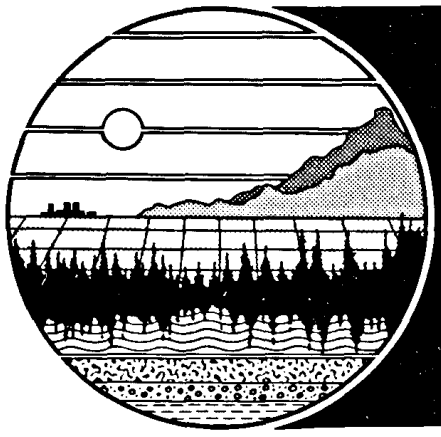

LANDS DIRECTORATE

DIRECTION GÉNÉRALE DES TERRES

THE AGRICULTURAL USE OF MARGINAL LANDS: A REVIEW AND BIBLIOGRAPHY

WORKING PAPER No. 13

Environment Canada Environnement Canada

Canada

THE AGRICULTURAL USE OF MARGINAL LANDS
A REVIEW AND BIBLIOGRAPHY

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Lands Directorate
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L'utilisation agricole des terres marginales:
une rétrospective et une bibliographie

ABSTRACT

The agricultural use of Canada's land varies greatly from region to region in its intensity, vitality and economic prospects. Over time, the agricultural frontier advances in some regions, retreats from others. This paper reviews the Canadian experience along the agricultural margins. A comprehensive review of the Canadian literature is undertaken. This review addresses the problem of definition of the margins, of marginal lands and of the "marginal" condition. The physical, economic and social factors which create retreating margins and advancing frontiers are reviewed, as are the conditions of the frontier and margins and their socio-economic consequences. The role of government programs as a further factor in the advance and retreat of the margin is discussed. Finally, an annotated bibliography of Canadian sources is provided.

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RÉSUMÉ

Au Canada, l'utilisation agricole des terres varie beaucoup d'une région à l'autre selon leur intensité, leur vitalité et les perspectives économiques qu'elles représentent. Avec le temps, la frontière agricole progresse dans certaines régions alors qu'elle recule dans d'autres. Ce document passe en revue l'expérience canadienne le long des terres agricoles marginales et donne une vue d'ensemble des études faites au Canada dans ce domaine. On y aborde le problème qui consiste à définir les limites des marges agricoles, les terres marginales elles mêmes et les conditions physiques, sociales et économiques qui expliquent la marginalité de ces terres. On y traite également du rôle provoquant la progression ou le recul des limites des terres marginales. Finalement, on présente une bibliographie commentée des études canadiennes sur le sujet.

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1. INTRODUCTION

In considering Canada's land resource as continuing base for agricultural use it must first be recognized that the quality of land is not uniform. Land is not a simple resource but rather a complex mosiac of resources. Like other land uses, agricultural production places specific requirements on the land and unless a specific area of land has these prerequisites it cannot be regarded as having capability for that use.

Whether land is used for agricultural production depends upon the nature of the climate and physical resource base, the demand for particular types of agricultural production, the technology available, and the demands in terms of remuneration that the individual user of the land requires. The balance of supply and demand, therefore, in the broadest sense, influences the location of the physical boundary of agriculture at any point in time. Land can be called marginal for agricultural production where it approaches this limit. It is clear, however that because of changes in markets, technology, management practice and in lifestyle concerns, the physical location of the actual agricultural frontier is dynamic. If the frontier moves to encompass additional land, we have the phenomenon of the advancing agricultural frontier. If, on the other hand, the economic frontier withdraws, leaving abandoned agricultural land or subsistence farming in its wake, we have the opposite situation of the receding agricultural margin.

The purpose of this paper is to present a general literature review on Canadian experience with land on the margins of agriculture. This review attempts to indicate the extent of marginal agricultural lands in Canada and trends in its use; to document the physical as well as the socio-economic causes and consequences of these trends; and to relate the responses of various levels of government in adjustment of the marginal use of agricultural land. The emphasis is placed on a discussion of the retreating agricultural margins.

What are the problems associated with farming of the land in the advancing frontier and the retreating margin? What causes the margin to advance or to retreat? What is the response of an individual who is farming in a region where conditions become uneconomic? The various approaches taken to answering these questions are the substance of this review.

1.1 Marginal Lands - Approaches to Definition

Canada's broad regions of marginal agriculture are almost all located peripheral to or beyond the more densely settled core areas of the nation. Thus zones of marginal agriculture are found in the so-called "broken ecumene" (Troughton, 1977) along what Vanderhill describes as the "ragged edge" of northern settlement (References to B.G. Vanderhill's thesis on the advancing farming frontier of western Canada are provided by Ironside, et al. 1974b; Ehlers, 1974; and Proudfoot, 1974). Many different usages of the term "marginal" have been applied to describe physical, economic and social conditions of adversity. Usually the connotation is reflective of the particular approach taken in considering agricultural resources. For example, socio-economic marginality is primarily the concern of quantitative analysts of farm property

(Trant and Brinkman, 1979; Noble and Purvis, 1973; Dickinson, 1970; Wampach, 1968; and Szabo, 1965). Ecological and environmental studies which define absolute and relative limits to production and physical frontiers of crops focus primarily upon the physical marginality of agriculture (Rostad and Kozak, 1977; Harris and Carder, 1975; Proudfoot, 1974; Shannon, 1974; Williams, 1974; Harris, et al., 1972).

Attempts to elucidate ideas of agricultural marginality have been undertaken by several authors. Wonders (1975) explores the geographical concept of marginal settlement at the ecumene's edge along with the comparatively synonomous terms, "pioneer settlement" (new agricultural settlement at the margins), "frontier settlement" (agricultural settlement at the margins from an historical perspective), and "fringe settlement" (regions of discontinuous settlement at the margins of the ecumene). The redundancy of using similar terms and concepts interchangeably leads Wonders to conclude that "we must accept the fact that marginal settlement continues to serve as a convenient roof under which a considerable variety of lodgers are housed (1975: 15)." Troughton (1977) applies the term marginal to a zone of marginal rural settlement broadly described as lying between 45 and 55 degrees north latitude. This zone encompasses both the western areas of the "pioneer fringe" which are peripheral to core areas of settlement, and localities in eastern Canada within the settled ecumene.

Most exacting is Francis's 1970 discussion of marginality in the context of fringe settlement regions. His locational approach to conditions of physical, economic and social marginality provides a focus for the identification and understanding of problems experienced within regions of discontinuous settlement, as well as within marginal areas considered effectively integrated into the national ecumene. Francis describes the physical marginality of those environmental and ecological parameters which determine both relative and absolute limits to production. Regional physical limits to agricultural cultivability are not necessarily fixed or static, but can be modified and extended through the technological innovations of man.

According to the analyses of the Canada Land Inventory (CLI), roughly 1½% to 2% of Canada's land area is physically "marginal" for agricultural production. However, these statistics are somewhat misleading since the term marginal is used here specifically to refer to lands of CLI class 6 soils which are only capable of producing perennial forage crops and rough grazing. Classes 4 and 5 soils can also be marginal for field crops if certain adverse physical and socio-economic conditions reduce the capability of land in a locality (Bureau of Municipal Research, 1977; Reeds, 1972; and Fortin, 1962). (Note the greatest part of Canada's vast land mass has no agricultural capability whatsoever, and is classified CLI Class 7).

Economically marginal conditions for agriculture are described by Francis (1970) as relating to factors of location, profit and capitalization. Not only are frontier areas disadvantaged in a spatial sense by their remoteness and distance from core regions but also in a more theoretical or perceptual sense of economic distance or

isolation. Such areas also may be disadvantaged with respect to infrastructure. Economic marginality also refers to the low levels of return on investment experienced by farms operating at or near subsistence. Capital deficiencies in fringe agricultural areas tend to sustain or accelerate economic marginality.

The concept of social marginality relates to those social factors significant in causing disadvantage to agricultural regions. Aspects of social marginality include regional deficiencies in social services and amenities (e.g., education, medical, or transport services), as well as social characteristics of the farming population (e.g., aging population, low educational level, lack of farm managerial skill, and lack of mobility). These social deficiencies, of course, do not apply to the more enterprising who may well use their skills as tickets out of marginal agricultural regions, leaving behind the less skilled and less ambitious to eke out a living in an area of limited opportunity.

In short, interpretations of agricultural marginality have been at once vague as well as strict; narrow as well as comprehensive. Marginality, it appears, is like beauty, in the eye of the beholder (Francis, 1970: 22).

1.2 Operational Definitions for Agricultural Marginality

Because of the wide range of definitions shown in the previous paragraphs, it is essential for the clarity of this paper that an operational definition of marginality be derived. On the basis of the evidence in the literature, the following definitions are proposed:

A. The agricultural margin: The agricultural margin or frontier is defined as a line which at any point in time separates that area wherein agricultural production is economic from that part of the nation where it is not. The use of this economic definition of the margin subsumes many other factors which influence the location of the margin at any point in time. These include the physical capability of the land, climate, accessibility, technology, management capability, market demand, and expectations of what constitutes a reasonable return on investment and an "adequate" standard of living.

B. Marginal lands: Marginal agricultural lands are defined as those lands which at any point in time are at or near the economic margin for agriculture, as defined in definition A. As will be shown later in this paper, many social, economic and environmental phenomena are associated with being at or near the agricultural margin.

C. The advancing margin or advancing frontier: The concept of the advancing frontier is a dynamic one. Regions of the nation can be characterized as "advancing frontier" if, over a relatively short period of time, the agricultural margin has advanced to include a greater area within agricultural use or within potential for economic agriculture. Such areas can probably be best characterized as having had significant increases in the area in agriculture and in improved agricultural practice during any period of time. In Canada, advancing frontier is primarily concentrated in the Peace River Region of Alberta and British Columbia, although

smaller areas of the northern Prairies, Newfoundland and a few other parts of Canada can also be so characterized where new transportation access, new technology, or changes in markets have suddenly involved the opening up of new areas.

D. The retreating margin: Also a dynamic concept, the retreating margins can be defined as areas where the agricultural margin has withdrawn, leaving less land in economic agriculture. Because the response of individuals to the retreat of the economic margin is not rapid, many sub-marginal farms may remain in such regions. Typically, however, such regions are characterized by rapid losses of area in agriculture and of area in improved agricultural land. Most retreating margins also experience substantial losses in numbers of farms. The Gaspē Region of Quebec and Northern New Brunswick are the most extreme examples in Canada (McCuaig and Manning, forthcoming).

