWICK

by

BRIAN R. DICK

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Department of School of Community and Regional Planning

The University of British Columbia
2075 Wesbrook Place
Vancouver, Canada
V6T 1W5

Date April 27, 1977

ABSTRACT

Within the province of New Brunswick, there has been a continual decline in the number of acres of improved land under cultivation since 1911. While the rate of decline was gradual before World War II, it increased rapidly during the post-war period. Much of the loss during the first 10-15 years of the post-war period was undoubtedly the result of the abandonment of land with marginal agricultural value and was generally accepted as a necessary part of the rationalization process that was required to bring New Brunswick agriculture into the twentieth century.

By 1961 however, the amount of improved land reported by the census was approximately equal to the estimated 710,809 acres of cleared C.L.I. class 2-4 land within the province which is considered to have the highest agricultural potential. In the following ten years, a further 246,727 acres of improved land went out of production. It is difficult to relate these recent losses to the quality of the soil available for agriculture or to the productivity of New Brunswick farmers, in light of the fact that nearly 75 per cent of the above mentioned 710,809 acres is of C.L.I. class 2 and 3 capability and the average net income per acre of improved land has consistently been nearly double the Canadian average since 1961.

Concurrent with these recent losses, there has been a dramatic increase in the amount of urban-oriented residential construction which occurs within the rural areas of the province. This activity first became evident during the 1966-71 period, but it has been since 1971

that the greatest increases have taken place.

The main objective of this thesis has been to address the following questions: (1) What is the impact of this urban-oriented development on the rate of loss of agricultural land? (2) Is the present market allocation of agricultural land between urban and agricultural uses in the long run interest of society at large? and (3) What policies or programs are required to deal with the problems of agricultural land loss in New Brunswick?

The following are in general the answers which have been found:
(1) Urban-oriented development within rural areas has become an increasingly more important determinant of the rate of loss of agricultural land. However, other traditional problems such as small farm size and the related socio-economic circumstances of a large portion of the farming community continue to be influential. Unfortunately these two factors working in tandem have a synergistic effect which causes the total loss to be greater than the sum of the individual losses either factor would produce if acting alone.
(2) The price agricultural producers are willing to pay to obtain land for agricultural production underestimates the true long run value of this land to society as a whole. Furthermore, the prices urban uses must pay to obtain agricultural land do not accurately reflect the full long run cost which society as a whole incurs when it is permanently destroyed for agricultural production. Therefore, when these two uses compete to obtain agricultural land, more land will be allocated to urban uses than is in the long run interests of society as a whole.

(3) Although programs to prevent the needless destruction of agricultural land by urban uses are needed, they only make sense if a viable agricultural industry continues to exist within the province and uses the available land base as fully as is economically possible. Furthermore a program to prevent development on agricultural land will have the unfortunate effect of increasing land and housing prices and/or accelerating urban sparwl and ribbon development on non-agricultural land. Therefore a positive program for the preservation of agricultural land must also encourage the full use of the land so protected and facilitate low cost orderly development of land for housing within urban areas.

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CHAPTER I

INTRODUCTION, SCOPE AND OBJECTIVES

In recent years, residents of urban areas in both Canada and the United States have opted to live further and further away from the centers of their cities, seemingly in an attempt to escape the noise, crime, pollution and high cost of city living. This outward migration has been stimulated and facilitated by the automobile, improved highway systems, increased affluence, and the extension of community facilities far into the urban fringe.

In the wake of this trend, concern has arisen over the amount of agricultural land which has been destroyed in the process and replaced with large suburbs, subdivisions and ribbon developments. In general, however, most of the attention has been focused on the physical destruction of this land for agricultural purposes.

Unfortunately the amount of land which is physically destroyed for agriculture may, in some cases, be only a small proportion of the land which is economically destroyed for agricultural purposes. Land can be economically destroyed for agriculture by segregating it into parcels which are too small for a viable farm unit; isolating it from transportation routes because of ribbon developments; bisecting individual fields with roads; and increasing production costs as a result of vandalism and other nuisances related to its proximity to urban development. The importance of land economically destroyed for agriculture, in relation to the total destruction of this land by urban

encroachment, will depend upon the intensity with which urban encroachment uses the land as it moves outward from the city. The intensity of use will in turn depend to a large extent on the economic strength and profitability of the agriculture industry surrounding the urban area in question.

For an urban center surrounded by agricultural land which is occupied by a reasonably profitable agriculture industry, we should expect urbanization to take place in a relatively contiguous fashion; using the land intensely. We should also expect the land to remain in agricultural production relatively close to the time it is physically occupied by an urban use. In such a case the amount of land which is physically destroyed for agriculture will be a high proportion of the total land destroyed.

In areas where agriculture is on a weak economic footing, urbanization can be expected to move outward more rapidly-taking the less viable farm operations first; then surrounding and choking the viable ones. The amount of land which will remain undeveloped but which has been economically destroyed for agriculture will be much greater.

In the first situation the zone of conflict between urban and agricultural uses of the land will likely be a narrow band along the urban frontier. In the second situation, however, the zone of conflict will penetrate further into the agricultural community, thus producing a greater loss of agricultural land for a similar increase in population. In a study, by A.D. Crerar, on the rate of loss of

agricultural land around major Canadian cities, it was found that for each 1000 increase in population the amount of land lost, varied from a high of 1001 acres in the Ottawa area to a low of 192 in the area surrounding Windsor.[1] It must be noted that the agriculture industry in much of the Ottawa Valley has gone through a difficult period of adjustment since the end of World War II while in the Windsor area the agriculture industry is among the most profitable in Canada.

The loss of agricultural land surrounding urban areas where the first situation exists has received the most attention from academics and governments concerned with this problem. The Niagara fruit lands, the farmland surrounding Vancouver in the lower mainland of British Columbia, the vegetable and grape lands of California, and the pineapple and cane lands of Hawaii all immediately come to mind as areas where concern has been greatest and where governments have acted to prevent this loss. In all these cases a relatively strong agriculture industry has traditionally existed.

In the province of New Brunswick-the area this thesis will deal with-this is clearly not the case. The agricultural industry in New Brunswick, with the possible exception of the potato growing areas of Carleton, Victoria and Madawaska counties, has had a long history of weak economic performance. There has been a continual decline in the number of improved acres under cultivation since 1911. While much of the land that was lost in the past had marginal agriculture value, there is evidence that two factors, other than the productivity of the land, have become increasingly more important determinants of the rate of loss

in recent years.

The first of these factors is the constraint that the traditionally small number of improved acres per farm puts on the viability of individual farm units. Table II shows that on a per acre basis farms in New Brunswick are on average more productive than the Canadian average. However because many farm operators control such a small number of improved acres they are unable to provide themselves and their families with a living which compares reasonably with alternative employment opportunities. Concurrently farms of this size are unable to produce competitive returns for the capital the operator invested in them. Thus increasingly, as incomes in alternative forms of employment and investment rise, operators of these farms are faced with the choice of either expanding their operations or going out of business.

The second factor is the dramatic acceleration since 1966 in the amount of urban-oriented residential construction which has taken place within the rural areas of the province. Most of this residential development has been in the form of haphazard ribbon development stretching sometimes for as much as 40-50 miles along the roads and highways surrounding urban areas both large and small. Another aspect of this development has been the purchase by residents and non-residents of properties for rural estates, hobby farms and recreational purposes.

This urban-oriented demand for agricultural land, working in tandem with the historical problems of small farm size, now threatens to destroy both economically and physically, land which otherwise would be valuable for agriculture. In areas where this type of development has

occurred it has placed both physical and economic impediments in the path of farmers wishing to expand the size of their operations. In some cases it physically restricts the expansion of a farm onto adjacent land while in others it drives up land values beyond their value for agricultural production. The end result of this process has been to permanently segregate good agricultural land into parcels which are too small for a viable farm unit, and which subsequently lie abandoned and non-productive. In a report by the Department of Agriculture's Land Planning Section, we find the following passage:

> Moreover, the degree and extent of semi-rural or semi-suburban pressures dramatically influence land prices through the speculative demands on agricultural lands, reflected in acquisition and rental prices which are not necessarily coincident with productive value. The subtle pressures of low density population growth confer a devastating effect on agricultural production in the area. In these regions, farm operations cease or show low growth potential due to environmental considerations (i.e. air and water pollution) as well as anticipated sepculative aspects associated with urban development.[2]

Thus, the amount of agricultural land which is physically converted to urban uses is not a good indication of the full effect of urban pressures on the loss of agricultural land in New Brunswick. However, the loss of land which is due to the tenure problems of the agriculture industry and that which is due to urban pressures cannot be dealt with separately. The spread of urban-oriented development far into the fringes of urban centers is encouraged and facilitated by the abandonment of non-viable farm units; but the abandonment of these units is accelerated by urban pressures for land and the lure of urban opportunities for employment and investment. We are squarely faced with a

synergistic relationship in which the total loss of land is greater than the sum of the invididual losses either factor would produce if acting alone.

The foregoing has been a brief introduction to the problem of agricultural land loss, as it affects the province of New Brunswick, which attempts to put the factors causing this loss in perspective with regards to other areas where this problem has arisen. In the remainder of this thesis we will: document this loss of land and the growth of urban-oriented residential construction in the rural areas of the province; provide a rationale for intervening into the present market allocation of this land; attempt to determine statistically the effects of various factors on this loss; and suggest policies to deal with this problem.

CHAPTER II

LAND BASE FOR AGRICULTURE AND ITS USE - PAST PRESENT AND FUTURE

Before continuing further, it is appropriate at this point, to outline the New Brunswick situation with regards to the agricultural land base and its use. In this chapter we will describe: the quantity and quality of agricultural land within the province; past and present trends in its use; and the supply of and demand for this land in the immediate future.

A. The Land Base for Agriculture

Agricultural land within the province of New Brunswick has been classified according to the Canada Land Inventory, Soil Capability for Agriculture System. This system divides all soils into seven capability classes, plus the class of organic soils for which no capability rating is made. With the exception of class 1, each soil class is subsequently divided into a number of subclasses which indicate the types of limitations to which soils within each class are subject.

Basically, soil classes 1-4 are considered appropriate for some form of continuous agricultural production. Class 1 soils have no serious limitations for cultivation and each succeeding soil class is more limited in the range of crops which can be grown and as to the ease with which cultivation can take place. There are no class 1 soils within the province of New Brunswick.

The C.L.I. classification system considers only physical

characteristics such as soil fertility, stoniness, or cliamte in its evaluation of agricultural land. Economic considerations such as distance to markets, types of roads, location, size of farms, characteristics of land ownership and cultural patterns are not considered as criteria for capability groupings.[3] In an attempt to partially overcome this limitation, agricultural soils within the province have also been blocked. The term agricultural blocking has been applied to designated areas, where there are a significant number of acres of land that display consistently high agricultural capabilities. This blocking has been done in an attempt to indicate where the agricultural potential of the province is greatest. Areas of C.L.I. class 2-4 land which exist in small pockets, isolated from markets, transportation networks and other agricultural communities, have not been included within the blocking. However, small amounts of C.L.I. class 5-7 land are included within the blocking, where they occur in close proximity to land of high agricultural capability.

Table 1, shows the distribution of C.L.I. class 0, 2, 3 and 4 land which is both cleared and blocked, as it occurs within the fifteen counties of the province. The table also gives totals, within each county and the province, for C.L.I. class 0-4 land which is cleared but unblocked; blocked but forested; and unblocked and forested.

From this information we find that although the province contains a total of 8,263,918 acres of land with C.L.I. capabilities 0-4, only 3,287,164 acres of this land are included within agricultural blocking. Furthermore, of this total, only 710,809 acres are presently cleared.

TABLE I - ACRES OF C.L.I. CLASS 0-4 AGRICULTURAL LAND

COUNTY	CLEARED AND BLOCKED				TOTAL CLEARED BLOCKED	TOTAL CLEARED UNBLOCKED	TOTAL FORESTED BLOCKED	TOTAL FORESTED UNBLOCKED
	0	2	3	4				
ALBERT	-	4,792	22,991	8,878	36,661	14,553	37,917	81,575
CARLETON	355	33,158	57,831	23,937	115,281	39,612	116,827	206,555
CHARLOTTE	-	-	5,613	3,091	8,704	23,728	31,209	143,293
GLOUCESTER	314	-	38,751	18,655	57,720	40,851	202,610	325,089
KENT	48	-	37,561	18,825	56,434	53,345	281,774	444,609
KINGS	-	9,729	23,711	12,973	46,413	62,057	86,671	134,794
MADAWASKA	314	15,028	20,071	10,907	46,320	24,827	161,181	250,246
NORTHUMBERLAND	164	24	19,278	15,536	35,002	34,617	421,870	830,507
QUEENS	-	2,802	6,594	4,896	14,292	23,594	85,872	325,095
RESTIGOUCHE	1,805	10,063	11,569	3,777	27,214	16,794	257,474	455,974
ST. JOHN	-	-	-	-	-	12,089	-	32,803
SUNBURY	115	3,957	5,383	4,113	13,568	10,377	89,904	220,551
VICTORIA	96	20,384	23,666	13,794	57,940	13,629	350,591	230,846
WESTMORLAND	155	521	123,425	25,771	149,872	23,175	264,258	236,604
YORK	-	3,920	28,359	13,109	45,388	34,701	188,197	630,264
PROVINCE	3,366	104,378	424,803	178,262	710,809	427,949	2,576,355	4,548,805

Source: Canada Land Inventory

This figure represents what we can consider to be the provincial land base for agriculture within the immediate future. Although the table shows much more class 0-4 land which is presently forested; or cleared but outside agricultural blocking, economic constraints would prevent this land from being used unless existing product prices were to rise dramatically. The cost of clearing the presently forested areas of class 0-4 land is estimated to be as much as $1000 per acre.[4] When we consider that much of this land is isolated from existing transportation systems, it becomes apparent that the cost of bringing this land into production would be prohibitive. In a province where the present average purchase price for improved farmland is between 101-151 dollars per acre,[5] it would take a considerable rise in food prices to bring forest land into production. The areas of cleared class 0-4 land outside agricultural blocking, may be used to some extent, but overall, the fragmented and isolated nature of this land excludes it from viable agricultural production in the near future.

In conclusion, although at first glance there appears to be a large surplus of C.L.I. class 0-4 land within the province, economic and physical obstacles restrict the amount of this land which can be used for viable agricultural production within the immediate future. Good improved agricultural land with high C.L.I. capabilities is a scarce resource within the province at present.

B. Past Trends in Agricultural Land Use

Table II, shows the number of farms and the acreage of farms-improved and unimproved land-within the province of New Brunswick

TABLE II

Number of Farms and Acreage of Farms, Improved and Unimproved Land

New Brunswick, 1871 - 1971

Census Years	1871	1881	1891	1901	1911	1921	1931	1941	1951	1956	1961	1966	1971
Total Area of Farms in Acres	3,827,731	3,809,621	4,471,250	4,443,400	4,537,999	4,269,560	4,151,596	3,964,109	3,470,234	2,981,449	2,199,675	1,811,695	1,339,133
% of Total Land area in Farms	21.8	21.7	25.4	25.3	25.8	24.3	23.6	22.5	19.7	17.0	12.5	10.2	7.5
Total Number of Farms	31,202	36,837	38,577	37,006	37,755	36,655	34,025	31,889	26,431	22,116	11,786	8,706	5,485
Total Area of Improved Land	1,171,157	1,253,299	1,509,790	1,409,720	1,444,567	1,368,023	1,330,232	1,235,431	1,006,377	951,291	734,107	638,649	487,380
Total Area of Unimproved Land	2,656,574	2,556,322	2,961,460	3,033,680	3,093,432	2,901,537	2,821,364	2,728,678	2,463,857	2,030,158	1,465,568	1,173,046	851,753

between 1871 and 1971. Diagram I gives a graphical representation of the number of improved acres under cultivation for each census year during this period.

The most evident message conveyed by this data is the continual decline in the number of cultivated acres since 1911 and especially the dramatic decline in the post World War II period. Undoubtedly the abandonment of land with marginal agricultural value was responsible for a large portion of the early losses. However, by 1961, the amount of improved land reported in the census was approximately equal to the 710,809 acres of cleared class 0-4 land which exists within agricultural blocking. Between 1961 and 1971 a further 246,727 acres of improved land went out of production. These recent losses can hardly be attributed to the poor quality or low productivity of the soil available for agriculture. This is especially true when we find that nearly 75 per cent of this cleared and blocked land is of C.L.I. class 2 & 3 capability.

Table III provides further evidence that these recent losses are not related to productivity. As can be seen from the table, both gross and net income per acre have consistently been nearly double the Canadian average. A close look at this table also provides further insight into the factors which have been responsible for these recent losses. The table shows that while New Brunswick farms have consistently had higher average gross and net incomes per acre, and gross incomes per dollar of machinery and equipment; they have consistently had lower average, gross and net incomes per farm, gross and net incomes per worker, and in 1971, lower net income per dollar of machinery and equipment.

DIAGRAM I

TOTAL FARMLAND AND
IMPROVED LAND
NEW BRUNSWICK 1871-1971

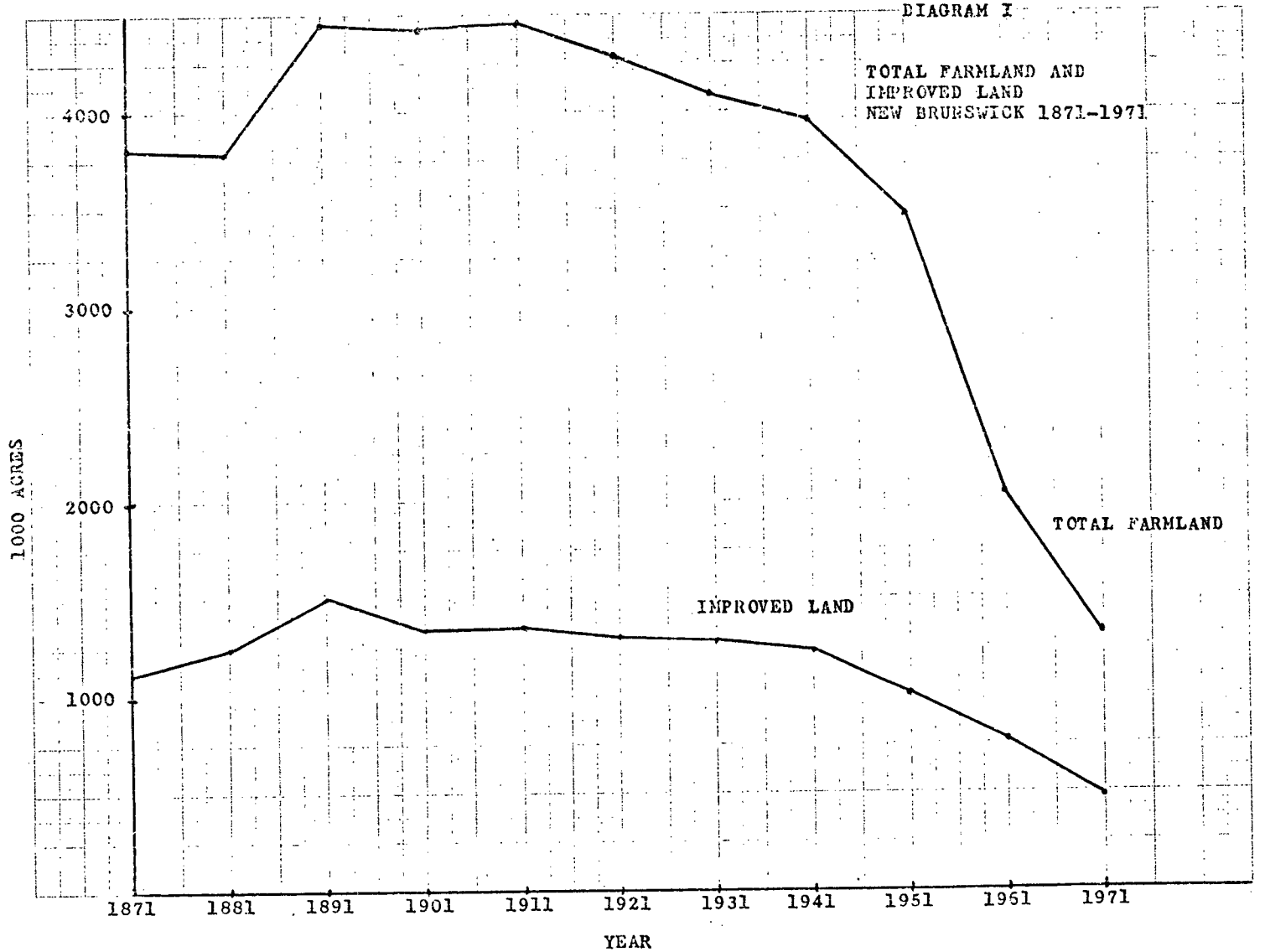


TABLE III - TITLE-SELECTED ECONOMIC INDICATIONS FOR CANADIAN AND NEW BRUNSWICK AGRICULTURE 1961-1971

Source: STAT-CAN - 96-505, 96-605, 96-705, 21-202

	1961		1966		1971	
	N.B.	CANADA	N.B.	CANADA	N.B.	CANADA
Acres Improved Land Per Farm	62.29	215.02	73.36	251.22	88.86	295.39
$ of Machinery and Equipment per Acre	$43.15	$24.84	$57.66	$32.85	$83.30	$36.15
Gross Income per $ of Machinery and Equipment	$ 1.02	$ .91	$ 1.10	$ .94	$ 1.15	$ 1.06
Net Income per $ of Machinery and Equipment	$ .41	$ .36	$ .59	$ .54	$ .25	$ .14
Full Time Workers per Farm	1.09	1.10	1.11	1.10	1.12	1.10
Full Time Workers per Acre	.0175	.0051	.0151	.0044	.0126	.0037
Gross Income per Worker	$2508	$4441	$4193	$7072	$7615	$10,317
Net Income per Worker	$1015	$1745	$2247	$4129	$1667	$3964
Gross Income per Acre	$43.83	$22.70	$63.30	$30.86	$96.20	$38.35
Net Income per Acre	$17.75	$ 8.92	$33.92	$18.02	$21.06	$14.74
Gross Income per Farm	$2730	$4880	$4643	$7753	$8548	$11,328
Net Income per Farm	$1106	$1917	$2489	$4527	$1871	$4352
$ of Machinery & Equipment per Farm	$2688	$5341	$4230	$8251	$7402	$10,677
N.B. Machinery & Equipment as % of Canada Machinery & Equipment	50.33%				60.32%	

It would be wrong to conclude that lower gross and net incomes per farm are the result of lower labor or capital productivity. The average number of workers per farm is very close to the Canadian average and not significantly greater than the lowest possible ratio of one. This would indicate that most farms are worked by the operator alone and suggests that the low labor productivity is the result of the small number of acres each farmer controls.

The small average farm size also explains why in 1971, gross income per dollar invested in machinery and equipment was higher than the Canadian average yet net income was lower. New Brunswick farms have traditionally had low levels of investment in machinery and equipment per farm. However modern farm practices and labor constraints have forced farmers to acquire more machinery. The table shows that the value of machinery and equipment per farm has risen from 50.33 per cent of the Canadian average in 1961 to 69.32 per cent in 1971. Unfortunately, because machinery and equipment comes in fixed sizes, New Brunswick farmers are forced to buy some units which have a yearly capacity exceeding that required on their small farms. The table shows that although in 1971, farmers on average had over $3000 less than the Canadian average investment in machinery and equipment per farm, they still had well over twice as much invested in this capital on a per acre basis. Thus, while they were able to obtain higher average gross returns per dollar invested in machinery, these returns were not proportionately high enough to offset the higher capital costs incurred per unit of output. Consequently, net returns per dollar invested in

machinery and equipment were lower in New Brunswick than in Canada.

This very clearly sums up the position of the average New Brunswick farmer, and a major reason why improved land went out of production during the 1961-71 period. New Brunswick farmers, while being more productive than the Canadian average on a per acre basis, operate too few acres of improved land. This results in higher capital costs per unit of output and, more importantly, in net incomes for operators which do not compare reasonably with alternative employment opportunities. Concurrently, farms of this size are unable to produce competitive returns to the land and capital resources operators have invested in them. As incomes in other forms of employment and investment have risen, operators of these farms have been faced with the choice of either expanding their enterprises; or looking elsewhere for employment opportunities for themselves and their capital.

C. The Rise of Urban - Agricultural Land Use Conflicts

As was indicated in the introduction, urban-oriented residential development has within the past ten years become an increasingly more important determinant of the rate of loss of agricultural land within the province. Since approximately 1966, there has been a dramatic acceleration in the amount of urban-oriented residential construction which takes place within the rural areas of the province. Most of this development has been in the form of low density, haphazard ribbon development which stretches for as much as 40-50 miles along the roads and highways surrounding urban areas-large and small alike. Another aspect of this development, has been the purchase by residents and non-

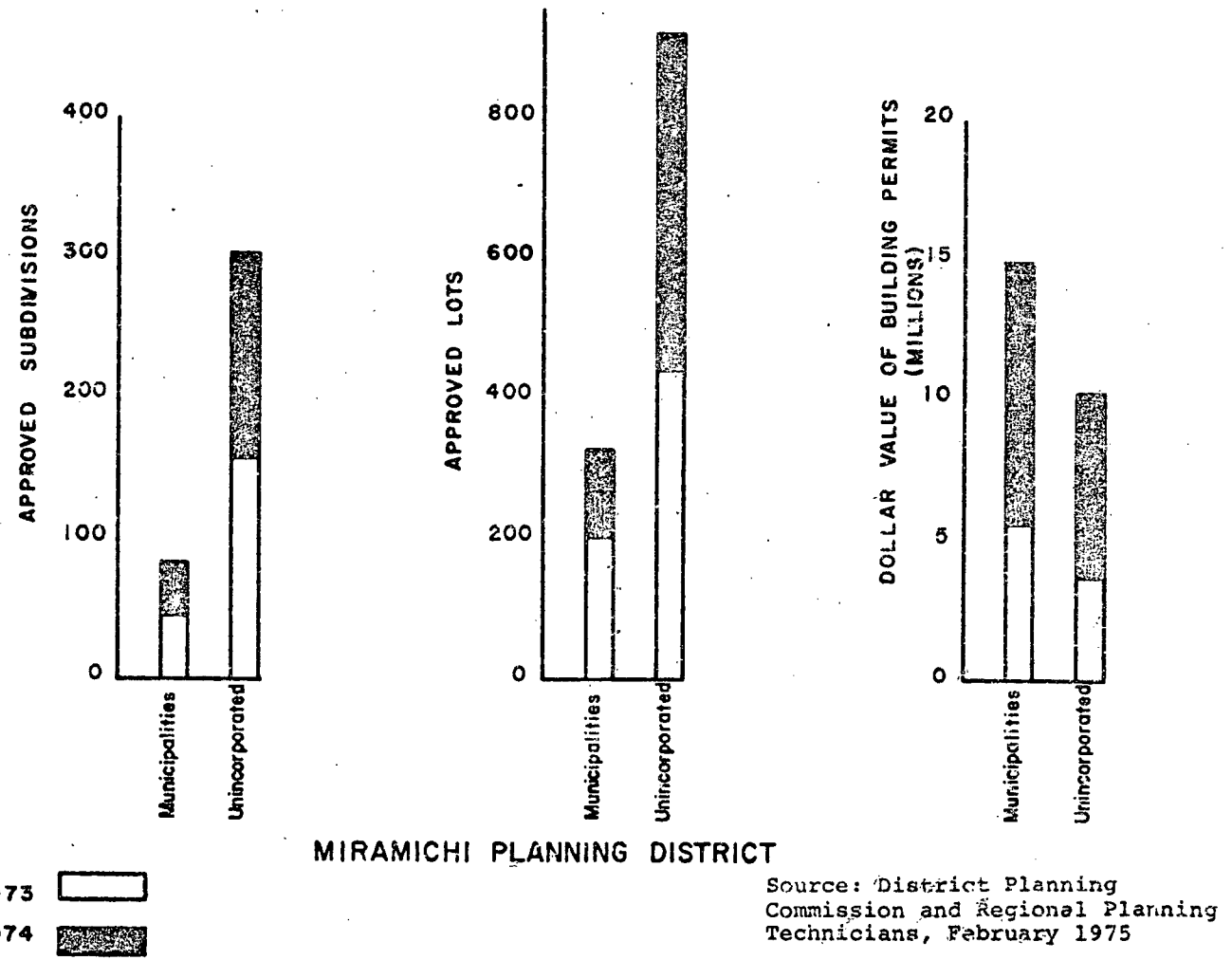
residents, of farms for rural estates, hobby farms and recreational purposes.

Diagrams II-VIII show the magnitude of this rural residential development in comparison to that occurring within municiaplities. In almost every planning district and county, the number of sub-divisions and lots created, along with the number of building permits issued was considerably greater in the unincorporated areas than in the municipalities during the 1973-74 period.

Table IV shows the number of building permits issued for the construction of single family residences within the unincorporated areas of twenty parishes surrounding the city of Fredericton, New Brunswick. The graphic representation of this information for the most active parishes, shown in Diagram IX indicates the dramatic increase in this activity over the 1968-76 period. In the first seven months of 1976, nearly as many permits were issued as were issued in the entire period between 1968 and 1971. By relating this information to Map I we can see that by 1976, this activity had reached those parishes most remote from Fredericton.

Because land abandonment due to the socio-economic and institutional problems of New Brunswick agriculture had been taking place long before this urban oriented development began to occur in the rural areas, it seems reasonable to assume that much of the early development took place on land which had already been abandoned. However, there is evidence that as the trend toward this type of development accelerated following 1971, and abandoned land in the vicinity of urban areas became

DIAGRAM II - SUBDIVISIONS, LOTS, AND BUILDING PERMITS
1973 - 1974



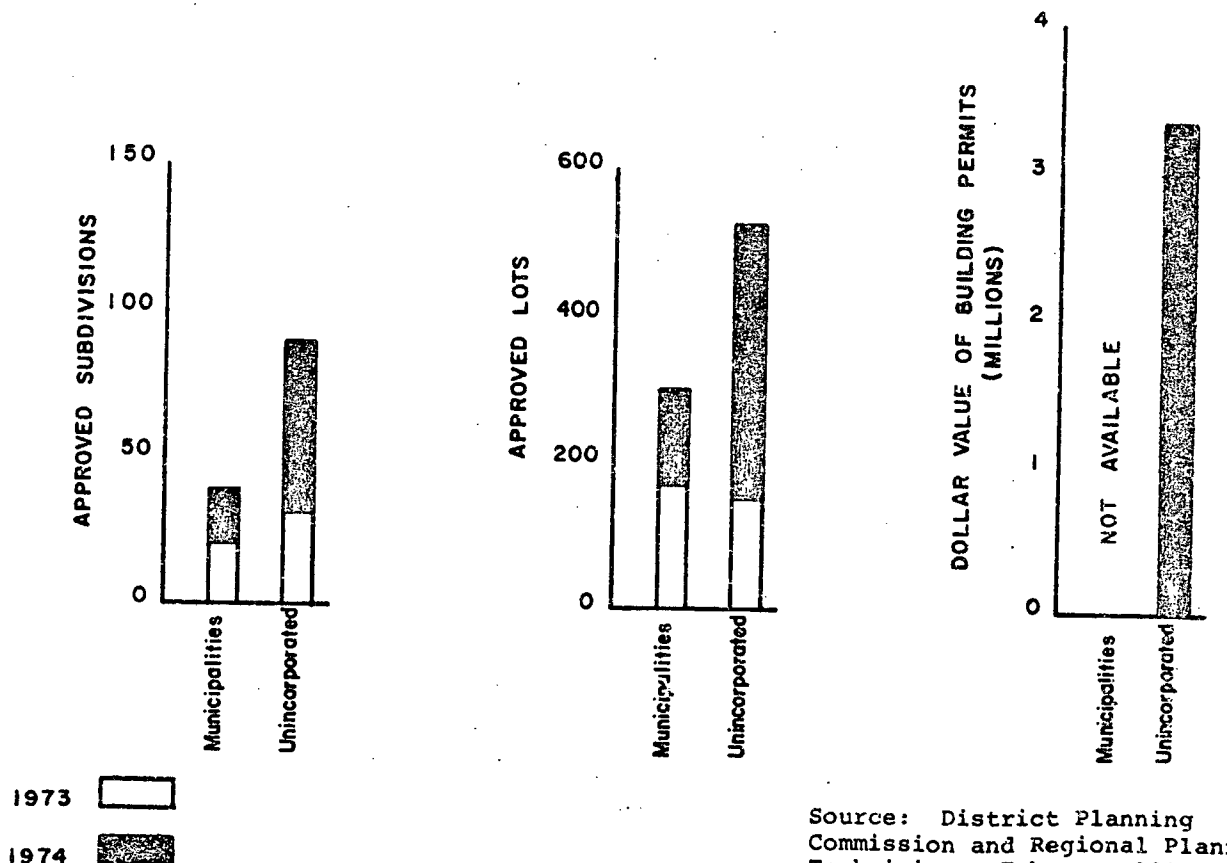
MIRAMICHI PLANNING DISTRICT

Source: District Planning Commission and Regional Planning Technicians, February 1975