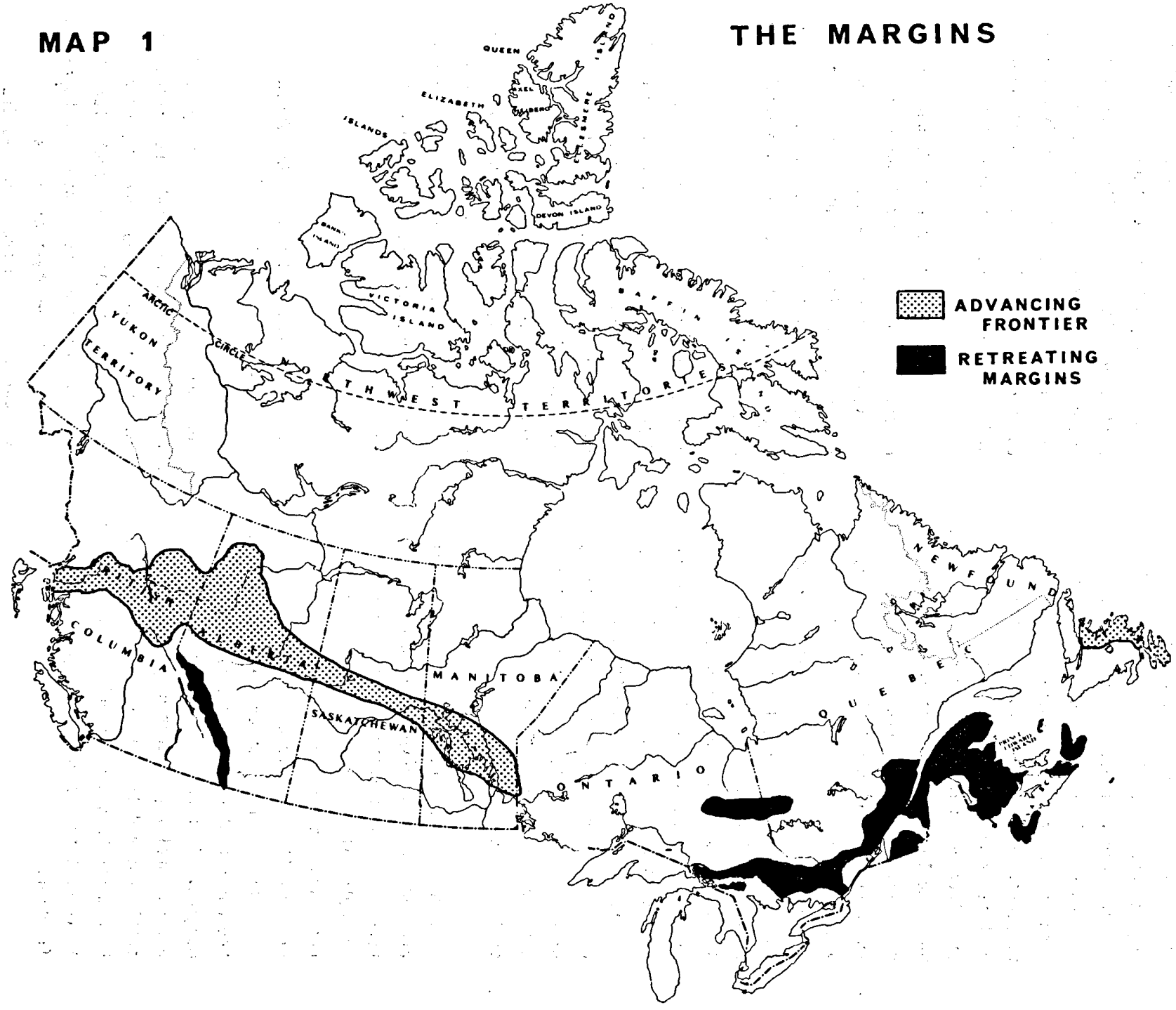
These operational definitions of advancing frontier and retreating margin have been applied by McCuaig and Manning (forthcoming) by use of data from the last four agricultural censuses - 1961, 1966, 1971 and 1976-adjusted to constant boundaries and definitions. In operational terms, the advancing frontier encompassed all regions which experienced an increase in agricultural land of 25% or more from 1961 to 1976, as well as a gain in improved farmland of 20% or more over the same time period. Conversely, the retreating margins comprised all regions which suffered a loss of 25% or greater in agricultural land from 1961 to 1976 and also experienced a reduction of 15% or greater in improved land during the same time span.

The spatial extent of the advancing frontier and retreating agricultural margins, delimited on the basis of these operational definitions, is shown in Map 1. The agricultural frontier is advancing most notably in the Peace River country of Alberta and B.C. as well as in northern Saskatchewan and Manitoba. Minor advances were also reported in parts of Newfoundland. Retreat is occurring in the Maritime Provinces, especially New Brunswick, and throughout Quebec, particularly in the Gaspē, the Beauce and the north shore of the St. Lawrence River. The margins are also retreating in the Muskoka-Haliburton area and throughout most of the clay belt in northern Ontario and western Quebec. Only limited areas of significant agricultural land loss occur in the west, associated with the creation of parks and wilderness areas on the margins of the Rocky Mountains.

While marginal agricultural areas are often readily identifiable in terms of their present physical characteristics, geographic location, land use pattern and settlement at any point in time; they are best characterized by the processes going on within them (e.g., the approach undertaken for the operational definition). Central to the identification of the processes creating advancing and retreating margins are the works by Gunnar Myrdal. In particular, his 1957 work, Rich Lands And Poor: The Road to Rural Prosperity, focussed on the process of circular and cumulative causation which causes poorer regions to be caught in a "vicious circle" of poverty and economic disadvantage. Mydral's further works - An American Dilemma, and Asian Drama, which

MAP 1

THE MARGINS



examined this phenomenon on a national and international scale, show the reinforcement of positive and negative factors once regions have initial advantages or disadvantages. Thus, the retreating margins exhibit the characteristics of becoming progressively poorer in many respects. Factors such as declining markets or out-migration may in turn stimulate abandonment of agricultural land. Once the level of agriculture in a region gets below a certain threshold, infrastructure ceases to be economically viable and may leave. This in turn stimulates further out-migration, further loss of infrastructure, further agricultural abandonment and so on. Similarly, an advancing region benefits from the process of circular and cumulative causation in a positive sense. The perception of greater opportunities may cause new investments which in turn bring greater productivity which in turn attracts settlers, capital, and infrastructure and so the process continues.

At a regional scale, agricultural margins are made up of different agricultural types. Depressed regions of marginal agricultural characterized by declining economies and out-migration are what Friedman (1972) would call downward transitional areas, which are comparable to the concept of retreating agricultural margins. Another type of marginal agricultural region characterized by new settlement and land cultivation is found in Friedman's "resource frontiers", comparable in concept to the advancing agricultural frontier.

The remainder of this paper focuses on the study of Canadian marginal lands. It examines the physical resources involved - the physical base which influences whether or not land can be agriculturally productive. It examines the socio-economic resources necessary for agricultural production and reviews Canadian literature as it deals with the variations of these and their influences upon marginality.

The paper goes on to attempt to develop a classification for marginal agriculture derived from the literature and to examine the policy implications as studied in the Canadian literature for various governments concerned with the advancing and retreating margins.

A brief description of some of Canada's major regions of marginal agricultural use is also included. In addition, an indication of the nature and extent of agricultural marginality in Canada are provided by several measures of land capability, agricultural land loss and the socio-economic characteristics of farming for selected areas which are representative of the advancing frontier and retreating margins.

2. APPROACHES TO THE STUDY OF MARGINAL LANDS

Four broad approaches to the study of marginal agricultural lands are evident in the literature. Early work adopted a regional or locational approach, largely descriptive in nature. Later, cartographic analyses of the physical limits of agriculture gained prominence as did descriptive investigations of the evolution

of settlement in marginal areas. Most recently, quantitative studies have been conducted concerning the socio-economic characteristics and trends in marginal agricultural regions. Each of these four approaches is outlined below.

2.1 Regional Approach

By far the most common approach to the study of marginal agriculture and marginal farmlands is the regional approach. From the early days of Canadian settlement, when propagandist literature encouraged pioneer settlement of farming frontiers, to the present day, ideas of marginality have been most widely discussed in a locational context.

Regional studies have traditionally focused upon the physical margins and the physical limits of agriculture (Francis, 1970). Almost all of the propagandist literature of the period extending from the mid-nineteenth century to the 1930's sought to describe and promote the development of Canada's frontiers of agriculture. It was during this period, too, that maps showing the supposed northern limits to cultivation were first published. A review of these early works is provided by Proudfoot (1974), in his paper, "The Northern Limit of Agriculture in Western Canada", and to a lesser extent by Stone (1972), in his brief article, "Rural Settlement Regions at the Ecumene's Edge: Europe and North America".

The same kind of literature that encouraged settlers to venture into areas marginal for agriculture in western Canada also gave publicity to the marginal clay belt and southern Shield regions of northern Quebec and Ontario (Parson, 1975; 1977). However, by the 1930's, persistent agricultural failures in these regions brought such optimistic reports to a halt.

Thereafter, more scholarly, realistic studies of frontier settlement and land use began to appear. This was especially the case by the 1950's when the unprecedented growth of Canada's agricultural core, or heartland, accentuated the relative disadvantages and decline of marginal areas. Rural poverty now became the subject of public documentation and social science research (Troughton, 1977). Since that time a great number of investigations for research and policy purposes have been undertaken. (Those issued by provincial and federal governments are reviewed in a later section.)

2.2 Cartographic Approach - Physical Limits

The mapping of ecological and environmental limits to cultivation has continued from its early origins to this day. One of the more recent interpretations is Chapman and Brown's (1966) study, The Climates of Canada for Agriclture. This Canada Land Inventory (CLI) report includes a map of the 2,000 degree-days isoline delimiting the growing seasons significant to agriculture. Similarly, Laut (1973c) uses an agro-climatic approach in his interpretation of limitations to cultivation in the northern Prairie Provinces, Yukon, and Northwest Territories.

Another cartographic approach that is effective in identifying zones of marginal agriculture is the mapping of soil-geomorphic-climatic limits to the production of certain crops (Williams,

1974). This method involves graphic overlays of the four physical limits to agriculture: temperature, moisture, soils, and topography. Perhaps the most useful agro-climatic method of delineating agricultural areas is the Agroclimatic Resource Index (A.C.R.I.) devised by Williams in 1975. This index is based on the length of the frost-free season, modified downward to reflect deficiencies in moisture or the lack of sufficient summer heat. A comprehensive description and review of Williams' A.C.R.I. methodology is provided by Simpson-Lewis et al. (1979) in Canada's Special Resource Lands.

2.3 Settlement Processes - Descriptive Approach

The other traditional approach which has continued to be developed and applied by geographers and other scientists pertains to the process of agricultural settlement of marginal and frontier regions (Wonders, 1975; Francis, 1970). The study of marginal agricultural settlements has proceeded at both micro- and macro-scales: the former approach typified by national overviews of land use and zones of agriculture; and the latter approach providing more detailed local settlement case studies and specific regionally oriented, land utilization reports. In view of the relatively large number of reports with regional emphasis, relevant examples and specific references shall be provided throughtout the remainder of this paper. However, the extent and importance of regionally oriented research on marginal settlements can be appreciated by acknowledgement of the following papers presented at the International Geogrpahy Union Symposium on "Frontier Settlement on the Forest-Grassland Fringe", held at Edmonton and Saskatoon in 1972: Ironside, et al., 1974a; 1974b; 1974c; Ehlers, 1974; Williams, 1974; Lamont and Proudfoot, 1974; Fairbairn and Ironside, 1974; and Shannon, 1974.