DIAGRAM III - BELLEDUNE PLANNING DISTRICT

SUBDIVISIONS, LOTS, AND BUILDING PERMITS

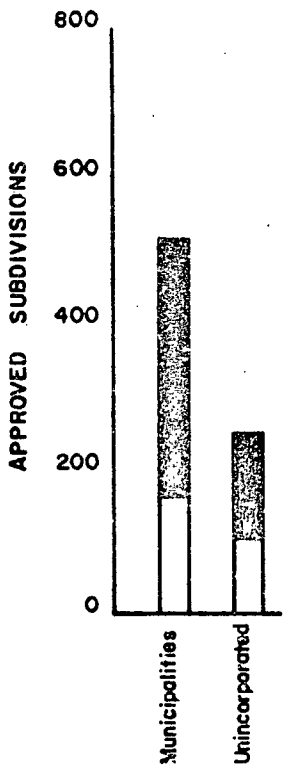
1973 – 1974

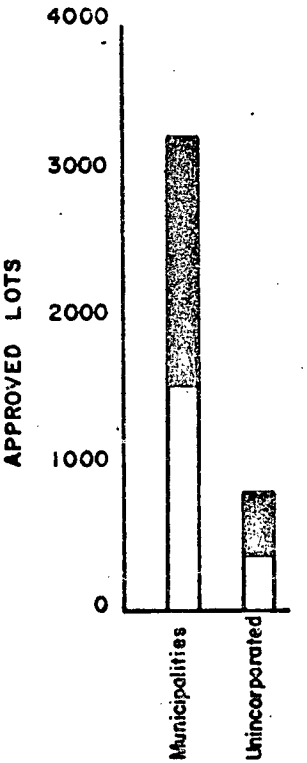


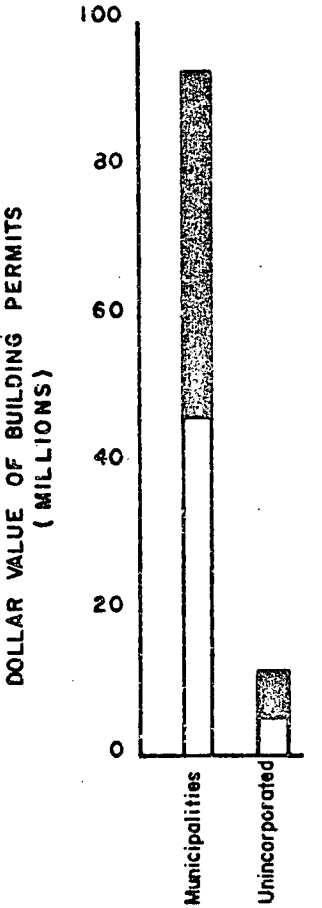
Source: District Planning Commission and Regional Planning Technicians, February 1975

DIAGRAM IV - MONCTON PLANNING DISTRICT

SUBDIVISIONS, LOTS AND BUILDING PERMITS
1973 – 1974







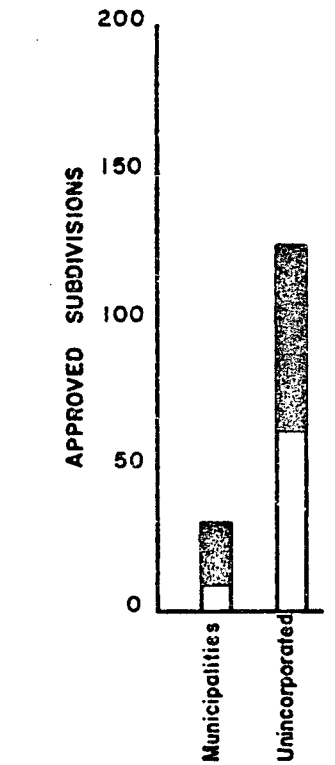
1973 ☐ 1974 ▒

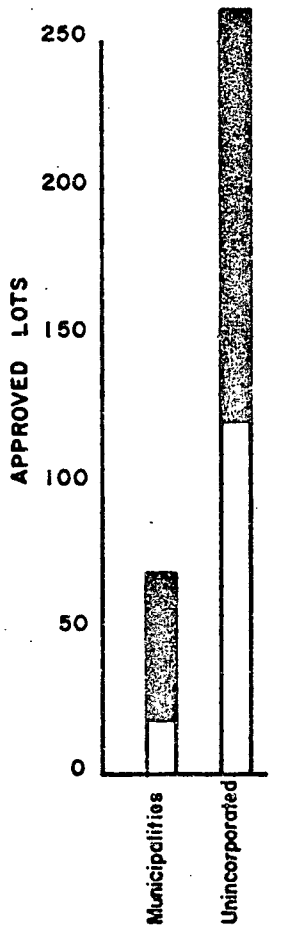
Source: District Planning Commission and Regional Planning Technicians, February 1975

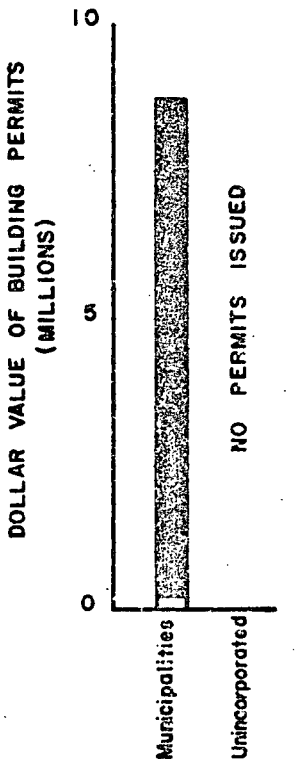
DIAGRAM V

KOUCHIBOUGUAC PLANNING DISTRICT

SUBDIVISIONS, LOTS, AND BUILDING PERMITS 1973 – 1974







1973 ☐

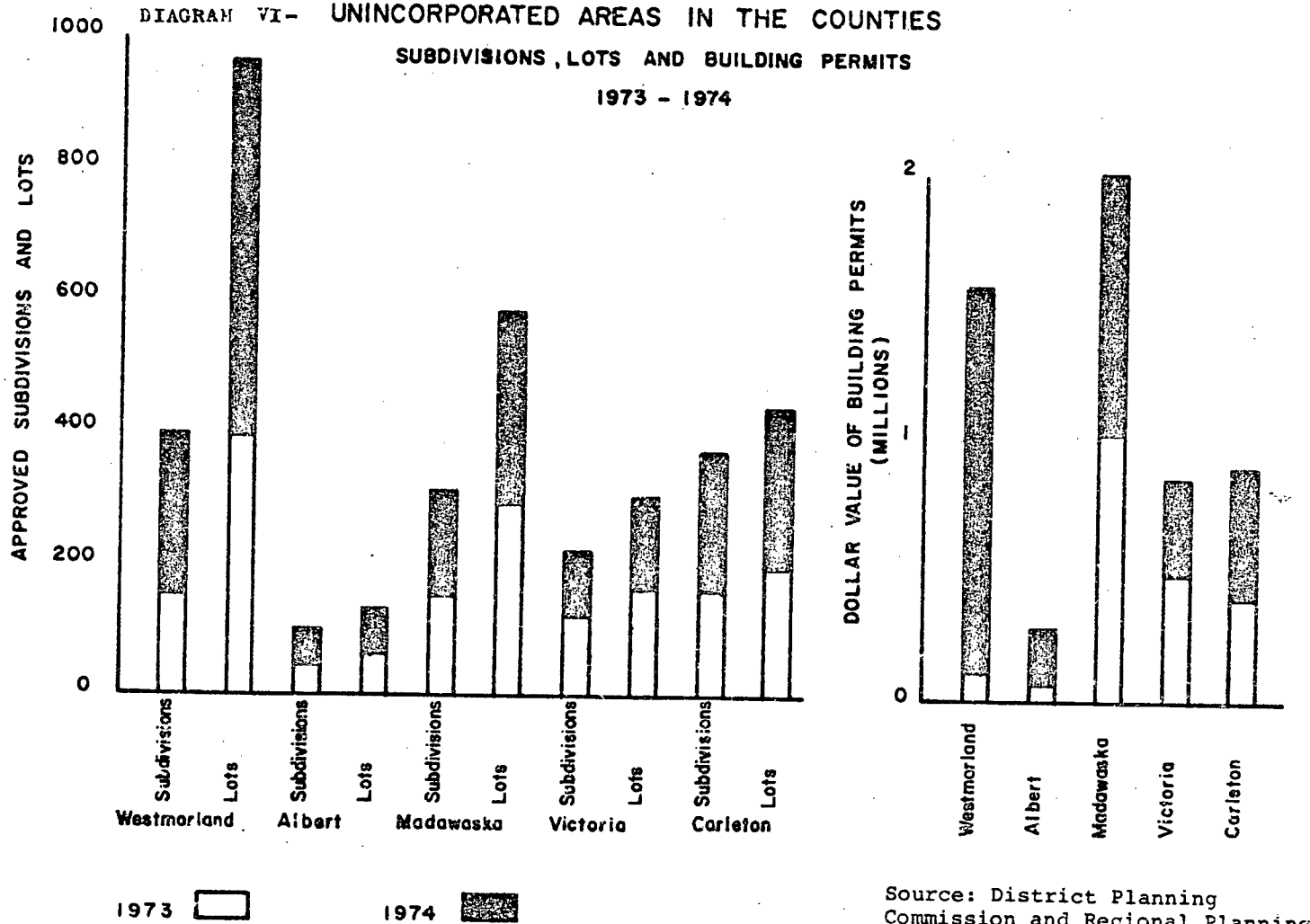
1974 ▒

Source: District Planning Commission and Regional Planning Technicians, February 1975

DIAGRAM VI- UNINCORPORATED AREAS IN THE COUNTIES

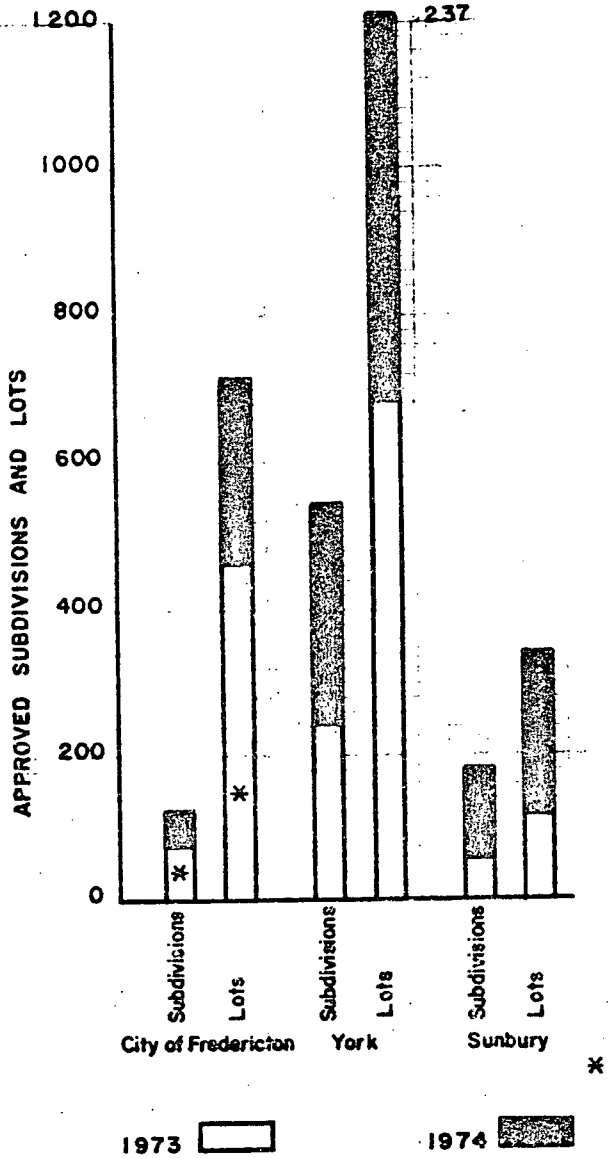
SUBDIVISIONS, LOTS AND BUILDING PERMITS

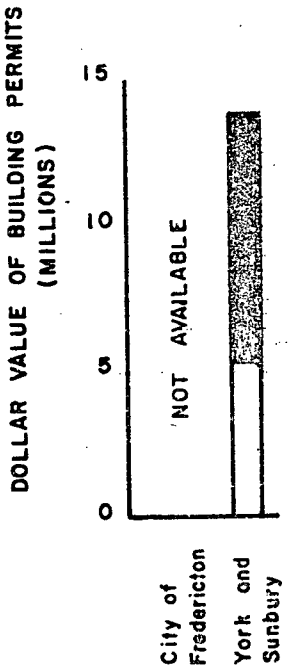
1973 - 1974



Source: District Planning Commission and Regional Planning Technicians, February 1975

DIAGRAM VII- CITY OF FREDERICTON
AND
THE UNINCORPORATED AREAS IN THE COUNTIES
SUBDIVISIONS, LOTS AND BUILDING PERMITS
1973 - 1974





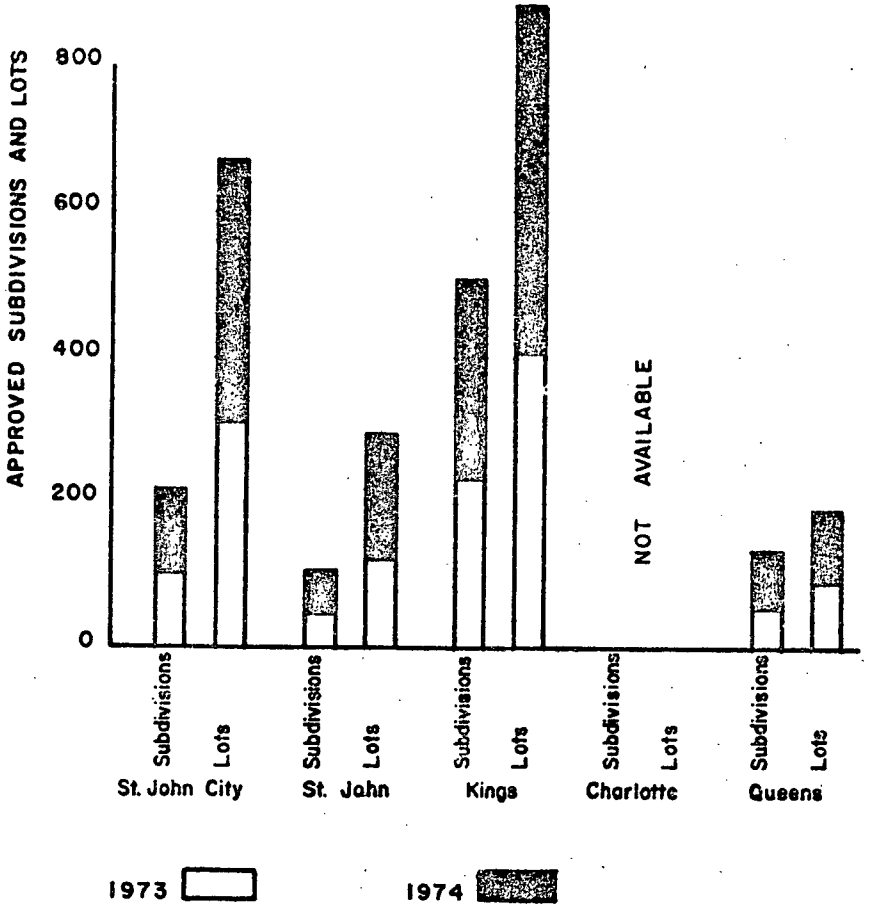
* - 1973 includes Marysville, Nashwaaksis, Barkers Point and City of Fredericton