2.4 Quantitative Approach - Socio-Economic Analyses

Up until the mid-1960's, the main thrust of regional studies had been descriptive and land-use oriented, centering on concepts of physical marginality (Ironside, 1970). Documentation of the economic and social marginality of regions have been largely neglected because of the lack of data and statistics for rural areas. By 1965, however, quantitative analysis was gaining popularity among agricultural economists, geographers, and other investigators of rural poverty and marginal settlement. The use of statistics and computer techniques greatly facilitated socio-economic analyses. In 1965, Szabo published one of the first statistical analyses of socio-economic variables related to small-scale marginal farms, with his paper, "Depopulation of Farms in Relation to the Economic Conditions of Agriculture on the Canadian Prairies". A somewhat parallel study of the abandonment of Ontario's marginal farmland came out the following year (Ontario Economic Council, 1966). Other socio-economic works highlighting this period include: Biays, 1964; Schmitz, 1965; Booth and Retson, 1966; Gartner, 1968; Wampach, 1968; Crabb, 1969; Dickinson, 1970; Fuller, 1970; Heighton, 1970; Gruber, 1971; Pich and Proudfoot, 1971; and Noble and Purvis, 1973. The bulk of this literature comprises either governmental studies, or geographical research.

Statistical analyses have gained momentum throughout the 1970's. Current research into agricultural economics and agro-climatology is built upon the growing data base of agricultural statistics. Strictly regional approaches to the study of marginal lands have given way to quantitative analyses such as provided by Bollman (1979), and Shaw (1979), with their Census Analytical Studies, Off Farm Work by Farmers, and Canada's Farm Population: Analysis of Income and Related Characteristics, respectively. Both of these works are based on recently available data derived from the 1971 Census Agriculture-Population Linkage (Ag-Pop) Project. Troughton's (1979) work on the International Geographical Union Commission on Agricultural Typology further exemplifies the importance of new statistical methodologies in national and international agricultural research.

2.5 Gaps in Research

In spite of these advances, large gaps remain in the kinds of information needed to assist rural planning and development in areas of marginal agriculture, particularly regions experiencing a circular and cumulative process of economic decline. Marginal agricultural lands, in a strict sense, received scant attention by Canadian researchers during the last decade. The kind of research that was undertaken looked at regions of marginal farmland as a side issue in studies of part-time farming practices (Fuller and Mage, eds., 1976; Benson, 1976; Bollman, 1979), and frontier settlement (Ironside, et al., 1974a). Some aspects of government research into marginal agriculture have also been curtailed. The number of experimental stations in Canada's north-western marginal areas have been significantly reduced with the contraction of the federal Department of Agriculture's northern research program (Laut, 1973c). Also, the development and expansion of experimental northern Prairie community pastures, under the auspices of the Prairie Farm Rehabilitation Act (P.F.R.A.), have occurred at a slower pace (Laut, 1973a; 1973b). It would seem that research on marginal farmlands has been eclipsed by the not unrelated analyses of low-income farmers in general, the loss of prime agricultural lands to urban uses, and the growing phenomena of part-time farming.

A decade has gone by since Ironside (1970) called for statistical and analytical research into the impact of distance, scale, and location on rural poverty in physically and economically marginal areas. At the same time he suggested that other basic statistics be gathered for areas smaller than the census division so that rural planning needs could be met, and decisions concerning public investment in marginal areas soundly based. Ten years later these needs have not been fulfilled to any great extent.

On the other hand, a renewed interest in the livelihood of marginal agricultural regions has recently appeared as more and more people and government agencies acknowledge the value of preserving all potential farmlands, and as it is recognized that marginal lands may soon be enlisted to replace farmlands absorbed by urban interests (Canada, Parliament, Standing Senate Committee on Agriculture, 1976; Akhurst, 1978a; 1978b; Troughton, 1977; Wight, 1978; Agricultural Institute of Canada, 1979). There are those, too, who, fearful of a world food crisis, look to

Canada's marginal areas for new expansion of agricultural frontiers (Beacom, 1974; Wight, 1978).

3. THE PHYSICAL RESOURCE BASE

Man's ability to alter the environment has time and time again shown that, to some extent, the physical limits to agriculture are not fixed or unchanging. Technological innovation has pushed world agricultural frontiers outwards through time. Most notable has been the expansion of agricultural areas in response to the 'green revolution' of recent decades. On the other hand, the improvement of technology has in many instances caused agricultural retreat from marginal lands (Francis, 1970). This has largely been the case in Canada, where once farmed northern areas have been abandoned as modern innovations lend greater comparative economic advantage to the larger scale, commercial operations located on land with higher capability for agriculture.

Nevertheless, whatever the effect of man on his environment might be, practical limits of cultivability do exist. No matter how astounding future advances are in agricultural science and technology, the physical limits to agriculture will ultimately dictate where farming cannot succeed at a given time. The physical suitability of any region for various crops will primarily depend upon parameters of climate (sunlight, temperature and moisture), soils, and topography, the so-called "physical frontiers of agriculture" (Williams, 1974).

3.1 Climate

Much of the land in marginal areas of agriculture is lower in quality by reason of less favourable climates. The importance of climate to agriculture is due to the susceptibility of crop production to climatic variations, and it is for this reason that agro-climatic research focuses on climatic variation.

The factors of climate which influence land productivity operate at different scales, the most commonly documented being the regional scale, for which climatic zones are identified (Williams, 1974). Usually, it is at this macro-scale of agroclimatic analysis that the marginality of agricultural districts is judged. Significantly less documented in agroclimatic analyses are micro-climatic factors (Proudfoot, 1974). Climatic variations of this scale are dependent on local soil and relief differences such as elevation, aspect, exposure, and type of forest cover (Laut, 1973c). The effect of micro-climates, can either be that of reducing opportunities for agriculture, or enhancing local opportunities for agriculture in an otherwise marginal area. Due to the lack of data, micro-climatic methods are seldom employed to identify marginal agricultural areas.

A highly generalized form of climatic analysis is the classification of regional climates into zones based on the aggregate data of average seasonal weather conditions. The classification of continental or sub-continental climatic regions will show major variations in climate related to general farming regions, or common field crops. However, since these agroclimatic

schemes are based on climatic measures for common field crops, which are not generally suited for production in marginal areas, they can only serve to identify very broadly defined zones of marginal agriculture (Proudfoot, 1974). Chapman and Brown thus point to the deficiency of their CLI climatic regions in relation to special crops, and further advise that, "for field crops they are admittedly inadequate in the northern fringe areas of agriculture" (1966: 13).

Moreover, general climatic zones are not intended to neatly correspond with any districts of agriculture other than very large generic regions. Laut (1974) found this to be the case when attempting to compare the distributions of climatic measures with the results of his socio-economic classification of Canadian Prairie agriculture. The high degree of detail and specialization apparent in Laut's land classes and agricultural districts makes such a comparison unfeasible. Clearly, the assigning of climatic parameters to agricultural marginality is not a simple task. If agricultural interpretations of climatic limits are to be meaningful, then climatic normals must be considered objectively for specific types of crops. Also, micro-climatic variations must be taken into account.

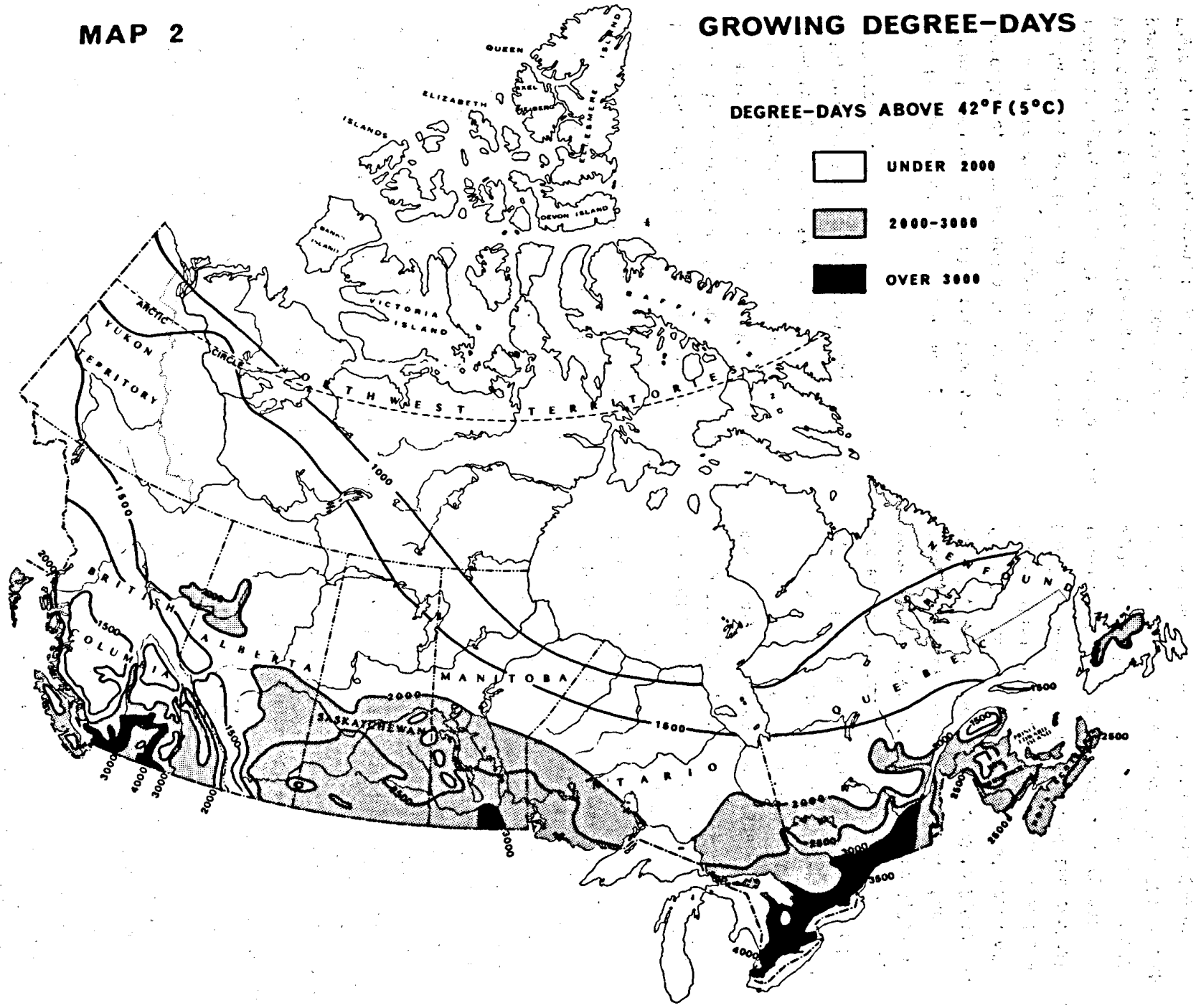
Despite the uncertainty of making any generalizations about climatic limits to agriculture, such an endeavor can assist in the understanding of marginal land productivity and in broadly defining the limits to agriculture. Therefore it should be with caution that the following climatic parameters are considered: temperature regimes, frost-free period, and bright sunshine. Each is discussed below.