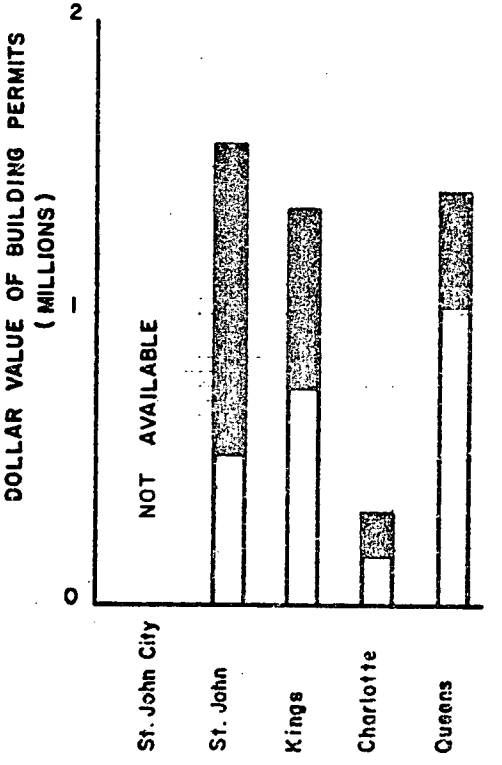
Source: City of Fredericton Advisory Committee and the Regional Planning Technicians February, 1975

DIAGRAM VIII - ST. JOHN CITY AND THE UNINCORPORATED AREAS IN THE COUNTIES

SUBDIVISIONS, LOTS AND BUILDING PERMITS

1973 - 1974





Source: City of Saint John
Advisory Committee and the Regional
Planning Technicians, February 1975

TABLE IV

BUILDING PERMITS ISSUED IN UNINCORPORATED AREAS OF YORK AND SUNBURY COUNTIES (1968-1976)

PARISH	1968	1969	1970	1971	1972	1973	1974	1975	TO JULY 1976	TOTAL
BRIGHT	1	2	6	11	25	27	29	27	20	148
CANTERBURY	0	0	0	0	0	0	0	0	0	0
DOUGLAS	3	6	18	46	70	69	42	65	70	389
DUMFRIES	1	1	1	0	0	3	3	5	2	16
KINGSCLEAR	19	23	17	24	54	51	30	75	70	363
MANNERS SUTTON	2	2	3	3	8	9	13	11	7	58
NEW MARYLAND	7	9	12	35	78	86	66	85	83	461
NORTH LAKE	0	0	0	0	0	0	0	0	0	0
PRINCE WILLIAM	1	1	0	3	4	6	2	0	3	20
QUEENSBURY	0	1	3	6	4	5	13	7	8	47
ST. MARYS	7	8	10	35	25	14	31	36	20	186
SOUTHAMPTON	0	3	4	6	9	13	20	33	16	104
STANLEY	0	0	0	1	3	6	5	5	3	23
BLISSVILLE	1	2	1	2	4	7	11	4	2	34
BURTON	10	12	7	33	34	25	33	30	19	203
GLADSTONE	2	0	0	2	0	0	6	3	1	14
LINCOLN	5	2	4	41	44	33	36	34	46	245
MAUGERVILLE	7	3	2	6	12	12	16	17	6	81
NORTHFIELD	0	0	0	0	0	1	7	7	5	20
SHEFFIELD	3	2	1	1	2	1	3	0	1	14
TOTAL	69	77	89	255	376	368	366	444	382	2426

Source: Dept. of Municipal Affairs Files

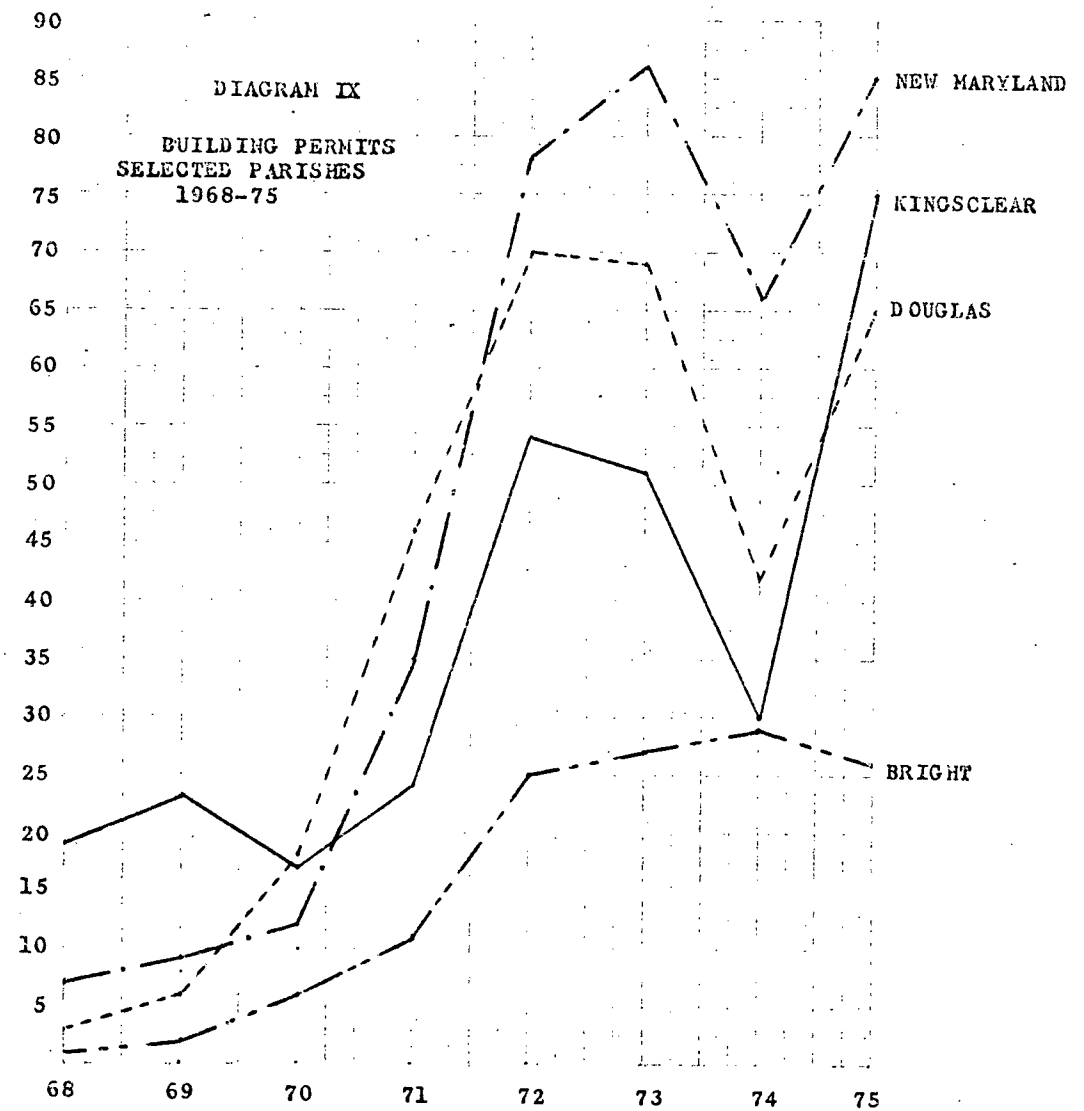


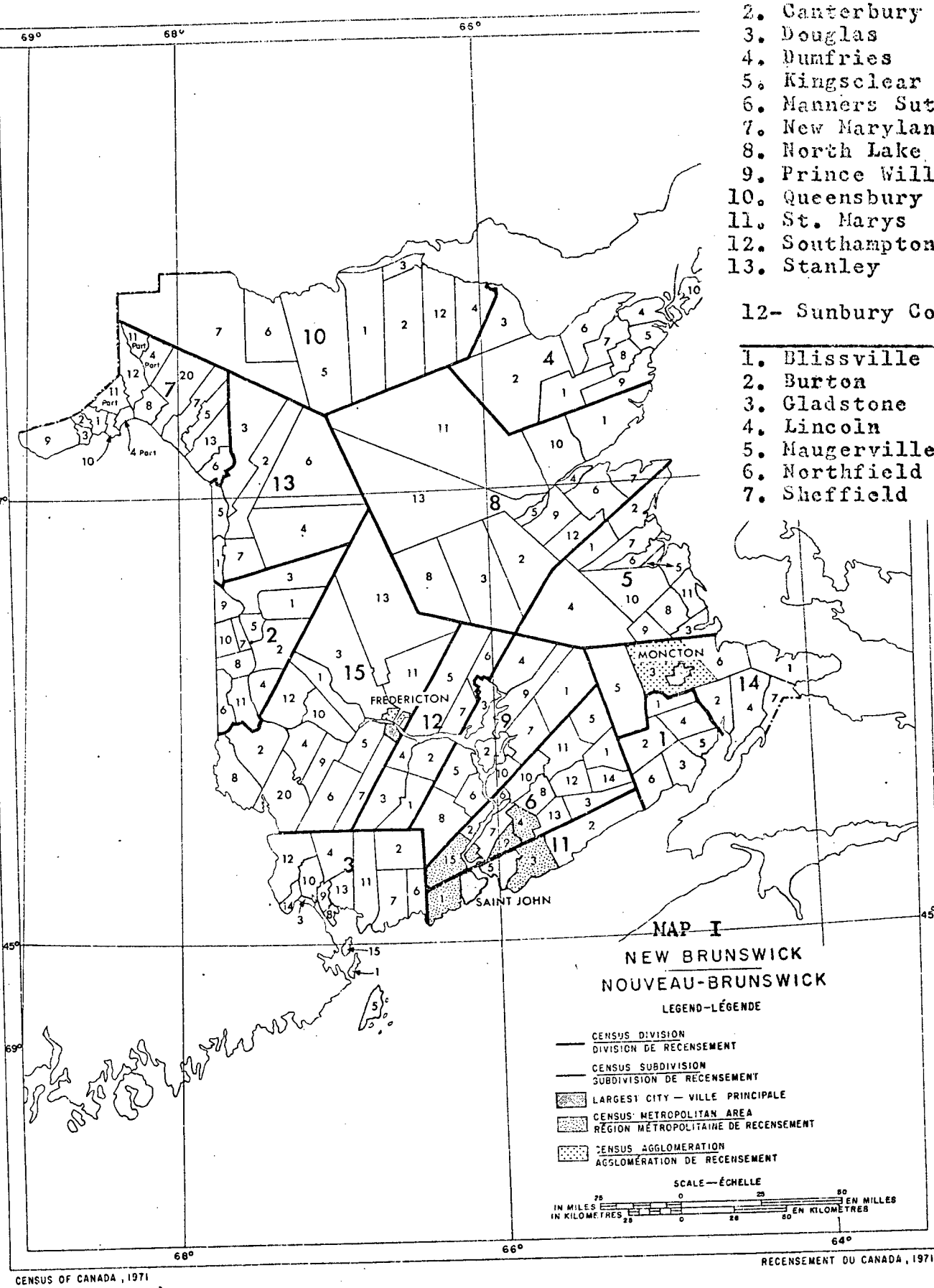
DIAGRAM IX
BUILDING PERMITS
SELECTED PARISHES
1968-75
NEW MARYLAND
KINGSCLEAR
DOUGLAS
BRIGHT
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
68
69
70
71
72
73
74
75

15 - York County

1. Bright
2. Canterbury
3. Douglas
4. Dumfries
5. Kingsclear
6. Manners Sutton
7. New Maryland
8. North Lake
9. Prince William
10. Queensbury
11. St. Marys
12. Southampton
13. Stanley

12- Sunbury Count

1. Blissville
2. Burton
3. Gladstone
4. Lincoln
5. Maugerville
6. Northfield
7. Sheffield



CENSUS OF CANADA, 1971

RECENSEMENT DU CANADA, 1971

more scarce, this development began to encourage the abandonment of land and compete for land still in production.

In 1976, the Agricultural Resources Study conducted a survey of 89 farms within four parishes which represented a range of agricultural activities and locations similar to that within the province as a whole. It found that 25 per cent of the farmers surveyed had abandoned land within the last five years. It was also found that 84 per cent of this land was of C.L.I. capabilities 2, 3, and 3-4. However, almost 50 per cent of the land abandoned was less than one-half mile from an urban area. Concurrent with this, the majority of the farmers stated they did not like farming on land next to urban areas. The survey report states:

> Toys left in fields by children and bottles and other types of trash left by adults make field operations difficult and sometimes hazardous. Also strip development along roads reduces access to fields and may influence the type of crop grown. The net result is that a one acre building lot may remove between three and eight acres of improved land from production.

The same survey reported that 51.8 per cent of the farmers stated that they had received offers to purchase all or part of their land within the last five years-46.4 per cent reported two or more offers. Of those farmers reporting offers of purchase, 51.3 per cent stated the intended use was non-agricultural. Only 26.7 per cent of the farmers stated they had subdivided their land within the past five years. However, since the questionnaire was restricted to farmers presently in business, it did not include those who had sold their entire farm or sold enough lots to make farming on the remainder non-viable. An important finding was that 63.6 per cent of the land which was subdivided was of C.L.I. capabilities 2 and 3.

Although this survey dealt with a small sample, and was specific to only four parishes, it does suggest that urban-oriented residential development no longer passively accepts land which has already been abandoned due to the tenure problems of the agriculture industry. On the contrary, the survey suggests that this type of development actively influences the abandonment of land and competes for land which is currently in production.

This competition for land by non-agricultural uses, threatens to impede the tenure adjustments which are needed within New Brunswick agriculture and therefore to encourage more land abandonment. Table V shows that in the parishes of St. Isidore and Grand Falls, 40 per cent and 50 per cent of the farmers reported that difficulty purchasing more land was the main constraint to expanding their operations. The reason why this was perceived as a problem by the farmers of these parishes and not the others may partly be explained by the relatively higher percentage of farmers reporting little or no off-farm work in these two parishes. This information is shown in Table VI.

This suggests that serious full-time farmers have a more urgent need to expand and have actually encountered difficulties, while part-time farmers have less need to buy more land and therefore have not experienced this as a problem. It would seem reasonable that farmers who perceive other problems, such as lack of capital, labor shortages, and poor returns on investment, as reasons for not expanding, would not be actively engaged in attempting to purchase new land. Therefore as the percentage of farmers who wish to expand increases, the difficulty

TABLE V

PROBLEMS RESTRICTING EXPANSION

% of farmers reporting

LOCATION	CANNOT BUY MORE LAND	LACK OF CAPITAL	LABOUR PROBLEMS	POOR RETURNS ON INVESTMENT	OTHER
St. Isidore	40.0	60.0	0	0	0
St. Mary	0	55.0	10.0	35.0	0
Salisbury	5.6	38.9	16.7	22.0	16.7
Grand Falls	50.0	30.0	0	0	20.0

TABLE VI

PERCENT OF FARMERS REPORTING LITTLE OR NO OFF-FARM WORK

LOCATION	% REPORTING LITTLE OR NO OFF-FARM WORK
St. Isidore	80.9
St. Mary	52.4
Salisbury	68.0
Grand Falls	81.0

of each obtaining land is greater. The important point here is that any unnecessary competition from non-agricultural uses will only aggravate the situation further and thus hinder the tenure adjustments which are essential for improving the viability of New Brunswick agriculture.

Finally, Table VII, gives an indication of how serious the problem of non-farm development on agricultural land is perceived by the farmers. It is clear that the overwhelming majority of the farmers surveyed felt there was a need to stop this type of development. This response, coming from a constituency that stands to gain financially in the short run from this type of development, speaks for itself.

D. Future Supply and Demand for Agricultural Land

Before closing this chapter it is appropriate to put this loss of agricultural land in perspective with respect to future supply and demand for agricultural products within the province of New Brunswick. In the first section of this chapter it was revealed that of all the C.L.I. class 0-4 land within the province, only 710,809 acres are presently cleared and within agricultural blocking.

The New Brunswick Agricultural Resources Study has suggested that a reasonable goal for development efforts within the agricultural sector would be to maintain present export levels for specific crops and produce 60 per cent of the domestic food requirements by 1985 (New Brunswick presently produces approximately 50 per cent of its domestic food requirements). Table VIII, indicates the minimum amount of land that will be required by 1985, in order to achieve these objectives. These estimates of land based requirements were made by the Agricultural

TABLE VII

Stop Non-Farm Development on Farmland?