1. Temperature Regimes, Growing Degree Days

Temperature regimes are useful indicators of the climatic suitability of marginal areas for agricultural production. The range between maximum and minimum temperatures within a year, month, or day is of importance to agriculture since crop production is limited by specific ranges of air temperature (Simpson-Lewis, et al., 1979). Accumulated values of temperature are commonly measured in degree-days and cumulative heat units (Chapman and Brown, 1966; Williams, 1974). Degree-days represent the cumulative or toal amount of heat available for plant growth, and are calculated by combining the length of the growing period with mean daily temperatures above 42°F (5°C). The system of cumulative heat units makes use of maximum and minimum daily temperatures, but only for the warmer areas of Canada and in relation to common field crops (Chapman and Brown, 1966; Simpson-Lewis, et al., 1979).
The accepted minimum requirement for any agricultural production is 1,000 degree-days above 42°F (5°C). Map 2, which shows degree-day isotherms for Canada, reveals that marginal areas of agriculture generally have indices of degree-days ranging from 2,000 to 2,500, with some exceptions both below and above, while prime agricultural areas generally receive between 3,000 and 4,000 or more degree-days above 42°F (5°C). For example, index readings of 1,500 to 2,000 are found in the marginal agricultural areas of Newfoundland, northern New Brunswick and the Gaspé, as well as in portions of the central Yukon and the Mackenzie Basin. Marginal agricultural lands registering between 2,000 and 2,500 degree-days above 42°F (5°C) include those found in central and western Quebec along the southern margins of the Shield, and

MAP 2

GROWING DEGREE-DAYS



the clay belt farming region of northern Ontario, as well as those marginal lands along the agricultural frontier of the Prairie Provinces, into the Peace River district of northern Alberta and British Columbia. Areas of marginal agriculture with fairly high degree-day levels of 2,500 to 3,000 are found in the Muskoka-Haliburton and Renfrew areas of central and eastern Ontario. In contrast, high degree-day levels approximating 4,000 are found in the prime agricultural areas of southern Ontario, and in the southern Okanagan Valley of British Columbia. Wheat-growing areas with degree-day readings of 2,500 to 3,000 and over are found in the southern Prairies (Chapman and Brown, 1966; Simpson-Lewis et al., 1979). (Table 1).

The growing season, simply stated, is the period which favours plant growth. The dates in spring and fall, corresponding to a mean daily temperature of 5°C are often used as the start and end of the growing season (Chapman and Brown, 1966). A growing season of 112 days is accepted as the minimum requirement for the production of hardy, early maturing crops such as barley and silage.

The growing season is not identical to another major climatic limit, the frost-free period. Typically, the growing season begins three to five weeks earlier and ends three to six weeks later than the average frost-free period, discussed next.

2. Frost-Free Period

The mean number of days between last occurrence of frost in spring and the first occurrence of frost in fall is defined as the frost-free period. A minimum of 80 frost-free days is required for the successful production of hardy crops (Laut, 1974). However, frost limitations to agricultural production are not uniformly restrictive over a wide area. Factors such as local topography, land use and close proximity to water bodies can cause marked contrast in the length of the frost-free season over short distances. Also, compensating farm management practices can extend the frost-free period to some degree.

Because unfavourable climatic conditions seem to combine and compound within regions of marginal agriculture, these areas are characteristically susceptible to frost hazards. The disparity between the longer frost-free period of prime agricultural areas and the short period of marginal areas is very similar to the distribution of growing degree-days between these regions. Whereas the best agricultural lands of British Columbia and Ontario have frost-free periods upwards of 160 days, the broad zone of marginal agriculture in Canada averages between 80 and 125 frost-free days (Simpson-Lewis et al., 1979).

3. Bright Sunshine

The duration of direct sunlight or photoperiod is another important factor related to the time/energy requirements for crop production, especially in northern marginal areas where the daily amount of sunlight received controls, to a certain extent, the rate of crop maturation (Williams, 1974). Since the mean period of summer daylight is generally longer in the northern latitudes, the extra hours of daylight compensate for low degree-day averages by allowing certain hardy crops capable of continuous growth through the long summer day to mature early enough to escape the killing frosts (Simpson-Lewis et

TABLE 1

Selected Climatic Characteristics in Contrasting Agricultural Areas

County/Region	Agroclimatic* Resource Index	Growing Degree-Days (Degree-Days Above 42°F)
Retreating Margins		
North-East New Brunswick		
Gloucester	1.6	1,500-2,500
Kent	1.7	2,000-2,500
Northumberland	1.5	1,500-2,500
Gaspé-Québec		
Bonaventure	1.5	1,500-2,000
Matane/Matapedia	1.2	1,500-2,000
North Clay Belt-Ontario & Quebec		
Abitibi	1.5	1,500-2,000
Cochrane	1.7	1,500-2,000
Advancing Frontier		
Fraser-Fort George, B.C.	1.0	1,500-2,000
Peace-Alberta	1.3	2,000-2,500
Peace River-Liard, B.C.	1.1	1,500-2,000
Prime Lands		
Essex County, Ontario	3.0	4,000 and over
Kent County, Ontario	3.0	4,000 and over

* In most marginal regions, agricultural uses only comprise a small portion of the region which often is the most climatically favoured part, whereas the index value is an average for the entire region or county.

al., 1979).

Photoperiods depend on both the macro-climatic variations of continental climates and micro-climate changes that give rise to orographic precipitation, coastal fog etc. As a result, the distribution of mean photoperiods across Canada varies significantly from place to place, and is in no way distinctively related to agricultural regions. However, where photoperiods are particularly short, like along the fog-bound coasts of Newfoundland, agriculture is limited owing to the compounded climatic risks of short photoperiods, low degree-day levels, and a minimal frost-free period.

4. Moisture

Marginal agricultural areas often have problems with being either excessively wet or arid. Moisture differences between locations are the result of both climatic variations and factors of soil and topography. The average amount and distribution of rainfall throughout the year and the growing season are important determinants of the moisture available for crop production.

Chapman and Brown (1966) define nine moisture classes for the agricultural areas of Canada. Marginal regions of drier, water deficient classes occur in the interior valleys of British Columbia, and in the Yukon. On the other hand, wetness is a problem in the marginal agricultural areas of the Atlantic provinces, and in the poorly drained clay belt region of northern Quebec and Ontario. The Peace River district on the advancing agricultural frontier has a favourable moisture class, as does the Rainy River district of northwestern Ontario. These latter two regions, however, must face other physical and socio-economic constraints to agriculture.

5. Summary - Climate

Troughton defines an all-encompassing marginal zone of Canadian agriculture for which he describes a climate, "marked by a long, cold winter (4-5 months, mean daily temperature below 0°C), a correspondingly short, cool summer (less than 2,600 growing degree-days), and a short frost-free period" (1977: 98). These climatic conditions, in addition to the problems of excessive moisture in the eastern part of the marginal zone, contribute to below average productivity throughout the zone and impose critical limits for agriculture in some parts of the zone.

The inherent climatic risk in farming on the margins coupled with generally much lower crop yields than in Canada's prime agricultural areas is graphically illustrated by two summary measures: the Agroclimatic Resource Index (ACRI) and the ripening limit associated with a 1°C cooling of the climate. The ACRI, which is based on the length of the frost-free season and modified downward for moisture limitations or insufficient summer heat, has been shown to directly reflect the potential crop yield (Williams, 1975). On this basis, it can be suggested that the prime farming areas of southern Ontario which register an ACRI of 2.5 or more have the potential, from an agroclimatic standpoint, to be twice as productive as Canada's agricultural margins which generally have an ACRI of 1.0 to 1.5 (Simpson-Lewis et al., 1979: 17). (Table 1). The vulnerability of farms at the margin is emphasized by the

sharp southward shift in the ripening limit for wheat under the influence of a cooler climate. It is estimated that a 1°C average cooling of the climate would reduce Canada's potential cropland for wheat by one-third, including virtually all of the advancing frontier areas in the West and much of the retreating margins in the East (Simpson-Lewis et al., 1979: 52).

3.2 Terrain and Soil

Attendant to the difficulties of climate are the critical limitations of relief and soil. In marginal agricultural areas, the productivity of the land is restricted by such hazards as poor or imperfect drainage, hilly topography, low soil fertility and moisture content, susceptibility to water erosion, excessive stoniness, and shallow, thin soil (Reeds, 1972). Other risks to agriculture include: susceptibility to wind erosion, low water retention capacity of the soil, salinity, soil acidity, and flooding. These various limitations strongly affect the economics of agriculture on the margins by (1) increasing input costs for fertilizer, drainage tile, stone removal, etc.; (2) restricting mechanization and the consequent economies of scale; and (3) reducing productivity with a lower economic return per dollar of input than in prime agricultural areas.

The CLI soil capability classification system takes into account the degree of total limitations to land use and the risks or hazards involved for agriculture. There are seven CLI soil classes that rate soils in order of capability for agriculture. The first three classes are considered the best for agriculture and are regarded as suitable for most field crops if well managed. Marginal agricultural areas are generally characterized by soils of classes 4-6. Classes 4 and 5 soils are physically marginal for sustained crop production and are suitable for only a few crops. The productivity of these soils is lowered by topographic and climatic limitations affecting farming practices. Class 6 soils have serious soil, climatic and topographic limitations and are only suitable for permanent pasture, hay, and some specialized and sparse grazing only, while the seventh class has no capability for agriculture whatsoever (Environment Canada, 1972).

To illustrate the physical differences between the core region and the margins, one need only refer to the significant difference in land of high agricultural capability between selected counties in the prime agricultural regions (94-96%) and selected areas in the margins (1-30%). Table 2 contrasts the percentage coverage of soils with high agricultural capability (CLI Classes 1 to 3) with those of limited or marginal agricultural capability (CLI Classes 4 to 6) for a few counties and census divisions selected as representative of prime agricultural areas, the advancing agricultural frontier and the retreating margins respectively.