% of farmers reporting;

	Yes	No
St. Isidore	90.5	0.5
St. Mary	75.0	25.0
Salisbury	76.0	20.0
Grand Falls	66.7	33.3
All Study Areas	77.0	23.0

TABLE VIII: Future Agricultural Land Based Requirements

Commodity	Total Production Units	Sufficient Farm Size	Number of Farm Units	Productive Acres Equivalent per Farm	Total Commodity Acres
PORK	171,000	75 sows farrow to finish	127	145	18,400
BEEF[1]	59,800	120 cow-calf	598	285	170,400
POTATOES[2]	60,000	150 acres	400	215	86,000
DAIRY[1]	27,800	45 cows	618	210	129,800
POULTRY	4,400,000	151,200 birds (35,000 per cycle)	29	395	12,000
VEGETABLE	5,000	25 acres	200	25	5,000
FRUITS	3,000	30 acres	100	30	3,000
MISC.[3]					56,000
TOTAL			2,072		480,600

[1]Includes pastures at one acre per cow unit.

[2]Includes potato grain rotation, 150 acres potatoes, 65 acres grain.

[3]Includes blueberries, tobacco, land in transfer of holding, etc.

Resources Study Group and are minimums assuming certain optimal farm sizes and efficiencies. Given these assumptions, the analysis indicates that a minimum of 480,600 acres of productive farmland and 2,072 farm units will be required to achieve these goals.

However, it is unrealistic to assume that this exact combination of optimal size farm units will actually be achieved. Moreover, there is bound to be some land within each farm unit and between farm units which is non-productive. In the 1971 census, for example, the category of "other improved lands" accounted for 41,640 acres. This included the area of barnyards, home gardens, lanes and roads, and other land that was lying idle. Taking these considerations into account, an estimate of 600,000 or more acres would possibly be closer to the minimum requirement.

Consequently, the supply of improved class 0-4 land within agricultural blocking is very nearly the minimum required to achieve these very modest goals within the agricultural sector. Clearly, any unnecessary loss of this land will needlessly impair the province's ability to meet these minimum requirements in the near future.

Therefore, it will be necessary to clear presently forested areas for cultivation, move production to more marginal cleared land, or import more food from outside the province in order to meet future increases in domestic food demand. The first two alternatives will undoubtedly lead to higher food costs and with the present outlook for world food production and demand, we can only expect imported food to be more expensive in the future also.

CHAPTER III

STATISTICAL ANALYSIS OF THE FACTORS CAUSING LOSSES OF IMPROVED LAND

In an attempt to gain a clearer understanding of the impact of various factors on the loss rate of improved land within the province of New Brunswick, correlation and regression techniques were used. These techniques were used on cross sectional data with observations for each variable taken from each of the fifteen counties of the province. The regression model constructed from this data attempts to explain differences in the rate of loss of improved land between the counties in terms of variations in a number of independent variables. The independent variables fall into one of two categories: (1) variables reflecting urban pressures on the rate of loss of improved land; and (2) variables reflecting the effects of the socio-economic and institutional problems of agriculture on the rate of loss of improved land.

Before discussing the details and results of this model further, there are several limitations of the investigation which should be outlined.

(1) Because of an almost complete lack of alternative sources of published data at the county level of aggregation, the model relied heavily on data from the Canadian Census. This reliance meant that the selection of variables for investigation was influenced to a large extent by what was available from this source. Therefore in many cases the variables used were only proxies for more specific variables which

were not available. For example, it would have been desirable to investigate the impact of rising land prices in rural areas on the loss rate of improved land, however, since the census does not record this information it was necessary to use increases in median house values for the county as a whole as the best available substitute. Furthermore, since the census only records this information every ten years it was only possible to investigate its effect over the period between 1961 and 1971 and not for the 1961-66 and 1966-71 periods.

This is just a sample of the types of limitations that reliance on census data placed on the construction of each model. These limitations were most severe for obtaining variables which related to the effects of urban pressure on the loss rate of improved land since the agricultural census reports a wide range of data reflecting the socio-economic condition of agriculture.

(2) The last year for which the Canadian Agricultural Census is available is 1971. It was therefore impossible to investigate the factors influencing the rate of loss of improved land during the 1971-76 period. This was unfortunate because as was demonstrated by Table IV in Chapter II, it was during this period that the increase in urban-oriented residential construction within the rural areas was greatest.

(3) The models which have been constructed are based on cross sectional data. This was made necessary because of a lack of data, collected on a frequent basis, which would have been required for the construction of a meaningful time-series model. Unfortunately, while a cross sectional model is capable of explaining differences in the rate

of loss of improved land between the counties in terms of differences in the values of certain independent variables for each county it cannot explain the effect variables which impact each county equally, have on the overall rate of loss within the province. For example farm product prices are fairly uniform throughout the province, therefore any impact these prices may have on the rate of loss of improved land independent of conditions peculiar to individual counties will be constant. For this reason a constant or intercept term has been incorporated into the model in an attempt to determine the magnitude and direction of these effects. Unfortunately we can only speculate as to what variables are responsible for these effects.

(4) The number of observations for each variable was limited by the number of counties within the province-fifteen. This small number of observations has meant a small number of degrees of freedom for statistical testing. Therefore, correlation and regression coefficients must be quite large before they can be considered significant.

Results of the Regression Model

The county model attempts to explain the variations in rates of loss of improved land between the fifteen counties of the province, over given periods, as a function of variations in the values of the following independent variables at the beginning of each period.

X_1 - The per cent of farms with between 3 and 129 acres of improved land.

X_2 - The average value-added per farm.

X_3 - The number of houses built within the county.

X_4 - The per cent of operators over sixty years old.

X_5 - The per cent of operators reporting off-farm work.

In order to investigate how these variables have affected the loss rate of improved land during different time periods, correlations and regressions were calculated for the 1961-66, 1966-71 and 1961-71 periods. For the 1961-71 period, X_6-the per cent increase in median house values, was added to the list of independent variables. The data sets used are shown in Tables IX-XI. From this data, the following regression equations were calculated. The quantities in brackets under the regression coefficients are the appropriate t-ratios.

1961-66 period

$$Y = -.591 + .564X_1 - .00009X_2 - .0014X_3 + .0683X_4 + .524X_5$$
$$\quad (-1.65) \quad (1.59) \quad (-.049) \quad (-.744) \quad (.310) \quad (2.00)$$
$$R^2 = .597$$

1966-71 period

$$Y = -.512 + .415X_1 + .00082X_2 + .0015X_3 + .680X_4 + .344X_5$$
$$\quad (-.955) \quad (.862) \quad (.594) \quad (.604) \quad (2.81) \quad (.725)$$
$$R^2 = .319$$

1961-71 period

$$Y = -.926 + .729X_1 + .0019X_2 + .00058X_3 + .517X_4 + .810X_5 + .00096X_6$$
$$\quad (-2.94) \quad (2.22) \quad (1.38) \quad (.653) \quad (2.32) \quad (3.60) \quad (.013)$$
$$R^2 = .775$$

At the 95 per cent confidence level we find that X_5 is the only

TABLE IX

DATA FOR 1961-66 MODEL

COUNTY	Y	X_1	X_2	X_3	X_4	X_5
Albert	19.64	85.71	1445	540	29.24	57.49
Carleton	1.45	76.76	3813	435	23.38	38.31
Charlotte	28.01	89.08	1616	445	38.38	46.13
Gloucester	21.06	95.30	1018	1670	28.94	57.14
Kent	19.71	92.11	1051	260	28.56	54.22
Kings	9.97	86.31	2141	925	29.39	43.60
Madawaska	14.26	82.40	2403	480	17.83	49.77
Northumberland	25.33	94.72	828	980	40.07	60.04
Queens	17.32	91.39	1714	200	30.88	53.15
Restigouche	30.81	88.78	1969	810	20.67	63.39
St. John	9.94	79.63	4407	3015	43.52	51.85
Sunbury	20.49	89.86	1413	640	30.43	54.71
Victoria	6.51	85.53	5739	355	19.86	29.79
Westmorland	14.94	83.90	1924	2550	29.46	49.24
York	16.99	90.38	2310	2235	28.77	50.82

TABLE X

DATA FOR 1966-71 MODEL

COUNTY	Y	X_1	X_2	X_3	X_4	X_5
Albert	21.64	76.65	2863	805	26.43	59.91
Carleton	18.33	70.40	8185	505	24.05	48.44
Charlotte	15.22	83.96	2840	430	39.04	45.99
Cloucester	38.23	90.41	1552	2635	32.60	58.90
Kent	35.71	88.87	1948	590	28.39	53.20
Kings	16.36	82.34	3940	1125	26.83	40.15
Madawaska	25.07	75.79	4743	650	19.24	42.29
Northumberland	41.72	94.33	1068	1090	43.95	55.47
Queens	25.65	89.45	2188	185	34.42	46.23
Restigouche	11.88	80.32	2469	1175	18.60	57.14
St. John	42.29	76.06	7676	2110	46.48	39.44
Sunbury	24.43	81.86	2775	555	29.90	49.02
Victoria	13.39	78.24	13684	540	19.38	29.62
Westmorland	22.44	81.25	3335	3070	30.60	52.05
York	29.96	86.36	3489	3130	31.57	51.72

TABLE XI

DATA FOR 1961-71 MODEL

COUNTY	Y	X_1	X_2	X_3	X_4	X_5	X_6
Albert	37.03	85.71	1445	1345	29.24	57.48	103.85
Carleton	19.51	76.76	3813	985	23.38	38.31	48.11
Charlotte	38.97	89.08	1616	875	38.38	46.13	40.23
Gloucester	51.80	95.30	1018	4035	28.94	57.14	115.13
Kent	48.38	92.11	1051	850	28.56	54.22	85.77
Kings	24.70	86.31	214	2050	29.39	43.60	73.19
Madawaska	35.76	82.40	2403	1130	17.83	49.77	47.95
Northumber-land	56.48	94.72	828	2070	40.07	60.04	64.25
Queens	38.52	91.39	1714	385	30.88	53.15	27.30
Restigouche	39.04	88.78	1969	1985	20.67	63.39	77.97
St. John	48.02	79.63	4407	5125	43.52	51.85	60.82
Sunbury	39.91	89.86	1413	1195	30.43	54.71	83.30
Victoria	19.03	85.53	5739	895	19.86	29.79	64.73
Wesmorland	34.03	83.90	1924	5620	29.46	49.24	56.99
York	41.86	90.38	2310	5365	28.77	50.82	86.63

significant variable during the 1961-66 period, X_4 is the only significant variable during the 1966-71 period, and the constant term, X_1, X_4, and X_5 are all significant during the 1961-71 period. At a confidence level of only 90 per cent however, the constant term and X_1 are also significant during the 1961-66 period and X_2 is also significant during the 1961-71 period. The changes in the significance and the coefficients of the variables between the 1961-66 period and the 1966-71 period clearly indicate that the influence of each variable on the loss rate of improved land is changing. Furthermore, the same variables which combined to explain 60 per cent of the variation in loss rates during the 1961-66 period, explained only 32 per cent of the variation during the 1966-71 period.

Perhaps a clearer picture of these changes can be obtained from an examination of Tables XII and XIII which show the intercorrelations between all the independent variables and their simple correlation with the loss rate during these two periods. From these tables we can see that the simple correlations between X_1, X_2 and X_5 and the loss rate are all lower during the 1966-71 period than they were during the previous period. However, the correlations between X_3 and X_4 and the loss rate have increased considerably. In fact, the correlation between the number of houses built and the loss rate was very insignificant and negative during the 1961-66 period but by the 1966-71 period had become positive and mildly significant. The most dramatic increase in correlation over this period was between the per cent of farmers over 60 years old and the loss rate (.237 for 1961-66 but increasing to .676 for

TABLE XII

INTERCORRELATIONS 1961-66

	Y	X_1	X_2	X_3	X_4	X_5
Y	1.000	.716	- .730	- .103	.237	.756
X_1		1.000	-..680	- .156	.205	.524
X_2			1.000	.133	- .232	- .754
X_3				1.000	.424	.155
X_4					1.000	.286
X_5						1.000

TABLE XIII

INTERCORRELATIONS 1966-71

	Y	X_1	X_2	X_3	X_4	X_5
Y	1.000	.488	- .313	.374	.676	.269
X_1		1.000	-..631	.164	.458	.368
X_2			1.000	- .143	- .299	- .779
X_3				1.000	.254	.272
X_4					1.000	.099
X_5						1.000

TABLE XIV

INTERCORRELATIONS 1961-71

	Y	X_1	X_2	X_3	X_4	X_5	X_6
Y	1.000	.632	- .456	.314	.581	.800	.322
X_1		1.000	- .680	- .043	.205	.524	.381
X_2			1.000	.048	- .232	- .754	- .293
X_3				1.000	.424	.155	.303
X_4					1.000	.286	- .025
X_5						1.000	.382
X_6							1.000

for 1966-71). These results suggest that while the effects of X_3 and X_4 are becoming more important, the effects of the other variables are declining. These results make sense when we consider that as more and more of the small sized farms go out of business or more part-time operators leave agriculture and find full-time employment elsewhere there are fewer farms in this category and therefore less potential for losses from these factors to be a large portion of the total losses. Furthermore, without new entry into agriculture, the age of operators is becoming older, thus increasing the potential of this factor to cause a large portion of the total losses.

It would have been interesting to determine whether these trends continued during the 1971-76 period, however, as was mentioned previously, the data for such an investigation were not available. With the large increases in urban-oriented residential construction which occurred during this period it seems reasonable to expect that the correlation between X_3 and the loss rate would have increased significantly in the 1971-76 period. Certainly the results of the Agricultural Resources Study's survey reported in Chapter II, indicate that the effect of this variable was considerable during the 1971-76 period. The percentage of farmers over 60 years old decreased only slightly from 28.49 per cent in 1966 to 25.43 per cent in 1971. This suggests that this factor also continued to be an important influence on the rate of loss of improved land during the 1971-76 period.

The constant term was found to be highly significant (95 per cent) over the whole 1961-71 period, mildly significant (90 per cent) during

the 1961-66 period and insignificant (less than 90 per cent) during the 1966-71 period. This term can broadly be interpreted as representing the net effect of all variables which have an equal impact on the rate of loss of improved land in each county, independent of location or socio-economic circumstance. The interesting point here is that in each of the three time periods this term had a negative impact on the rate of loss of improved land. This suggests that if the impact of the other variables were removed, the general climate for agriculture in the province would tend to produce an increase in the amount of land under cultivation.

CHAPTER IV

THE PRESENT MARKET ALLOCATION OR AGRICULTURAL LAND - A RATIONALE FOR CHANGE

At this point in the discussion it is appropriate to ask the following question. Does this conversion of valuable agricultural land to non-agricultural uses which destroy its value for food production constitute an optimal allocation of this resource in both the short-run and long-run. Here we will consider the short-run to be the time horizon of decision-makers presently owning agricultural land and the long-run as that which is beyond this horizon.

In order to answer this question it will be necessary to examine the mechanism which is presently responsible for allocating this land between its various uses. In New Brunswick, as in most of the western world where the so-called free enterprise system prevails, land is allocated to different competing uses through the market mechanism.

Conventional economic wisdom tells us that any resource will be allocated to the use that is able to bid the highest price to obtain it. Economic theory also tells us that this market allocation will be an optimum allocation for society as a whole, if, and only if, the prices bid by the different uses are accurate reflections of the relative value to society of the product of those uses. Therefore if in any given time period the prices bid by one or more uses of land are not accurate reflections of their relative value to society, a misallocation of land between these uses will occur.

Misallocations of this sort produce only short-run costs for society if the uses between which they occur are ones that do not permanently destroy the land's ability to be used for other purposes, since a reallocation is still possible in the long-run. However, more serious long-run costs accrue to society when a misallocation occurs in which too much land is allocated in the short-run to a use that permanently destroys or impairs its value for a purpose that is essential to the long-run maximum welfare of society.

Such is the case when agricultural land is misallocated to urban uses. Not only is the land which is physically occupied by urban uses permanently destroyed for agricultural purposes; but when urban development takes place in a haphazard, low density fashion, the full agricultural potential of much of the land which remains free of buildings is permanently impaired. It is the irreversibility of this process which makes it of the utmost concern to us and because it ultimately affects the quantity of food we can produce and the price at which it can be produced, we must be certain that land-use decisions of this type do not jeopardize the long-run welfare of society. While this concern for keeping our long-run food production options open is extremely important we must also be concerned about the short-run costs which accrue to society as a result of a misallocation of agricultural land.