The low proportions of CLI Class 1-3 land in the margins suggests that even where the high capability land forms a significant area in a census division, commercial farming remains difficult due to the discontinuity in the CLI Class 1-3 land and its interspersion with land of little or no agricultural capability. By contrast, comparatively little CLI Class 4-6 land is found in the counties of the core region. In most of the census divisions on the margins, land of marginal agricultural

TABLE 2

Selected Land Capability Characteristics in Contrasting Agricultural Areas

County/Region	Total Area in CLI	High Capability Agricultural Land CLI Classes 1 to 3		Marginal Capability Agricultural Land CLI Classes 4 to 6		Land With No Agricultural Capability CLI Class 7 & Organic	
		Area	% Total CLI	Area	% Total CLI	Area	% Total CLI
	('000s ha)	('000s ha)		('000s ha)		('000s ha)	
Retreating Margins							
North-East New Brunswick							
Gloucester*	475	104	22	291	61	80	17
Kent*	454	137	30	222	49	95	21
Northumberland*	1,206	164	14	633	52	410	34
Gaspé-Québec							
Bonaventure*	875	89	10	46	5	740	85
Matane/Matapedia*	885	144	16	74	8	667	76
North Clay Belt-Ontario & Quebec							
Abitibi	2,668	72	3	664	25	1,932	72
Cochrane	4,079	963	24	1,491	36	1,624	40
Advancing Frontier							
Fraser-Fort George, B.C.	3,439	50	1	1,181	34	2,209	65
Peace-Alberta	18,910	2,331	12	10,519	55	6,060	33
Peace River-Liard, B.C.	4,757	489	10	2,772	58	1,496	32
Prime Lands							
Essex County, Ontario*	187	175	94	2	1	9	5
Kent County, Ontario*	250	241	96	4	2	5	2

* Approximate total area of counties except in non-CLI classified area (e.g., parks).

capability is predominant. Marginal areas such as the Gaspé and Cape Breton have relatively little land with any agricultural capability - only a few dispersed areas of land which is mainly agricultural Class 4 or worse. Most of the Gaspé is CLI Class 7 - no capability for agriculture.

Throughout the broad (marginal) zone of agriculture in Canada, physically marginal conditions of soil, climate, and terrain create problems that significantly restrict the land's capability for commercial agriculture. At a time when commercial agriculture is characterized by large-scale operations, high technology, and widespread mechanization, the smaller, often discontinuous plots of arable soil found in marginal regions are ill suited for commercial agricultural production. It is therefore not surprising that large parts of these physically marginal regions have been abandoned over the past several decades. Where farming persists, the economic response to physically marginal conditions is often reflected by small, subsistence farming operations.

4. SOCIO-ECONOMIC RESOURCES

Agricultural frontiers rarely coincide directly with the actual physical limits of cultivability. Marginal areas of production, therefore, are only partly explained in physically deterministic terms. Human response to physical marginality through research, technology and management practices has had considerable impact on land productivity, and so, marginal agriculture represents the interaction between physical and socio-economic factors (Laut, 1974; Reeds, 1972). In fact, Williams (1974) and Troughton (1977) distinguish marginal areas of agriculture from other regions in the context of human response to the challenge of physically harsh environments.

If the factors of temperature, moisture, soils and topography are the four physical frontiers of agriculture, then land, labour, capital and management, the major factors of agricultural production, are central to the discussion of the socio-economic margins of agriculture.

Changes in the retreating margins have produced severe decreases in total farmland, and more importantly in total improved agricultural land, often upwards of 50% from 1961 to 1976, as is indicated by the trends for selected areas shown in Table 3 (McCuaig and Manning, forthcoming). Conversely, the relatively few areas on the advancing agricultural frontier have undergone substantial increases in total and improved farmland, over 100% in some areas during the 1961-76 period. The reasons for these major shifts in farmland use, particularly for the significant losses on the retreating margins, are now discussed as reviewed in the literature.

4.1 Land

Socio-economic limitations of agricultural productivity often reflect the quality and quantity of the land resource. Small sized farms tend to be the predominant scale of operation found in physically marginal regions (Stock, 1976). This trend reflects the discontinuity of tillable soils and rough terrain of marginal areas, as well as other more economic characteristics of a farm on

TABLE 3

Selected Land Use Change Trends in Contrasting Agricultural Area

County/Region	Total Agricultural Area				Total Improved Area			
	1961	1976	Change 1961-76	% Change 1961-76	1961	1976	Change 1961-76	% Change 1961-76
	('000s ha)	('000s ha)	('000s ha)		('000s ha)	('000s ha)	('000s ha)	
Retreating Margins								
North-East New Brunswick								
Gloucester	50	17	-33	-66	16	7	-9	-54
Kent	72	27	-45	-63	25	10	-15	-61
Northumberland	45	11	-34	-76	9	4	-5	-60
Gaspé-Québec								
Bonaventure	103	49	-54	-53	40	21	-19	-48
Matane/Matapedia	196	132	-64	-33	90	68	-22	-25
North Clay Belt-Ontario & Quebec								
Abitibi	232	153	-79	-34	109	79	-30	-27
Cochrane	76	49	-27	-35	33	23	-10	-30
Advancing Frontier								
Fraser-Fort George, B.C.	43	84	+41	+93	13	31	+18	+148
Peace-Alberta	1,787	2,531	+744	+42	1,036	1,595	+559	+48
Peace River-Liard, B.C.	349	749	+400	+114	149	320	+171	+115
Prime Lands								
Essex County, Ontario	154	144	-10	-6	142	139	-3	-2
Kent County, Ontario	225	223	-2	-1	201	211	+10	+5

the retreating margin such as orientation to small-scale production, low farm sales, rising land prices due to demand for recreation and non-farm uses, and a resulting lack of capital for farm expansion (Francis, 1970; Stock, 1976).

For some marginal areas, such as those in eastern Canada, it has been suggested that farm consolidation and an extension of the agricultural land base will improve the viability of farming (Atlantic Provinces Economic Council, 1977; Canada, Parliament, Standing Senate Committee on Agriculture, 1976). Unfortunately, the rough terrain of some marginal regions is not suitable for either land consolidation programs or land base extension. In Newfoundland, for example, large-scale farming is not physically possible (Travers, 1970).

Location on the economic periphery may in many cases, be a greater barrier to viable farming than the limited agricultural capability of the land. Remoteness and isolation from markets, services, and transportation infrastructure places marginal localities at a competitive disadvantage with core agricultural regions (Troughton, 1977). Dilley and Loghrin (1975) observe that persistent marketing problems at the Thunder Bay Community Pasture counterbalance any advances made in overcoming physical difficulties. Similar observations have been made for the Atlantic Provinces where variable rates of return to the land are attributed to poor services, weak marketing systems, and inadequate transportation infrastructure (Atlantic Provinces Economic Council, 1977; Lill, 1979).

Whether marginal land is extensively farmed or intensively farmed is of importance to its value as a resource. For instance, the successful small-scale farming enterprises near St. John's, Newfoundland are land intensive, producing high yields per unit area (Travers, 1970; Troughton, 1979). Other marginal lands are better suited to extensive modes or production, especially those areas in the western provinces where forage production and grazing are most feasible (Beacom, 1974; Johnston and Smoliak, 1976).

4.2 Labour

Various socio-economic analyses of farm populations indicate that the persistence of marginal farming is at least in part due to the failure of human resources to appropriately respond to the disadvantages imposed by marginal environments (Troughton, 1977).

To farm the retreating margins, the farm operator must cope with climatic and soil limitations, remoteness from markets and a low degree of supporting agricultural services, generally through higher input costs and adept management. But the generally lower yields per hectare and increased risk of crop failure lowers the rate of financial return per dollar of farm input and can provoke the proverbial 'cost-price squeeze'. Faced with limited economic opportunity for successful farming on the margins and aware of better economic prospects and a more confortable lifestyle elsewhere, the better educated and more highly skilled and innovative members of the farm community typically choose to migrate elsewhere.

Left behind on the receding margin are small-scale subsistence-like farming operations in which the operators do not perceive the better economic alternatives elsewhere or do not wish to alter their lifestyle. Analyses of low-income farmers and small-scale farmers on the retreating agricultural margin indicate that this type of farmer is likely to be either very young and inexperienced in farming, or of retirement age with a fading interest and stake in agriculture. The farmer on the margin is not likely to have the high level of education or the high level of farm management skills to successfully produce in an adverse environment. Nor does he generally have the additional skills and endowments necessary for off-farm employment to supplement his farm income. Furthermore, the farmer on the retreating margin tends to have traditional rural values (low economic expectations), strong ties to the community, and slow responses to changing economic conditions (Bollman, 1979; Shaw, 1979; Stock, 1976; Lamont and Proudfoot, 1974; Dickinson, 1970; Wampach, 1968). The agricultural use of marginal land is more than a question of overcoming physical limitations and establishing economic links to markets, but is also social, educational and attitudinal.

The failure to adapt to farm innovations or adjust to changing economic circumstances due to lack of capital, skills, knowledge, or inclination can ultimately lead to the financial failure of the farm and the abandonment of farmland on the margin. Attesting to this lack of successful adaptation is the large-scale 'fall-out', or abandonment of of marginal lands (Tosine, 1979; Lamont and Proudfoot, 1974; Ehlers, 1974; Reeds, 1972). The adjustment of farm populations out of agriculture in marginal areas primarily occurs as a response to the cost-price squeeze on farming operations (Bureau of Municipal Research, 1977; Lill, 1979). When the costs of farm inputs outstrip net returns to farming, the farm operator can respond in a variety of ways: (1) enlarge the scale of the operation through farm consolidation, (2) achieve higher production through intensification, (3) adopt more efficient technology and management methods, (4) change to different crops, (5) seek off-farm work to bolster farm income, (6) abandon the farm, or (7) subsist on a non-economic basis. In marginal areas where the greater risks of production give rise to higher costs and lower returns, the 'squeeze' is tighter. Part-time farming and land abandonment or partial abandonment may be the only alternatives available to the farmer. Land abandonment may involve just cessation of farming while the farmstead remains a residence, or may involve the departure of the farm family for other regions, including forfeiture of title.

Although part-time farming is a widespread phenomenon across Canada, marginal regions have been found to have the highest incidences of farmers reporting off-farm work (Bollman, 1979; Gunn, 1978; Jones and Tung, 1977; Benson, 1976; Fuller, 1976; 1972; Stock, 1976; Mage, 1976; 1973; Ward, 1975; Noble and Purvis, 1973; Herndier, 1973; Heighton, 1970). In some marginal regions, such as in northern Ontario and Quebec, where agriculture developed in symbiotic relationship with forestry, part-time farming is traditional (Parson,

1977; 1975; Benson, 1976). Off-farm employment is considered to be a successful form of redundant labour resource adjustment out of marginal agriculture. Off-farm work both relieves the problem of underemployment and provides supplemental income for the marginal farmer (Benson, 1976). However, off-farm work opportunities are especially poor on many of the retreating agricultural margins. Census data indicates that in these areas off-farm work is insecure and seasonal, and reported off-farm participation rates are low (Shaw, 1979; Bollman, 1979; Stock, 1976; Heighton, 1970). Thus, farmers on the retreating margins tend to be underemployed both on and off the farm. Evidence of long-term and persistent part-time farming in marginal areas implies a perpetuation of a non-commercial, subsistence emphasis and small-scale practices.

4.3 Capital and Infrastructure

The substantial capital requirements of commercial farm operations simply cannot be met in marginal regions. Due to the generally lower levels of production and greater risk of crop damage, the farmer on the margins has extremely restricted opportunities compared to the farmer in the core region for the accumulation of the capital resources needed to purchase new equipment or expand his operation. Also, because of poor prospects, borrowing is difficult, compounding the problems for the farmer. Thus, despite evidence of scale economies, the farming of marginal lands continues to be based on comparatively high expenditures of human capital and low financial investments in mechanization or improved management practices. Troughton (1977) refers to this untimely tradition as the "pioneer" or "homestead" approach to farming in marginal areas.

Although the more severe climate and problematical soil conditions require comparatively higher levels of input for a commercially viable return, census information shows that the value of farm inputs is, in contrast, generally low in marginal areas of agriculture (Shaw, 1979). Capital investments in land, farm buildings, machinery, livestock, fencing, fertilizer, sprays and other inputs contrast significantly between marginal operations and commercial farm enterprises (Stock, 1966). The value of agricultural outputs is correspondingly disparate between marginal and commercial farms, since agricultural yields and rates of return to low capital expenditures are weak.

Crude comparisons of trends in the intensification and the capitalization of farm operations in the margins as well as the core regions are provided in Table 4. A very high proportion of farmland in the core region counties was improved as of 1976. By contrast, less than one-half, and in some instances as low as one-third, of the farmland in the selected regions on the margins was classified as improved in 1976. The capitalization per improved acre of farmland in the core region averages two to three times that of the margins (Table 4). Evidence of considerable variation in the value of land and buildings per improved acre among marginal farming areas is also provided.

TABLE 4

Selected Socio-Economic Characteristics in Contrasting Agricultural Areas

County/Region	Intensification: Improved Area/Total Agricultural Area			Capitalization*: Value of Land & Buildings / Total Improved Area		
	1961	1976	% Change	1961	1976	Absolute Change
	(Ratio)	(Ratio)		($ Value per ha)		($)
Retreating Margins						
North-East New Brunswick						
Gloucester	.32	.43	+34	477	1,477	+1,000
Kent	.35	.37	+4	185	1,106	+921
Northumberland	.21	.35	+65	594	1,888	+1,294
Gaspé-Québec						
Bonaventure	.38	.42	+11	324	824	+500
Matane/Matapedia	.46	.51	+11	205	480	+275
North Clay Belt-Ontario & Quebec						
Abitibi	.47	.52	+10	188	388	+200
Cochrane	.44	.47	+7	247	930	+683
Advancing Frontier						
Fraser-Fort George, B.C.	.29	.37	+28	413	2,128	+1,715
Peace-Alberta	.58	.63	+8	113	509	+396
Peace River-Liard, B.C.	.43	.43	0	160	596	+436
Prime Lands						
Essex County, Ontario	.92	.96	+4	955	3,853	+2,898
Kent County, Ontario	.89	.95	+5	705	3,017	+2,312

* Figures were rounded in the metrification process.

Myrdal's (1957) principle of circular and cumulative causation best describes the capital-poor situation of marginal farm operators. Farmers on the retreating margin are caught in a vicious circle of poverty, where small-scale rates of return and profit do not afford the additional capital needed to invest in inputs that would improve their farming situation and allow them a viable rate of return for further investment. Access to other capital resources, such as off-farm income, sufficient and appropriate government aid programs, and commercial farm credit sources, is limited (Gunn, 1978; Benson, 1976; Crown, 1975; Fobes, 1974). As the process continues the farmer on the retreating margin is less and less able to adapt to changing economic conditions, or financially survive a year when climatic hazards and uncertain markets diminish agricultural yields and net returns. And, following a 'poor year', the capital-deficient operator can only afford an even smaller investment in farm inputs, which, as stated above, further reduces the agricultural output per hectare of land. Eventually, if not initially, severe conditions of economic distress reduce marginal farming operations to the subsistence level. Unable to withstand any more reverses (due to climate, pest damage of crops, or disease and predator losses of livestock), the farm operator finds himself incapable of economic recovery and largely abandons his farm operation through obtaining off-farm work, entering the welfare rolls, selling or abandoning his land and migrating elsewhere.

The circular and cumulative process of financial decline that strikes the individual farmer on the margins also operates throughout the entire farm servicing system in an agricultural community with deleterious results for the farmers remaining in business. The widespread process of farm abandonment and the out-migration of human and capital resources from the agricultural margins escalates rural decline. As farms cease operation; there is less demand and less money for essential agricultural support services such as feed stores, machinery repair shops, nurseries, veterinarians, suppliers of sprays and fertilizers, facilities for packing and grading produce, transport firms and others. Eventually an economic threshold is reached where such support services are no longer financially viable and they close down. The depletion of the agricultural support infrastructure makes life difficult for the remaining farm operations, and tends to hasten their demise, which in turn further erodes the need for the remnants of the supporting infrastructure in an ever downward spiral (Noble and Purvis, 1973; Parson, 1977).

The process of decline for agricultural support services applies equally to community infrastructure, such as schools, community services and retailing, further reducing the attractiveness of an area to the residents or to potential in-migrants. Once in motion, the downward momentum of socio-economic marginality is hard to reverse, especially when capital sources, so needed to improve conditions, are not available. By this circular and cumulative process, farming areas in a state of decline and depopulation impose severe limitations on the continuing viability of agriculture since the remaining farm resources in these areas are devalued by right of their location in 'derelict' countrysides (Troughton, 1974).

4.4 Management

The existence of prosperous commercial family farms in the Peace River district; successful community pastures in Saskatchewan; and small-scale intensive vegetable and poultry farms in Newfoundland, provides evidence of what sound management practices can accomplish in areas where climatic and other conditions mitigate against commercial agriculture. But serious farm management problems still persist. In Alberta's Peace River District the unsuitable application of 'southern' technology in a northern environment has caused farm failures and the loss of farms, usually to consolidation (Wight, 1978). This has been the case, time and time again, along Canada's western frontier of farming settlement (Ironside, et al., 1974b). Similarly, Troughton (1977) argues that it is a false assumption that marginal areas on the advancing frontier are able to successfully compete with, and on similar terms to, agricultural heartland. Marginal locations are not, and cannot be spatial extensions of core economies in regard to agricultural markets, for they are at a continuous competitive disadvantage for similar crops due to the higher costs of production and transportation, the lower potential levels of production per hectare, and the greater climatic and other physical risks involved (Ehlers, 1974; Francis, 1970).

In contrast to areas where the agricultural frontier is advancing, the problems are quite different along the retreating agricultural margins. Farm management skills are generally not highly developed (Shaw, 1979; Stock, 1976). In these retreating regions of marginal agriculture the misuse of land resources through outdated, inapproporiate, and uneconomic farm management contributes to agricultural failure and eventual land abandonment (Dick, 1975). Furthermore, the lack of managerial counselling services, and agricultural extension services, is appreciable (Dickinson, 1970; Francis, 1970). Compounding the problem still further is the failure of the poorly educated farmer who is low in skill and ambition, to take advantage of the government counselling and management services that are available.

Poor farm management practices can lead not only to business failure, but depletion of the land resource itself. Although land is considered a renewable resource, negligent management practices can ruin farmland to the extent that it might never be restored to its previous level of productivity. The cost-price squeeze is forcing some farmers to apply unsuitable farming techniques on marginal land in order to achieve the highest possible short-term yields and profits. For example, marginal land, characterized by thin soil cover, is generally not compatible with large-scale machinery, and deep ploughing (Dick, 1975). Such practices eventually reduce the land's productivity by causing the erosion and loss of fertile top soils. In Ontario, as an illustration, the recent trend of corn cultivation in the marginal clay belt region has, because of its unsuitability, lead to soil compaction, drainage difficulties, and erosion (Romahn, 1979).

4.5 Summary

It is apparent that the combination of factors of production -- land, labour, capital, and management is less than optimal in marginal areas. Together with adverse climatic, soil and topographic conditions,

these factors put marginal regions at a severe disadvantage, making it extremely difficult for them to compete with the cumulative advantages of the core agricultural areas. All these conditions of marginality contribute to the process of circular and cumulative decline, thereby heightening the socio-economic disparities between the agriculture core and the margin, and increasing the pressure for the abandonment of marginal agricultural lands.

5. REGIONS OF MARGINAL AGRICULTURE

Several specific regions of Canada illustrate the problems of the agricultural margins. In this section, a review of marginal agriculture in each of the major economic regions of Canada is provided in order to place the discussion of the physical and the socio-economic processes in context. The salient characteristics and the primary physical and socio-economic constraints to farming are noted for each region. Requirements for government assistance and the prospects for continuing decline or revitalization are also discussed. In some instances, the settlement and evolution of development on the agricultural margin is sketched. The review of marginal agricultural regions across Canada show the contrast between the retreating agricultural margins of the east and the advancing agricultural frontiers of the west. In each region, however, the physical limits to agriculture are in evidence.

5.1 Atlantic Provinces

Significant physical limitations to agriculture are encountered throughout most of the Atlantic Provinces. As much as 98% of all agricultural soils have limitations of low fertility as a result of the cool, wet climate. Fertilizer and lime inputs are a widespread and costly necessity throughout the Atlantic Provinces. Other major limitations of soil are: (1) poor structure and low permeability which affect 32% of all Atlantic region soils, and which give rise to problems of excess water, hindering seeding and harvesting equipment, as well as shallow rooting and consequent deficiencies in plant nutrition; (2) excessive stoniness affecting 19% of all soils; and (3) steep topography which lowers the capability of 14% of all soils by hindering the operation of machinery, and causing serious soil erosion hazards (Nowland, 1975).

These substantial physical constraints to agriculture are matched by an economic history which has left farming in the Atlantic Provinces in a position of decline and adjustment, largely outside the commercial mainstream. Nineteenth century rural settlement in the Maritimes region was largely promoted by opportunities for engaging in lumbering, fishing and trade, tending to the coasts and the navigable Saint John River rather than corresponding to the relative capability of agricultural land. Although differences in farm size and the use of improved land reflected soil fertility, actual variation in numbers of farms reflected accessibility to the sea at the turn of the century in the Maritimes. Atlantic agriculture, weak in grain growing and conducted on small farms, was less capital intensive than that of Ontario, and on the whole, more labour intensive.