If indeed we are to maintain that the present market allocation is not an optimal or desirable allocation of agricultural land, in both the short-run and the long-run, in essence what we are saying is that this land has a true value to society which is greater than that which

is reflected by the price agricultural producers are willing to pay for it, or the price urban uses are willing to pay for it is higher than their true value to society, or there is some combination of these two situations. In order to justify interference with the present market allocation of agricultural land, it will be necessary to identify the various factors which support such a claim and cause this market allocation to be less than optimal in both the short-run and the long-run.

Factors Causing a Misallocation of Agricultural Land in the Short-run

Improper Adjustment to the Realities of Modern Agriculture[6]

As was indicated in Chapter II, a large proportion of the farms within New Brunswick contain a very small number of acres of improved land. In order to understand the full impact of this factor in causing a misallocation of agricultural land within the province today, it is necessary to be familiar with the history of the agriculture industry and the conditions which have shaped its present tenure problem. Beyond the effect this tenure problem has on the strictly economic viability of individual farm units, the long standing nature of this tenure problem, has produced other social and institutional barriers to the development of a viable agriculture industry.

Serious agricultural settlement within the province did not begin until after the coming of the United Empire Loyalists in 1783, following the American Revolutionary War. In a very short period of time, over 12,000 Loyalists were settled within the province-mainly in the south and along the Saint John River and its tributaries.

The methods by which these Loyalist settlers were allocated agricultural land, was to have a detrimental effect on the development of a viable agriculture industry which is still felt today. The British government, in allocating land to the Loyalists, was primarily interested in the defence of the region and in the settlement of this large number of immigrants as quickly as possible. They had little concern for establishing a viable agricultural economy within the province. Furthermore the loyalists themselves came from largely urban backgrounds and had very little knowledge of farming-especially under the primitive and harsh conditions which prevailed in the province at the time.

To make matters even worse, the authorities suffered under the misconception that the soils in all parts of the province were suitable for agriculture. As a result of this situation, much of the land in each settler's allotment was totally unsuited for farming. Thus the arable portion of the allotment was often too small for commercial agriculture and the forest portion was too small for a self-sustaining lumber operation. However, the settlers were generally able to eek out a subsistence living from a combination of the two. Along the coast fishing provided another source of income.

The settlers were also aided by a system of extensive subsidies for clearing land, producing wheat, raising livestock, and constructing mills. Unfortuantely these subsidies were given without a sound appraisal of the land's capabilities or an adjustment in the original allotments. These subsidies were in most cases made because of political, defence and commercial considerations, rather than for the development of agriculture per se. Consequently, when applied to the original

ill-considered tenure pattern, these subsidies resulted over the years in the clearing of much land which should have been left forested, while much good farmland remained in the hands of the crown and remained untouched.

From an examination of agricultural policy in New Brunswick from the time of this first settlement onward, a consistent pattern emerges. Down through the years agriculture has been promoted through the use of subsidies whenever there has been a prolonged recession in the provincial economy. As a result a pattern of successive settlement and abandonment of farmland has followed the boom and bust of the provincial economy. Unfortunately this promotion of agriculture has never been combined with a sound appraisal of the land's capabilities or a consolidation of the good land into viable farm units. The subsidies have been applied across the board, thus enabling those with poor land to remain in business and reducing the need for consolidation. Accordingly, the original tenure pattern with farms of excessively small amounts of good land has been perpetuated.

With the post World War II period came major changes in agriculture throughout Canada and the world. The advent of large scale machinery in agriculture meant that in order for agriculture in New Brunswick to be viable it would have to face up to its long standing tenure problems. Farms within the province would have to increase in size if they were to use this new technology efficiently and provide adequate incomes for their operators.

While the same adjustment problems occurred in other parts of

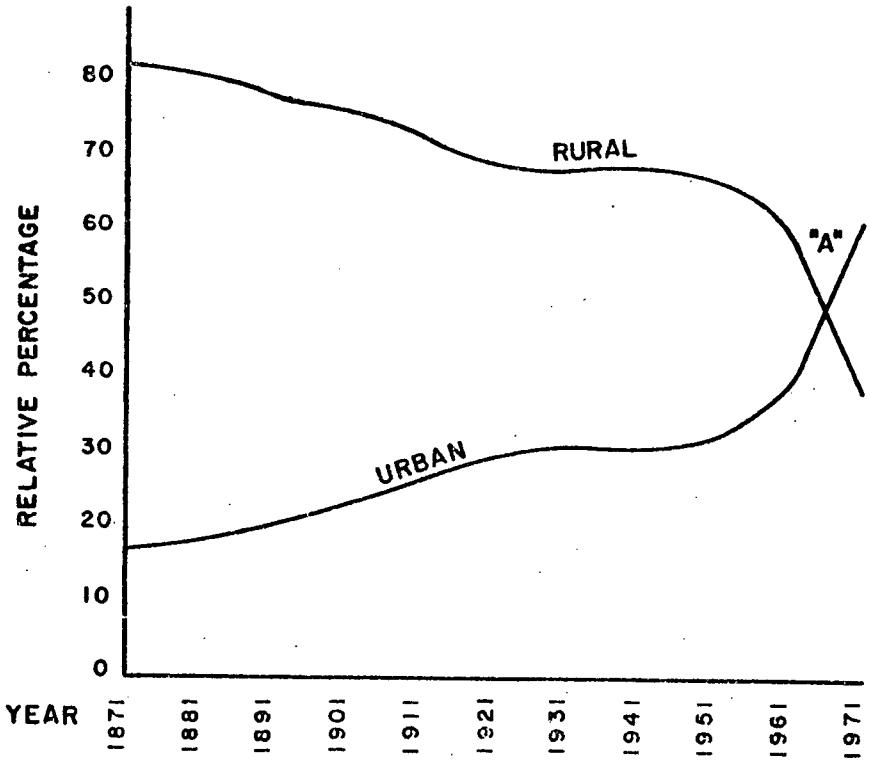
Canada, in New Brunswick the adjustment process was hampered by the severity of the original tenure problems and the lack of alternative employment for those who would have to leave agriculture. In other parts of Canada where this adjustment took place successfully, the lure of post-war urban opportunities drew farmers off the land and helped to facilitate the process. In New Brunswick the post-war recovery of the economy was slow and farmers tended to stay on the land even if they discontinued commercial farming. Many turned to the forest potential of their land and farmed just enough to provide their own needs.

Diagram X shows the historical split between urban and rural population in New Brunswick. It can be seen that the rural population continued to rise until 1961. This suggests that although many farmers stopped producing agricultural products for sale-as is demonstrated by the loss of farms and farm land from the census estimates during this period-they did not move to urban areas.

With such a large number of farmers remaining on the land the opportunity of obtaining land for expansion would be limited. Also it is reasonable to assume that the first land to come available would be that which was most marginal for agriculture and therefore worthless for the purposes of expansion. Table XV shows that between 1941 and 1956 there was very little change in the average number of acres of improved land per farm, and thus very little consolidation had taken place. In the 1956-1971 period, however, the average more than doubled.

> In these other regions, attractive alternative employment had been one of the most dynamic elements in supporting the shift out of low income farming.

DIAGRAM X - NEW BRUNSWICK
URBAN - RURAL
POPULATION PROPORATION CHANGES



A - All Local Improvement Districts, Commissions and Hydro Districts were incorporated as villages November 9, 1966.

YEAR	PERCENTAGE		TABULATION		
	RURAL	URBAN	RURAL	URBAN	TOTAL
1871	82.6%	17.4%	235,981	49,613	285,594
1881	81.6	18.4	262,143	59,090	321,233
1891	79.4	20.6	259,055	62,208	321,263
1901	76.4	23.6	253,180	77,940	331,120
1911	73.0	27.0	256,951	94,938	351,889
1921	69.7	30.3	270,201	117,675	387,876
1931	68.5	31.5	279,756	128,463	408,219
1941	69.3	30.7	317,085	140,316	457,401
1951	67.5	32.5	342,639	173,058	515,697
1961	61.2	38.8	382,823	215,113	597,936
1971	38.3	61.7	243,001	391,556	634,557

Source: Municipal Journal, March 1972

TABLE XV

CHANGES IN THE AVERAGE SIZE OF NEW BRUNSWICK FARMS
1941 - 1971
(improved land only)

YEAR	ACRES	YEAR	ACRES
1901	38.09	1951	38.10
1911	38.26	1956	43.01
1921	37.32	1961	62.28
1931	39.10	1966	73.35
1941	38.74	1971	88.86

Source: Canadian Agricultural Census

> The institutional obstacles to adjustment lay partly in the pattern of land holdings and partly in the established traditions and habits of the people. The pattern of settlement and the division of farms as they passed from one generation to the next had resulted in many small holdings, each separately owned. Difficulties of consolidating small farms into larger units were not remedied. The lack of alternative employment had led to much underemployment on small farms.[7]

This delay in the adjustment of farms in New Brunswick to the realities of modern agriculture allowed other disadvantages to build up, which were to further hamper an ultimate adjustment. The most important of these disadvantages are as follows:

(1) As other regions successfully adapted to large-scale mechanization, the competitive position of existing farms in New Brunswick was further undermined. Adaptation to the new technologies in other areas resulted in considerable economies of scale and thus lower costs of production per unit of output even with increasing input prices. As a result, output prices rose very little in the first two decades after the war. New Brunswick farmers who maintained traditional size enterprises were thus faced with rising production costs and relatively stable output prices. The resulting income squeeze meant that the longer a once-profitable farm unit waited to increase its size, the weaker its position to finance such an expansion independently or to persuade financial institutions to loan it the required capital. This situation could have drastic effects in areas occupied by a large number of traditionally profitable farm units. In such a case each operator would be restricted from expanding as long as all stayed in business. With no prospects for alternative full-time employment, it is unlikely that any farmer would want to sell his farm to the others. Consequently by the time the first of these farmers was

forced out of business the financial position of those remaining would make it difficult for them to obtain the money required to finance expansion.

(2) The low profitability of agriculture and the rural poverty which existed in New Brunswick during the post war period, meant that the children of farm families left the industry in large numbers to seek opportunities in the urban areas of New Brunswick and Canada. As a result the average age of farm operators within the province today is very high. Thus while the opportunity for acquiring good land for expansion is better than in the past, many farmers are reluctant to invest in expanding their operations because they expect to retire soon and have nobody to continue the enterprise.

(3) Although opportunities for full-time alternative employment were bad, many operators of small farms were able to supplement low-income farming with seasonal and part time work in other occupations. Many of these farmers turned to seasonal work in logging, carpentry, government work crews, school bus and truck driving etc. or commuted to part time work in urban areas. This allowed them to continue farming and still maintain a reasonable income. This arrangement, although beneficial to individual farmers, further impeded an ultimate adjustment in the tenure problems that influenced the profitability of the agriculture industry. As a result, a large proportion of farm operators in the province today are partially employed in off-farm occupations. (42.44 per cent in the 1971 census)

Thus by the time urban-oriented residential development began to compete for land in the rural areas, starting about 1966, much of the

agricultural land of the province was still divided into small parcels and controlled by aged operators, many of whom by this time depended heavily on other sources of income for their livelihood, and whose heirs had long since migrated to urban areas to seek employment.

Because the tenure problems of the agriculture industry have remained unsolved for so long, farming has come to be associated with low incomes and limited opportunities for advancement. The effect that these attitudes toward farming can have on the propensity of farmers to sell their land is demonstrated by the Agricultural Manpower and Training Needs Survey[8] conducted by the Department of Agriculture in 1972. Farmers interviewed, were asked to list the occupation they would like their sons to choose. According to their responses to this question the farmers were divided into the following three groups: group A - those who would like their sons to choose agriculture; group B - those who did not want their sons to choose agriculture; and group C - those who expressed no preference. The farmers were then questioned as to their attitudes toward selling their portions of their farms. The response of each group to these questions is presented in Table XVI.

It is clear that the propensity of farmers to sell their land is influenced considerably by their attitudes toward farming as a way of life. Both group B and group C show consistently higher positive responses to selling portions of their land. Group B also consistently shows the highest rate of positive response.

Consequently the prices such operators are willing to refuse to retain their land for agriculture are not accurate reflections of the

TABLE XVI

ATTITUDE OF FARMERS TO SELLING PORTIONS OF THEIR FARMS

	Group A* (percent)	Group B* (percent)	Group C* (percent)	Total (percent)
Cleared Land				
Yes (sell)	8.5	25.0	16.3	14.8
No (not sell)	90.2	73.4	82.7	84.0
Not Applicable	1.3	1.6	1.0	1.2
TOTAL	100.0	100.0	100.0	100.0
Woodlot				
Yes (sell)	11.8	21.9	18.7	16.7
No (not sell)	85.6	76.5	80.3	81.6
Not Applicable	2.6	1.6	1.0	1.7
TOTAL	100.0	100.0	100.0	100.0
Homesite				
Yes (sell)	6.5	17.2	13.8	11.7
No (not sell)	92.2	82.8	84.7	87.1
Not Applicable	1.3	-	1.5	1.2
TOTAL	100.0	100.0	100.0	100.0
Other Land				
Yes (sell)	9.8	20.3	14.3	13.6
No (not sell)	86.3	78.1	81.3	82.6
Not Applicable	3.9	1.6	4.4	3.8
TOTAL	100.0	100.0	100.0	100.0

true value of this land for agricultural production. Rather they are reflections of existing tenure arrangements and the attitudes which have risen out of the historical socio-economic position of farming within the province of New Brunswick. The high average net income per acre reported by the New Brunswick farms in Table III, suggests that in the absence of these tenure problems New Brunswick agriculture would compete well with presently imported production and show growth potential instead of the present decline in production. However, the negative attitude toward farming as a way of life has resulted in an almost complete lack of new entry into the industry. Thus the true potential of this land to provide employment and income within the province is not fully developed. Furthermore, the unrealistically low price at which operators of small non-viable farm units are willing to sell all or part of their land, facilitates its conversion to urban uses and encourages this use to occur in a low density fashion.

The Problem of Externalities

One of the major factors that prevents the market mechanism from producing a short-run optimum allocation of agricultural land, lies in the fact that the vast majority of this land is under the control of private individuals who have the right to use and dispose of it as they desire. It is only understandable that these individual owners will utilize their land in such a way as to provide themselves with a maximum of private benefits. Unfortunately, the maximization of individual benefits, whether monetary or non-monetary satisfactions, may not be congruent with the maximization of the welfare of society at large. This problem exists

because associated with any use of agricultural land, there are both costs and benefits above and beyond those which accrue directly to the owner of the land.

Because these external costs and benefits do not accrue directly to the owners of these lands they are seldom taken into consideration when decisions concerning the use of these lands are made. If the external costs associated with any particular use of agricultural land out-weigh the external benefits, an over-allocation of land to that use will be made by individual owners making land-use decisions neglecting these costs and benefits. Likewise, an under-allocation will occur where the external benefits out-weigh the external costs.

When urban and agricultural uses of land compete to obtain agricultural acreages, both of these conditions are present and acting together cause a serious misallocation of this resource. On the one hand a use such as private residential housing-which is responsible for a great majority of the encroachment onto agricultural land in New Brunswick-produces almost no external benefits but is responsible for many external costs when it occurs in the haphazard, low density pattern which is common in New Brunswick. Agricultural uses, on the other hand, produce many external benefits but when properly conducted produce few external costs.

Examples of costs to society as a result of the location of low density housing on agricultural land have appeared everywhere in New Brunswick within recent years. The pollution of ground and surface water by unserviced rural subdivisions and ribbon developments is becoming a major problem in some areas. This has led to demands by

residents of these areas for provincial help in the financing of water and sewer systems. Because of the physical layout of this type of development, and its distance from existing water and sewer facilities, the unit costs of such installations are more than residents of these areas can support themselves. As a result the rest of the population will be forced to bear some of the burden.

The costs of busing ever increasing numbers of children over large distances, to schools located in the municipal centers are also rising, along with costs associated with the provision of police, fire, and ambulance services to these areas. Again part of these costs are shared by society as a whole.

An important external cost of this type of residential development is related to the destruction of rural seenery which has resulted from it. Although these costs may at first glance appear to be somewhat intangible, in New Brunswick they have a great potential to destroy the monetary well-being of many. Beautiful rural scenery is a very important amenity resource which enables New Brunswick to attract thousands of tourists each year. As a result of this ability the welfare of many residents of the province depends on the additional revenue brought into the region by the tourist industry. If, however, through the individual decisions of many private land owners, this scenery is cluttered with ribbon developments and haphazard subdivisions a large portion of the province's attraction for tourists will be destroyed. This is an excellent example of how land-use decisions made by private land owners can effect the welfare of the larger society while they alone

benefit from these decisions.

Because of the haphazard way in which residnetial development takes place within the rural areas of New Brunswick, and because the agricultural land is divided into many non-viable units, much more land is economically destroyed for agriculture than that which is actually purchased for residential purposes. For example, the selling of lots for residential development by one owner of a non-viable farm-unit may restrict the expansion of an adjacent non-viable farm, thus destroying its value for viable agricultural production even if it remains free from buildings. Furthermore, residential development adjacent to operating farms (as was indicated by the results of the survey conducted by the Agricultural Resources Study outlined in Cahpter II) may cause the abandonment of land because of the impact of nuisances related to this development. Thus while each person who constructs a residence on agricultural land need only pay for the lot he builds on, the external costs of his actions can destroy much more land than he has competed for in the market. Obviously if he and the other builders in the area were required to pay for all the land which is economically destroyed as a result of their combined decisions, the propensity to make such land-use decisions would be considerably less.

Finally, it is evident that farmers are not the only ones who earn a living as the result of the existence of an agricultural land base. Farm machinery, fertilizer, food processing, insurance, finance, lumber and many other companies, along with their employees depend to various degrees upon the existence of a viable agriculture industry-and

thus on the agricultural land base for their profits and incomes.

Examination of the 1965 input-output[9] table for New Brunswick, reveals that for every person employed in primary agriculture, .87 people were employed in industries providing inputs to agriculture. For every dollar of gross domestic product produced in agriculture, two dollars more were produced in industries supporting it. Finally, for every dollar of household income generated by agriculture $1.38 was produced by supporting industries.

When we consider that for every 1000 dollars of output in agriculture, 1578 dollars of G.D.P. is created, it is obvious that any reduction of the amount of agricultural land under cultivation will have an impact on many more people than those who control this land-use decision. In a province where unemployment is acute and millions of dollars have been spend, often unsuccessfully, to create new job opportunities, we cannot afford to unnecessarily waste the potential of the agricultural resource base to provide employment and incomes.

While it can be argued that the residential construction industry also provides external benefits to all those who depend upon it and industries supporting it for their incomes, the improtant point here is that although land for agriculture in New Brunswick is limited, there is no shortage of land for residential construction. This industry would undoubtedly continue even if it were restricted from using agricultural land.

All of these externalities must be considered as external costs related to the use of agricultural land for low density haphazard

residential development or external benefits produced when this land is retained for agriculture. However, when private owners of agricultural land are faced with the decision of whether to sell it for urban pruposes or maintain it for agricultural production, these externalities are seldom considered. Their decision is made by comparing the present value of future net returns from using this land for agriculture with the present value of future net returns from using the land for urban purposes. The owners future net returns from agricultural use are affected only by his yields, costs of production and the market price for his product. Although he may count as part of his returns all the non-market satisfactions he receives from owning or living on agricultural land, he does not consider all the benefits which are external to him.

Likewise, the price urban users of this land must pay to obtain it does not represent the full cost that results from their actions. Under these circumstances, the market mechanism will allocate more agricultural land to urban uses than is in the interests of society as a whole.

Summary

The foregoing analysis has pointed to improper tenure adjustments and related socio-economic problems of New Brunswick agriculture and external costs associated with low density haphazard residential development as factors which impair the market's ability to produce a short-run optimum allocation of this land between urban and agricultural uses. Working together, these factors produce both an under-estimate of the value of this land for agricultural production and an unrealistically low

cost for those wishing to use it for urban purposes. We have not attempted to estimate the magnitude of the impact these factors have on the prices agricultural and urban uses are willing to pay to obtain agricultural land and thus the magnitude of the misallocation. However, given the relatively low opportunity cost of directing urban growth onto non-agricultural land in a more orderly manner, it seems prudent to take steps to eliminate the potentially high external costs of this growth as it now occurs in New Brunswick.

The Long-run Demand for Agricultural Land

Even if it were somehow possible to adjust the present market price of agricultural land to properly reflect its true short-run value to society in light of the factors we have outlined thus far, it is unlikely that the allocation so produced would be a long-run optimum. The factors we have outlined so far all deal with values that accrue to present generations as the result of the existence of agricultural land. However because of the irreversibility of this type of land use decision, the options for food production and the ability of the land to support human populations in the future is either preserved or restricted by land-use decisions made in the present. Unfortunately, the value future generations (i.e. generations beyond the time horizon of present owners of agricultural land) may attach to the preservation of agricultural land now is not reflected in the present price agricultural producers are willing to pay for farm land, since these generations obviously have no way of affecting present prices.

There are several considerations which may cause the long-run

demand for agricultural land to be greater and therefore incompatible with even an optimal short-run allocation.

(1) Per capita consumption of food can only be expected to rise in the future. Presently, millions of people throughout the world are starving and under-nourished, yet they lack the financial means to make their demands felt in world markets for food and thus affect the present allocation of agricultural land. It is possible, however, that in the long-run this presently dormant demand will obtain the resources necessary to influence world food prices and thus the demand for agricultural land.

(2) We can expect the world population to continue to increase at a rapid rate. Again, this will undoubtedly mean an increase in the world demand for food.

(3) There has been in recent years an increasing concern that the period of favourable weather which we have experienced over the past 100 years (the period in which most of our industrial development and the large increases in world population has taken place) may be coming to an end.

> It has long been recognized that the climatic optimum of the present inter-glacial passed 6000-7000 years ago and has been succeeded by slow, oscillating cooling, interrupted by milder episodes like the one in the early Middle Ages. From about the 1880's to the 1940's, the mean global temperature increased by some 0.6 degrees C. The subsequent cooling by about 0.3 degrees C. suggests, however, that this warming trend might also be regarded as a temporary interruption of a general cooling trend and that climatic conditions are now returning to a more 'normal' situation.[10]

Although there is much disagreement about this particular explanation, there is more general agreement on the fact that we can

expect more variability in the world climate in the future. Certainly everyone has been aware of the abnormal weather patterns which have occurred within the last year-droughts in Britain and California, a severe winter in the Eastern United States and snow and frost in Florida and Bermuda. Obviously if these trends continue they will have a dramatic effect on the world food suply, and possibly restrict further the amount of land which is suitable for agriculture.

The question to be asked at this point is whether technological advancement in agricultural production can keep pace with population growth, increased per capita consumption and possible production losses due to climatic effects. While a definite answer to this question would be difficult to provide and certainly beyond our purposes here, a few observations about the nature of such advancements in the past may shed some light on their potential for the future.

Basically, the technological advancements made in agriculture in recent years can be broken down into five categories: (a) machinery technology (b) better plant varieties (c) chemical fertilizers (d) chemical sprays for disease and pest control, and (e) better management techniques.

Machinery technology has made farming more efficient and reduced the land/labor and output/labor ratios. Also by replacing draft animals on farms, machinery has released much of the crop and pasture land once used to feed these animals to production for human consumption. Unfortunately, modern farm machinery is most efficient on a limited range of soils and as a result much land which was formerly

farmed with draft animals has been removed from production because it is too rocky, too hilly, too wet or too broken up into small fields to be farmed efficiently with modern farm machinery. This has had the effect of restricting the quantity of land that is economically viable for agricultural production. Furthermore, mechanized agriculture is highly energy intensive and this factor may constrain its use in the future. We should not expect increased productivity through mechanization to be as important in the future as it has been in the recent past.

The development of new plant varieties in the past has proved very helpful in producing greater yields, reducing susceptibility to disease and pests and adapting crops to specific climates and soils. However there may be finite limits to our abilities to increase production through these methods.

> Agronomists simply have not been able, for instance, to find a way to breed more than one calf per cow per year. They have had difficulty in adapting certain high-yielding 'miracle' varieties to their new ecological settings in the developing world. Nor have there been any dramatic breakthroughs to increase yields per acre of soybeans, a major source of protein. Soybean yields were increased in the U.S. by planting more acres, but idle cropland is quickly vanishing.[11]

The use of chemical fertilizers has greatly increased yields and facilitated continuous cropping practices, but this is a once and for all increase, since once optimum amounts of fertilizer are applied, further applications will not improve yields. Chemicals for disease and pest control have also helped to increase yields through a reduction of crop losses due to these two factors. However, the use of both chemical fertilizers and pesticides has caused much concern over the pollution of ground and surface water, along with other ecological side effects. It

is quite possible that their use in the future will have to be restricted in the light of these concerns.

Finally, management techniques have been developed over recent years that have made farmers more efficient users of the resources available to them, thus increasing yields and reducing production costs. Management practises that allow more intensive farming of agricultural land promise to help increase yields in the future.

In the final analysis we find that the two aspects to the "green revolution" which have been responsible for the largest gains in productivity within recent decades-mechanization and the use of chemicals-do not hold great promise for the future. Unless we have major new breakthroughs in the technology of food production, such as biological pest control, aquaculture or laboratory food production, much of the increase in food production needed to meet increased demand in the future will probably have to come from increases in cultivated acreages. A recent paper on the preservation of agricultural land presents this position very well:

> . . . Agricultural science and technology kept ahead of the exponential increase in population. Looking back we now see that much of the spectacular increase in production was due to replacing the horse by the tractor, a once-for-all release of fertile lands unlikely to be repeated. Much of it was due to the first shock waves of chemical warfare against the pests which were produced by monoculture, and now the pesticides became problematic to society . . . The green revolution is already being out stripped by population growth . . . we are at the end of the illusion that land is infinite, that energy is unlimited, that science and technology can solve instantly every foolish and unnecessary problem we unthinkingly create.[12]

In another article we find the following:

> Several factors in the past decade have worked against adequate supply growth. Technological restraints, both technical and monetary, are currently limiting rapid expansion of food production. The green revolution-remarkable per acre yield increases in grain crops-held off disaster for several years, but its limitations soon became apparent. The onset of shortages of the 4 major resources necessary to produce food-land, water, energy and fertilizer-forced the green revolution to a near standstill.[13]

While the foregoing has been a very superficial analysis of an area where many experts maintain opposite views, it does suggest that there is considerable uncertainty as to our abilities to maintain adequate production to meet future needs from "landless" technological advancements. To guard against this uncertainty it seems reasonable to protect agricultural land from needless destruction by urban development (i.e. when urban development can be directed to non-agricultural land with little or no increased cost).

Concluding Remarks

There are several important conclusions which can be drawn from the discussion presented in this chapter. First, and most importantly, there is no reason to believe that the present practice of allowing the market mechanism to be the sole authority in decisions concerning the utilization of agricultural land will lead to either a short-run or long-run optimum allocation of this resource.

Secondly, given the potential costs associated with a short-run misallocation of this land to hapahzard low-density residential development and the uncertainty regarding the long-run demand for this land, it seems prudent to design policies to encourage a more rational use of this vital resource. Such policies should, where possible, preserve good

agricultural land for agricultural purposes while directing urban growth onto areas that have little or no agricultural value.

Finally, in New Brunswick, policies designed to preserve agricultural land will produce maximum short-run benefits for the people of the province if they are combined with programs which will ensure a consolidation of this land into viable economic units and encourage its full and efficient use.

CHAPTER V

MECHANISMS FOR PRESERVING AGRICULTURAL LAND

In recent years, efforts on the part of other jurisdictions to preserve agricultural land have been initiated through the use of a variety of mechanisms. These mechanisms generally fall into two categories of theoretical approach; (1) Indirect-those which accept the market mechanism as the allocator of agricultural land between its various uses, but attempt to compensate for market imperfections and therefore produce a more "socially desirable" allocation; and (2) Direct-those which replace the market with a public body responsible for determining the "socially desirable" allocation of this land. To aid in the selection of a particular mechanism for use in the province of New Brunswick, we shall analyze a number of mechanisms from each category.

Indirect Mechanisms

A list of all possible indirect mechanisms for preserving agricultural land would be exceedingly long and it would be impossible to deal with all of them here. We will confine our discussion to three approaches which have been proposed most often-preferential assessment, deferred taxation, and the use of large-lot zoning.

Preferential assessment has been used for many years in both Canada and the United States and is presently in effect within the province of New Brunswick. This mechanism simply applies the existing tax rate to an assessment of the value of agricultural land when it is used for agriculture instead of its potential value for urban development.

Although this mechanism reduces the tax burden of farmers located close to urban areas, it does nothing to discourage them from eventually selling their land for urban purposes when the price becomes irresistible. "This then is the ultimate weakness of preferential assessment legislation as a tool for agricultural/open space preservation. While it does provide needed relief from burdensome, or in some cases impossible, tax loads, it addresses only one aspect of the farmer's financial plight."[14] Since this mechanism is already being used in New Brunswick we need not consider it further.

Deferred taxation simply refers to a preferential assessment program in which a penalty or roll-back is assessed when land given this treatment in the past is eventually converted to an urban use. This type of legislation is presently in effect within 18 American states and within the province of Prince Edward Island. The amount of the penalty varies from one jurisdiction to another but is usually the amount of tax deferred during a specified number of years before the use conversion takes place (e.g., 5 years in P.E.I. and 3 years in New Jersey). In some cases deferred tax programs are voluntary but in others all bona fide agricultural land is taxed in this manner. Again depending on the jurisdiction, what is considered a bona fide farm varies. In P.E.I.,[15] all farmers earning more than 50 per cent of their labor income from the sale of farm products are involuntarily included in the program. In New Jersey,[16] any land owner actively devoting his land to an agricultural use for no less than two successive years may apply to be included in the program.

The effectiveness of a deferred tax program for preserving agricultural land will depend upon whether or not the program is compulsory and the severity of the roll-back penalty. Unless the program is compulsory, only those farmers who are interested in continuing farming in the long-run can be expected to participate, and unless the roll-back penalty is high enough it is unlikely to be a deterrent to the conversion process.

To get some idea of how effective a deferred tax program would be if applied in New Brunswick we should examine the magnitude of the price increases the program would place on those wishing to purchase agricultural land for urban uses. The Keswick Ridge area, approxiamtely 15 miles from Fredericton, has in the past been dominated by apple orchards and dairy farms. However, since the construction of the Mactaquac power dam and a related recreational facility (including an 18 hole golf course, sailing, canoeing, nature trails, beaches and camping facilities in the summer along with cross country skiing, tobogganing, and snowmobile trails in the winter) this area has become a very desirable place to live and has subsequently been invaded by urban-oriented residential development.

In a discussion during 1975 with members of the New Brunswick Fruit Growers Association, an apple grower from this area stated that he would be willing to pay from 500-1000 dollars per acre for orchard land. The figure of $500 per acre refers to good cleared land adjacent to his present orcahrds, capable of being planted with the new variety of dwarf root stock tree while the $1000 per acre refers to land presently occupied with a well maintained old style orchard.

From the property Assessment Branch of the Department of Municipal Affairs it was determined that land for urban purposes was, at that time, being sold for prices ranging between 3000-5000 dollars per acre. The tax rate at this time was .0293 dollars per hundred dollars of assessed value for the Local Service District and 1.50 per hundred for the province. This is a combined tax rate of 1.5293 dollars per hundred dollars of assessed value.

If a deferred tax program were in effect in this area the difference between the tax paid by agricultural uses and urban uses (assuming the highest and lowest possible extremes) would be between $30.95 and $68.82 per acre per year. This means that if a five year roll-back period were employed in the program an additional cost of between $152.95 to $344.10 per acre would be incurred by anyone wishing to convert agricultural land to an urban use.

These amounts hardly seem sufficient to deter people who are already paying from $3000-$5000 per acre to obtain land in this area. Moreover, an interesting fact emerges from this analysis. The maximum deterent for converting the lowest valued agricultural land can be calculated by subtracting its value in use ($500) from the highest price at which it is being sold for urban pruposes ($5000) and then multiplying by the combined tax rate (1.5293) and the five year roll-back period. This gives us a value of $344.10. By a similar procedure, the maximum deterent for converting the highest valued agricultural land is found to be only $305.85. In any area, good agricultural land will have a higher value in use than poor agricultural land, however it is unlikely that there will be

a price differential based on soil quality when this land is bid for by urban uses. Other factors, such as location, will be more important determinants of the price urban uses are willing to pay for this land. Therefore if we assume that there is no direct preference by urban uses for land with a high agricultural use value, a deferred tax program would provide less of a deterrent for conversion of the best agricultural land.