Erskine (1968: 249) described Atlantic

agriculture as it existed around 1900, providing insight into the socio-economic processes that led to the retrenchment and marginality of farming throughout most of the Maritimes in the ensuing decades:

> "Better suited climatically to unspecialized mixed farming than grain farming, Maritime agriculture tended to retain a subsistence bias. Alternative activities, easily accessible to farm residents, helped to preserve subsistence ways. The lack of new lands and of immigration tended to make agricultural practice conservative. Its small scale as an agricultural region kept it from becoming the major supplier of any outside market. Yet proximity to the sea, making trade practicable, kept commercial opportunity in view."

With the exception of Newfoundland which has little agricultural land, each Atlantic Province has sustained great reductions in the amount of improved farmland, as well as huge losses of all classes of agricultural lands as small-scale farmers have had to abandon their farm operations. The major socio-economic constraints to agricultural viability in the Maritimes are those of marginal areas: small farm size and uneconomic scale of operations; ineffective farm management practices (poor choice of crops and livestock); heavy reliance on imported inputs; deficiencies of capital and labour inputs (inability to meet the high cost of modernization and adapt to commercial practices); unavailability of markets and competition in products from other regions; deficiencies in service and transportation infrastructures; generally ineffectual land-use planning and regulation; and, inadequete governmental assistance (Donham, 1979; Atlantic Provinces Economic Council, 1977; Nowland, 1975; Black and Maxwell, 1972; Sitwell, 1966). Of these, perhaps the most common and significant barrier to greater agricultural capacity has been the fragmented spatial pattern of fields and farming areas, which in turn causes marketing inefficiency (Nowland, 1975).

In spite of these cumulative disadvantages to agriculture, it is felt that the development of farming can be enhanced if certain socio-economic limitations can be overcome through government action (Nowland, 1975). The Atlantic Provinces Economic Council (1977) urges a rationalization of the agricultural industry by greater efforts to encourage and enable farm consolidation and an extension of the improved farmland base. Improvement of educational and technical advisory services, an expansion of credit facilities, and an extension of the improved agricultural land base is especially urged for the broad marginal area of eastern New Brunswick (Canada, Parliament, Standing Senate Committee on Agriculture, 1976), as well as for Newfoundland (Travers, 1970; Crabb, 1969; Booth and Retson, 1966). As with other areas of marginal agriculture, it is suggested that soaring transporation and energy costs might well stimulate a revival of local agriculture to serve local markets throughout the Maritimes (Donham, 1979).

5.2 The Province of Quebec, the Clay Belt Region

As in the Atlantic provinces, government efforts to relieve rural poverty and check rural depopulation have not been successful

on the retreating agricultural margins of Quebec (Wampach, 1968; Belanger, 1972). All marginal areas of agriculture are in either a state of stagnation, or decline and retrenchment; most particularly those marginal areas located: in eastern Quebec and Gaspē (Carrier, 1979; J.A.L., 1979; Smith, 1972); along the southern agricultural margins of the Shield (Parson, 1977; 1975; Robinson, 1969); in the outwash plains of northern Lake St. John (Clibbon, 1972; Robinson, 1969); and, in the Abitibi clay plains of the Clay Belt (Comeau, 1974; Ehlers, 1974; Clibbon, 1972; Robinson, 1969).

The Clay Belt region of western Quebec and northern Ontario provides an example of some of the physical and socio-economic constraints faced by farmers on the retreating margins. The agricultural settlement of the Clay Belt region first occurred together with lumbering, mining, and railway development, between 1860 and 1913. A second influx of people from southern Ontario and Quebec occurred in response to the economic Depression of the 1930's. Since that time, dairying has evolved as the only viable type of agricultural operation in the region. Although as much as 2.5 million acres have been cleared for farming since the early years of its settlement, by the mid-1970's only 600,000 acres remained under cultivation.

The Clay Belt region faces a full range of difficulties, typical of farming on the retreating margins. The use of improper or inadequate farming techniques is widespread. The average age of farm operators in 1974 was about 48 years, and there is no evidence of younger farmers beginning to replace those that retire. Farm credit is not easy to obtain because the value of farms (buildings and land) are relatively low. Agricultural communities are scattered over great distances, which makes for additional servicing costs.

If viable commercial agriculture is to succeed in this region, then extensive farming practices will have to give way to intensive methods. However, intensive farming requires high capitalization, so credit facilities need to be improved and adapted to the region (Comeau, 1974).

It is generally felt that so long as there is not a strong demand for agricultural production in the marginal agricultural regions of Quebec, agricultural land will continue to be abandoned and improved farmland will further decrease along with the number of farmsteads (Parson, 1977; 1975; Clibbon, 1972; Robinson, 1969). However, community farms in eastern Quebec (Carrier, 1979; J.A.L., 1979), and experimental operations in the Clay Belt (Comeau, 1974), indicate that some marginal areas of agriculture are under-developed, and their resources underutilized. It is thus hoped that higher yields will result in these areas from more effective management practices and higher capital investment in intensive, rather than extensive, agricultural operations.

5.3 Eastern And Northern Ontario

Recent trends indicate that the abandonment of Ontario's marginal farmlands is occurring at a lesser rate than that of the past several decades (Tosine, 1979).

The prominent regions of marginal agrcilture in Ontario are found in the eastern areas of the province, where farm enlargement and consolidation schemes have been successful for new farm families (Noble and Purvis, 1973; Ontario Economic Council, 1966), along the southern fringe of the Shield (Benson, 1976; Dilley and Loghrin, 1975; Comeau, 1974; Robinson, 1969), and, in the northern clay belt areas briefly described above (Comeau, 1974; Ehlers, 1974; Kent, 1966; Hills, 1948).

The prospects for economic viability of farming in these areas are not great (Ehlers, 1974), though it is generally felt that improved socio-economic conditions would enhance productivity levels (Dilley and Loghrin, 1975; Comeau, 1974). Retrenchment of agriculture through the provision of off-farm work opportunities, particularly in the forestry sector, is considered to be an effective farm adjustment and a partial, if non-agricultural solution to marginal agriculture in northern Ontario (Benson, 1976; Stock, 1976; Ontario Economic Council, 1966).

5.4 Northern Saskatchewan And Manitoba

Considerable attention has been given to the opportunities for advancing the agricultural margin in western Canada. Over half of Canada's total agricultural land is found in the provinces of Saskatchewan and Manitoba. Underutilized land resources in south-eastern Saskatchewan (Johnston and Smoliak, 1976; Sahir, 1972; Gartner, 1968), and in eastern Manitoba (Proudfoot, 1972), have excellent potential for forage production and grazing. Likewise, the advancing frontier lying north of the Prairie farming belt and south of the Precambrian Shield has some potential for economically viable forage production (Bumpus, 1977; Beacom, 1974; Ironside, et al., 1974c). At present, little of this land is in agricultural use since a number of problems are involved in bringing this largely forested, muskeg land into production. The physical problems of clearing, breaking, and draining the land make for great development costs.

In addition, the expansion and clearance of relatively low capability agricultural land on the northern fringe can lead to a series of trade-offs and resource management issues. In some instances, such lands have greater capability for forest use, or wildlife habitat, or should remain protected as environmentally sensitive areas. The opportunity costs of agricultural land clearance on this and other advancing frontiers needs to be considered as a land planning issue.

Once in production, these northern Prairie lands further incur costs that are especially peculiar to northern agroclimates. Soils must be carefully managed to avoid erosion by wind and water, since much of the northern Prairie region has soils with shallow surface layers that are low in organic matter. Soil salinity is another problem in many cultivated areas of Saskatchewan.

Livestock production in the northern Prairies has its own special problems. The greater risks of insects and predators require the application of strong control measures. Furthermore, the long cold winters necessitate more protective shelter practices than in areas to the south (Beacom, 1974).

5.5 The Peace River District: Alberta and B.C.

The Peace River district, straddling the Alberta-British Columbia border in the northwest, is the great outlier of true grassland soil, well removed from the main body of grasslands within the Prairie region. Bounded by the Rocky Mountains on the west and south and on the east by highlands north of Lesser Slave Lake, the Peace River area extends over 40 million acres, 20 million of which are potentially arable and 5 million of which are presently under cultivation (Elliot, 1974).

The Peace River district is Canada's most noteworthy exception to the retreat of agriculture on the margins. In the Peace, the limits of agricultural production have been extended; the agricultural frontier has advanced (British Columbia, Ministry of Agriculture, 1978b; Bumpus, 1977; Hoyt, et al., 1974; Elliot, 1974; Ehlers, 1974; Ironside et al., 1974c; Laut, 1973c).

More important to agriculture than the black soils which form the heart of the cultivated area are the warm summer temperatures. The 15°C isotherm for mean daily temperature in July includes the Peace River country and extends almost to the Arctic Circle before looping southward again. The warm summer, the result of a combination of factors: mountain barriers cutting off cool air masses; continentality permitting intensive summer heating; long summer days, a consequence of latitude; and the "refrigerating" effects of Hudson Bay which prevent an easterly extension of similar warm temperatures (Richards, 1968).

The temperature characteristics suggest certain difficulties for agriculture and, indeed, for everyday aspects of living. In contrast, are the long winters of agricultural dormancy and the short summers of intense farming activity. The shortness of frost-free and growing seasons places a premium on crops capable of early maturation, particularly on wheat, barley and oats. The accent on cereal crops over much of the area and the consequent seasonality in farm operations has made commonplace "absentee farming" of many grain farms. Long winters of very low temperatures, snow cover and occasional blizzards, are conducive neither to mixed farming operations nor to easy conditions for range cattle (Richards, 1968). Another difficulty is the variation in soil fertility. Generally, soil-building practices are required to improve the organic and nitrogen content. In some localities, lime is required for certain crops because of the moderate to strong acidity of soils (British Columbia, Ministry of Agriculture, 1978b; Hoyt, et al., 1974).

Settlement of this great grassland area began largely after the turn of the century, when the remainder of the southern prairie grasslands was already undergoing an infilling and consolidation process. Settlement of the Peace River area was particularly strong between 1925 and 1928 when the Prairies experienced a series of good years with excellent crops, causing immigration to soar. Agriculture settlement in the Peace once again increased in the 1960's after a long period of stagnation.

The key to agricultural success in these northern environments appears to be the diversification of practices, and intensification of mixed production on the

more suitable lands (Bumpus, 1977; Ironside, et al., 1974b; 1974c; Pich and Proudfoot, 1971). However, because agriculture cannot sustain the northern economies on its own, it is suggested that off-farm work opportunities be stimulated (Lamont and Proudfoot, 1974; Siemens, 1972).

5.6 The Yukon And Northwest Territories

In 1973, Laut argued that the time had come for governments to begin planning for the future agricultural development of the north (1973c). Since that time the Saskatchewan Institute of Pedology has completed a soil inventory and agroclimatic analysis of potential agricultural areas in the Yukon and Northwest Territories (Rostad and Kozak, 1977; Akhurst, 1978a; 1978b). Agriculture Canada has also considered the climate of the Mackenzie Plain in relation to future agricultural potential (Harris and Carder, 1975; Harris, et al., 1972). These studies indicate that agriculture is indeed physically possible in certain northern localities. However, if agriculture is to be economically viable in the Territories numerous constraints will have to be overcome; and this does not seem soon likely in view of the severity of the conditions (Pawlick, 1979; Hall-Beyer, 1976; Pringle, 1974). Also, the cost of overcoming these extreme transportation, soil and climatic constraints may outweigh any potential benefits.