The use of a deferred tax program as a means of preserving agricultural land would also raise the question of equity. While the type of development occurring in the Keswick Ridge area has been the result of a desire by moderate to high income groups to live close to amenities, much of the urban development on agricultural land within the province stems from the actions of low income groups attempting to lower their housing costs by building on low cost land. If a deferred tax program had any impact at all, it would be low income groups who would be restricted from this type of development.

Finally, in order for a deferred tax program to have an impact on the conversion process the price elasticity of demand by urban-oriented people for this land and the living environment associated with it would have to be very high. With the relatively small price increase that would result from such a program an elasticity close to infinity would be necessary to alter the amount of land converted by very much.

Referring back to Table IV in Chapter II we find that in many of the most active parishes surrounding Fredericton, there was a drop in the number of building permits issued between 1972 and 1974. These drops coincide with large increases in mortgage interest rates and the first

round of fuel price increases following the 1972 energy crisis. The interesting point here is that following 1974, the number of permits issued rises dramatically. This information suggests that while price increases do have an effect on demand in the short-term; in the long-term people adjust, both psychologically and financially to these new prices and return to their original consumption patterns. Today a large portion of the population is unionized and thus able to adjust its income in the long-term to counter the effect of price increases. This, accompanied with the psychological tendency of people to become accustomed to higher prices very quickly, suggests that price deterrents of any kind may have limited effects on changing human consumption patterns in the long-run. A report prepared for the Council of Environmental Quality in the United States, arrives at the following conclusion after a detailed assessment of the effectiveness of various preferential and deferred tax programs presently in effect within nine states:

> . . . differential assessment laws in general work well to reduce the tax burden on farmers. Acting alone, however, they are not very effective at preserving current uses. It is only when such laws are combined with other effective land use mechanisms in rural areas that they can contribute to successful long-term preservation of open lands.[17]

Large-lot zoning has often been suggested as a mechanism for deterting the agricultural land conversion process. While accepting the market as the allocator of this land between urban and agricultural uses, this device attempts to change the nature of the process by specifying the minimum size parcel which can be formed by subdivision. The successful use of this device depends upon the minimum lot size established. When minimum lot sizes of between 1-5 acres are used there is evidence that the

device has little impact on the amount of conversion which takes place.

In 1976, for example, the minimum lot size for a dwelling serviced by a septic tank was set at one acre within the province of New Brunswick. This action produced little change in the price of rural lots; it merely shifted the standard lot size from a quarter to a half acre to a full acre. If we again consider the land prices quoted for the Keswick Ridge area we find that a minimum lot size of five acres would have an agricultural value of between 2500 and 5000 dollars. However, urban uses are already paying these amounts for lots in this area. This means that in many cases land owners would still be able to get a better price for their land if they sell it in five acre parcels for urban uses. When we consider that the use value of agricultural land for crops other than apples is closer to 200 dollars per acre, very large minimum lot sizes would have to be established in order to deter the conversion process. While this is a definite possibility, it seems hard to justify when other more straight forward zoning methods are available.

Direct Mechanisms

Within the category of direct mechanisms two basic approaches are available; (1) restrictive agreements; and (2) formal agricultural zoning. We shall look at each of these approaches.

Restrictive Agreements:

Restrictive agreements are presently being used in California, Pennsylvania, New York and seven other American states for the purpose of preserving agricultural land. Although the programs vary in detail from

one state to another, they basically allow owners of agricultural land to surrender the development rights to their land for a specified period of time by entering into an agricultural reserve or district. In return for opting into the reserve, the owner is given special tax treatment similar to that previously discussed for preferential and deferred tax programs.

This type of legislation has several important limitations which ultimately restrict its effectiveness. Perhaps most important among these is the fact that the program is voluntary. "New York's program, which is now nearly four years old, offers some protection to approximately one and three quarters million acres of prime agricultural land in 119 districts. Impressive as it is, it represents but 12 per cent of the total farmland in the state, and only 25 per cent of what is considered the "best" farmland."[18] As was the case with the deferred tax program, only farmers interested in continuing farming in the long-term, are likely to participate if the program poses any obstacle to removing land from the reserve in the future. Therefore those who participate are bound to be those who are least likely to sell their land for urban purposes in any case.

A second limitation is that in most cases, this legislation has been left under the control of local and county governments. In California, for example, the use of restrictive agreements has had little effect in stopping the conversion process. Because of the felxibility of the system adopted for opting into the reserves, the consistent ability of land owners to persuade local administrators to relieve them of their contract obligations, and the fact that no penalty is assessed when land is removed

from the reserve, the program has been reduced to a convenient way for developers to reduce their holding costs while waiting for the right time to develop the land.

Obviously, for the program to be effective, it would have to be made compulsory, removed from the control of local administrations, and definite criteria for removing land from the reserve established. These actions, however, would essentially change the program from one of restrictive agreements to one of formal agricultural zoning.

Agricultural Zoning:

The most impressive use of agricultural zoning for the preservation of agricultural land has been in Hawaii and British Columbia. In both these jurisdictions, agricultural land reserves have been established through legislation at the respective state and provincial levels. Within these reserves, the subdivision or conversion of land to a non-agricultural use is subject to administrative approval. Concurrent with this, Land Commissions were established to hear applications for the removal of land from the reserves. In both jurisdictions, in order for the Land Commission to allow removal of land from the reserves, the applicant must demonstrate that the land in question is essential to the proposed use.

In terms of effectiveness, the use of this mechanism in both Hawaii and British Columbia has been very successful. In the British Columbia case, for example, Table XVII indicates the Department of Agriculture's estimates of the amount of prime land lost in British Columbia and the average yearly rate of loss during the twenty years preceeding the implementation of the Land Commission Act. Table XVIII shows the

TABLE XVII

LOSS OF PRIME AGRICULTURAL LAND
IN BRITISH COLUMBIA

(acres)

AREA	20 YEAR LOSS	PER ANNUM LOSS
PRINCE GEORGE	26,000	1,300
PEACE RIVER	9,000	450
KAMLOOPS	3,000	150
CARIBOO	10,000	500
OKANAGAN	15,000	750
VANCOUVER ISLAND	65,000	3,250
FRASER VALLEY	57,000	2,850
KOOTENAYS	6,000	300
MISCELLANEOUS	4,000	200
TOTAL	195,000	9,750

Source: B.C. Dept. of Agriculture

TABLE XVIII

ACRES INCLUDED AND EXCLUDED
from the
AGRICULTURAL LAND RESERVE

APPEAL TYPE	1974	1975	1976	TOTAL
Inclusions	0	14,981 ac.	1,277 ac.	16,258 ac.
9(2)	938 ac.	2,941 ac.	2,307 ac.	6,186 ac.
9(1)	530 ac.	4,392 ac.	3,395 ac.	8,317 ac.
9(7)	0	405 ac.	121 ac.	526 ac.
Total Acreage Excluded	1,168	7,738	5,823	15,029

Total A.L.R. acreage at designation:		11,661,600
Included since designation:	+	16,258
Excluded by 9(2):	-	6,186
Excluded by 9(1):	-	8,317
Excluded by 9(7):	-	526
PRESENT A.L.R. Acreage:		11,662,829

Source: B.C. Land Commission

quantity of land which was included and excluded from the land reserves during 1974, 1975, and 1976. From this information we find that before the implementation of the Land Commission Act, an average of 9750 acres of prime agricultural land was lost within the province each year, however since implementation this loss has averaged only 5010 acres per year. While this is a reduction by nearly one half of the previous loss rate there is probably also a qualitative difference in these two loss rates. The Department of Agriculture's estimates refer only to the loss of prime land, however, it seems probable that at least a portion of the exclusions from the reserves were based on the grounds that the land involved had marginal agricultural value. Furthermore, it was estimated that before the establishment of the reserves, a further 3000 acres of farmland in the Lower Fraser Valley were lost to hobby farms and country estates. Since the Land Commission Act restricts this type of land subdivision, it is reasonable to assume that this activity has also been reduced. Table XVIII also indicates that over this three year period more land was included in the reserves than was excluded.

The key to the successful use of this mechanism in both British Columbia and Hawaii lies in the fact that the power to permit land to be removed from the reserves is in the hands of an independent semi-judicial board acting at the provincial and state levels. These boards are thus able to judge each application free from the influence of local pressure. All too often, agricultural zoning at the local level has been a failure because local councils are continually under the influence of local land owners and tempted by the expectation of higher tax revenues. In

Ontario's Niagara fruit belt, for example, agricultural zoning at the local level has failed miserably for this very reason.

Another advantage of this mechanism is the high degree of public awareness it affords each decision to convert agricultural land to an urban use. Thus, the case for excluding any land from the reserves, must not only be made to the satisfaction of the Land Commission, but in the long-run the performance of the Land Commission must meet with the approval of the public at large. Before the impelmentation of the Land Commission Act in British Columbia, thousands of acres of prime agricultural land were lost to urban development each year, but because each transaction was conducted in private the public in general was not aware of the magnitude of the total process. Today, every application to remove land from the reserve and the commission's subsequent decision are matters of public record. This allows the public to have a complete knowledge of what is happening and therefore express their approval or disapproval at the ballot box.

The complaint which is most often raised in conenction with the use of zoning for the purpose of preserving agricultural land is that it takes away farmers' development rights without compensation. However this cannot be accepted as a reason for preferring any of the previously discussed mechanisms, since, they too would have this impact if they were actually effective. Furthermore, the use of Zoning has long been accepted as a "socially desirable" use of police power within urban areas. Owners or urban land zoned for single family dwellings, for example, cannot use their land for high rise apartments simply because that use promises them greater returns. Zoning farmland for agricultural purposes, merely places

owners of this land under the same type of constraints that urban land owners have been under for years. Finally, when a system of agricultural reserves is established in conjunction with use-value taxation and a farm income stabilization program, farmers will in the long run receive compensation in the form of higher, more stable incomes. The implementation of a Farm Income Assurance Program has been instrumental in obtaining the support of the B.C. Federation of Agriculture for the Land Commission Act in British Columbia.

The foregoing discussion has pointed to formal agricultural zoning as being the most effective mechanism for the preservation of agricultural land. It is therefore suggested that this mechanism be seriously considered for adoption within the province of New Brunswick. The basic administrative structure of the British Columbia approach, with agricultural reserves established and administered by a Land Commission operating at the provincial level would seem to be a good model to follow. However, it should be regarded as a structural model only-detailed decisions regarding what land should be included in the reserves, procedures for appointing and discharging Land Commission members, criteria for removing land from the reserves, and appeal procedures against Commission decisions, must be tailored to meet New Brunswick circumstances and should be a matter of negotiation between the government, producer organizations and other affected land owners.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

In this thesis, we have outlined the factors which have been responsible for the dramatic losses of improved land within the province of New Brunswick in the past and have attempted to demonstrate the growing role urban-oriented residential development within the rural areas of the province has played in causing these losses within recent years. We have also demonstrated that we can not rely upon the market mechanism, as it presently functions, to produce a proper allocation of agricultural land between urban and agricultural uses. Fianlly, after an analysis of the effectiveness of a variety of mechanisms which have been used in different jurisdictions to deal with this problem, we suggested that agricultural zoning at the provincial level should be given serious consideration for use within New Brunswick.

However, to pursue the single-minded objective of eliminating the conversion of agricultural land to urban uses as a solution to the problem of agricultural land loss in New Brunswick would be a mistake. We have tried to stress throughout this thesis that while urban development within the rural areas is an increasingly more important factor causing the loss of improved land, the problems of small farm size and an aged farm population continue to be important causes of this loss. Although programs to prevent the needless destruction of this land by urban uses are needed, they only make sense if a viable agriculture industry continues to exist within the province and uses the available

land base as fully as is economically possible. Currently, the Agricultural Resources Study is conducting an in depth investigation of the problems of New Brunswick agriculture and will shortly make recommendations geared to improving the viability and long-term potential of this industry. It is essential the operation of an agricultural land preservation mechanism be coordinated with the development proposals of this study.

Furthermore, although the emphasis of this thesis has been on the negative impacts of haphazard, low density development within the rural areas of the province, we should not be blind to the fact that this development pattern has had some beneficial aspects. Because the land available for residential development presently includes all land within 20-30 miles of urban areas within the province, the total supply is far in excess of the demand and its ownership is in the hands of an extremely large number of individuals. Consequently large developers are unable to control housing markets simply by assembling large parcels of land within urban boundaries. Whereas in many other parts of Canada, new house buyers purchase a unit which has been built on speculation by a developer on land which he has assembled in advance of construction, much of the housing that is built in New Brunswick is either owner-built, sub-contracted by the owner, or built by a small contractor for a predetermined owner. Furthermore, in many cases the home buyer acquires the building lot first, and then arranges for construction in the manner and by whom he prefers.

This arrangement allows for an excellent interface between supply and demand, avoiding over-supply or under-supply, and keeps the price of

housing reasonably close to its cost of construction. However the key to the success of this process lies in the ability of individuals to acquire building lots on which they can arrange for the construction of the type of housing they require and in the manner they choose. While in recent years, developers who assemble land in advance of construction and build houses on speculation, have become more important within the larger urban centers, individuals still have the alternative of acquiring lots on the urban fringe and arranging construction themselves. However, with the implementation of agricultural land reserves there will be a restriction of the land which is available for residential development. There are two possible negative impacts which could result from this action.

(1) For urban areas surrounded totally by an agricultural land reserve, the land available for urban development will be in the hands of a considerably fewer number of land owners. This opens up the opportunity for a few develoeprs to assemble large parcels and therefore control the available supply. Besides the impact this could have on housing prices, it will also mean that small builders and contractors who do not own land may be forced out of business.

(2) There may be an acceleration of urban sprawl on land surrounding urban areas which is not included in the agricultural reserves.

It is therefore essential that the impact of the formation of agricultural land reserves on housing prices and spacial patterns be investigated in more detail and action taken to minimize potential problems. If these issues are not dealt with, our attempt to preserve agricultural land will merely replace one problem with another.

FOOTNOTES

[1]A. D. Crerar, The Loss of Farmland in the Growth of Metropolitan Regions in Canada (Montreal: Resources for Tomorrow - Supplementary Volume, 1967), p. 191.

[2]J. P. Drozdowski, Agricultural Land Use in New Brunswick: A Direction Towards Policy Formulation (Fredericton: Agricultural Land Planning Section, 1976), p. 10. (Mimeographed)

[3]New Brunswick Department of Agriculture, Land Planning Section, Soil Capability for Agriculture (Fredericton, 1977), p. 5. (Mimeographed)

[4]New Brunswick Agricultural Resources Study, A Survey of Land Use in Selected Areas of New Brunswick (Fredericton, 1976), p. 23. (Mimeographed)

[5]Ibid., p. 17.

[6]For the Historical Background in this Chapter I have relied heavily on: D. W. Carr, Maritime Agriculture - A Comparative Regional Analysis, Volume 1, Chapter 11 (Ottawa: Atlantic Development Board, 1967).

[7]Ibid., p. 95.

[8]New Brunswick Department of Agriculture, Agriculture and Water Management in the Saint John River Basin, Volume 2 (Fredericton: Queens Printers, 1974), pp. 7-467.

[9]New Brunswick, Office of the Economic Advisor, New Brunswick Industry Profiles, Number 9, Agriculture (Fredericton, 1974), pp. 34-36. (Mimeographed)

[10]Derek Winstanley, Brian Emmett and Gil Winstanley, Climatic Changes and the World Food Supply (Ottawa: Environmental Systems Branch, Environment Canada, 1974), pp. 14-15. (Mimeographed)

[11]Hana Umlauf, "Endangered: Our Daily Bread", The World Almanac, 1976, p. 129.

[12]Norman Pearson, Why Preserve Farmland (Queens University, Kingston, Ontario: Second Summer Institute in Urban and Regional Planning - Keynote Address, 1974). (Mimeographed)

[13]Umlaf, op. cit., p. 129.

[14]Randall W. Scott, David J. Broewer and Dallas D. Miner (eds), Management and Control of Growth, Volume III (Washington: The Urban Land Insittute, 1975), p. 571.

[15]V. Cranmer, Land Use Programs In Canada - Prince Edward Island (Ottawa: Land Use Planning Branch, Lands Directorate, Environment Canada, 1974), p. 11.

[16]Scott, Brower, Miner, op. cit., p. 57.

[17]U. S. Council on Environmental Quality, Untaxing Open Space (Washington: U. S. Government Printing Office, 1976), p. iii.

[18]Scott, Brower, Miner, op. cit., p. 58.

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