6. CHARACTERISTICS OF MARGINAL AGRICULTURE - TOWARDS A CLASSIFICATION

In light of the review of the characteristics of marginal agriculture, and the factors and processes that affect marginal farming, it is not surprising that areas of marginal agriculture are not uniform in nature. Classifications or models of marginal farming, per se, have not been developed for the marginal agricultural areas in Canada. Nevertheless, other more general classifications of agriculture in this country may be of use in studying the nature and processes of Canada's marginal areas. These existing typologies can serve as examples for both the selection of measures and of the methodological approach to the classification of marginal agriculture.

Both Mage (1975) and Troughton (1979) have adapted schemes suggested by the International Geographical Union Commission on Agricultural Typology in their respective typologies of part-time farmers and of world agriculture to Canada. Troughton employs the I.G.U. Commission's most recent version which presents a set of 27 variables or indices grouped in four broad categories. These categories are: (1) social attributes, (2) operational attributes, (3) production attributes, and (4) structural characteristics. Cluster analysis was applied to develop agricultural types from the 27 variables. Similarly, Mage performed a factor analysis of 20 measures to formulate a classification of part-time farming based on the interrelationships of social, ownership, organizational and technical variables.

Trant and Brinkman (1979) developed a classification of limited resource farmers (those farmers having gross sales of less than $15,000 in 1970, and those with $25,000 or less in 1975) by use of correlation and regression analysis. Similarly, Shaw (1979)

derived a classification of low versus high income farm operator groups based on a discriminant analysis of 22 variables. Also, Laut (1974) established a regional classification of Canadian Prairie agriculture by manipulating 39 variables in a principal components analysis and a subsequent cluster analysis in which weighted factor scores were included.

Although each of the referenced agricultural classifications employed different combinations of statistical techniques, a common element in all the typologies were the characteristics chosen for measurement and the variables selected for inclusion. Any classifications or models of farming in marginal agricultural areas would likewise have to include measures of key physical, economic and social characteristics, based on census and other survey data. For example, labour and management factors, so critical to successful agricultural enterprise, have been represented in the previous classifications through census-derived measures for age, level and type of education, skills for off-farm work, managerial skill, dependence on farm income and productivity per labourer. Measures related to the economic operation and structure of farms which have been employed in past classification studies, include fertilizer expenditures, value of machinery, extent of irrigation, farm size, land use type and area of improved land, all based upon the Agricultural Census. Other economic measures concerning the capital assets and requirements of farms in marginal areas are, on the basis of past studies, also needed. These include measures which may be derived from the Agricultural Census such as farm output per unit of land, or per unit of labour, level of farm sales, the capital value of land, livestock, and farm buildings, annual level of expenditures, and regional income differentials. Physical measures of concern to agriculture, comprising temperature, moisture, length of growing season, CLI soil capability generally must be obtained from the provincial and federal departments of agriculture or environment.

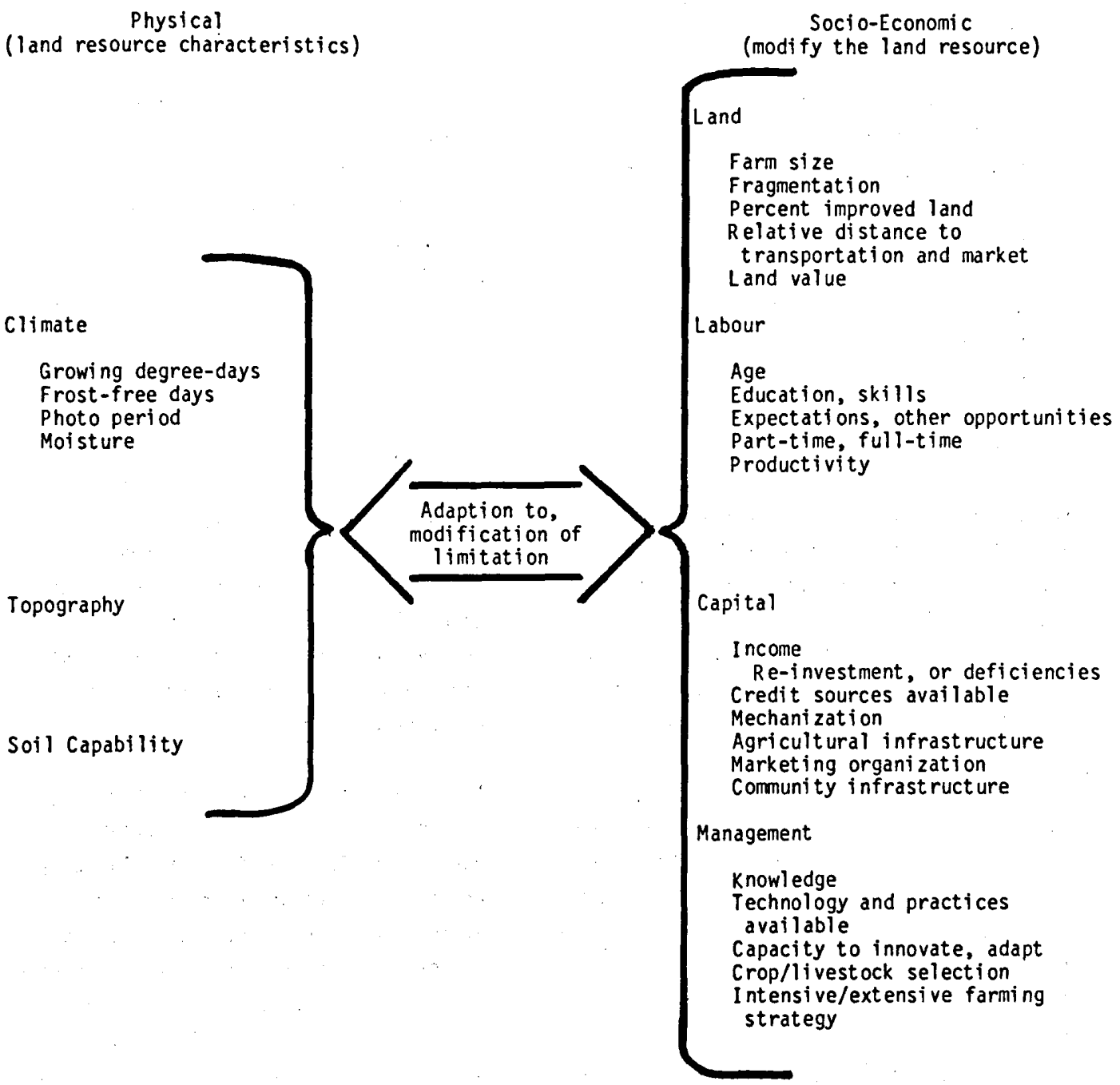
The study, modelling and classification of agricultural activity, particularly agriculture at the margins, should be further enhanced by the Census Agricultural - Population Linkage Project. Under this project, data files from the Census of Population and Census of Agriculture are linked at the individual farm level. Through this activity, as an example, data are provided on the characteristics of those entering and leaving farming (Bollman, 1979). Shaw (1979) describes this special Census project and indicates that much useful information on the relationship between the economic characteristics of the farm (Agricultural Census) and the social, economic and educational, attributes of the farm operator (Population Census) will become available. Information of this kind will enhance understanding of the general factors contributing to the evolution of the retreating margins and the advancing frontier.

Agriculture on the margins may be distinguished from large-scale commercial agriculture according to the comparative strength (i.e., quantity and quality) and appropriate combinations of production factors, including physical inputs of climate, topography and soils, and economic inputs of land, labour, capital and management. For

TABLE 5

Agriculture on Marginal Land

Factors of Production



example, in his analysis of marginal farming and off-farm employment by small-scale farmers, Stock (1976) described marginal farming as:

> "a situation where the quantity, quality, or balance of inputs (land, labour, capital, and management) is limited in such as way as to reduce the productive capacity of the farm. In this regard marginal farms tend to be smaller in acreage and less capitalized than their commercial counterparts. Furthermore, they are relatively more numerous in areas characterized by poor soil and remoteness" (Stock, 1976: 69).

The concept of describing marginal agriculture in terms of both the physical and socio-economic factors of production is detailed in Table 5. Agriculture on the margins must cope with the physical limits of the land resource, be it a limited frost-free period, excessive moisture, extreme relief, or low soil capability for agriculture. The socio-economic factors of production (land, labour, capital and management) are applied to the physical resource in order to adapt or modify the physical limits so as to sustain an economically viable farming industry. The relative success in application of socio-economic factors to the physical land resource at a given point in time is indicated by the retreat of the agricultural margins or the advance of the agricultural frontier.

The retreating margins, for example, are characterized by the low performance of many of the socio-economic factors of production in comparison to the core agricultural areas (Table 5). Typically, the land factor in retreating margins would be marked by relatively small farms, fragmented holdings, a low percentage of improved land, low land values and remoteness to markets. In like manner, the labour factor in areas of agricultural retrenchment is characterized by elderly farm operators with little education, few skills, low awareness of other opportunities outside the area and often engaged in only part-time farming. In regards to capital requirements, agricultural areas on the retreating margins are usually distinguished by low income farms with insufficient cash flow for needed investment, few credit sources, low mechanization and a depleted infrastructure for agricultural support, marketing, or community services. As concerns management factors, farms on the retreating margin are generally less innovative and less likely to have the capability and willingness to adopt and utilize new technology and farm practices.

This sketch of farms on the retreating margins, based on the characteristics outlined in Table 5, is indicative only. Any given region on the retreating agricultural margins would, of course, have deficiencies of greater or lesser severity in the various factors of production. On the advancing agricultural frontier, the quality and quantity of resources to pursue viable farming is generally more favourable, although certain production factors will pose limitations (e.g., climate, remoteness, infrastructure). By comparison to the core agricultural region, the advancing frontier (as well as the retreating margins) have more constrained factors of production.

7. GOVERNMENT POLICIES AND PROGRAMS RE: MARGINAL AGRICULTURE

Based on the 1976 Census, McCuaig and Manning (forthcoming) have calculated that 78% of farms and 90% of the improved agricultural land in Canada is located in the nation's agricultural heartland. Conversely, less than one farm in four and less than one hectare of improved land in ten are found in Canada's agricultural margins, even though this area of the retreating margins as well as the advancing agricultural frontier encompasses a vast geographic area, including the Peace River district. The retreating agricultural margins and the advancing agricultural frontier are geographically delimited on Map 1. In terms of the value of agricultural production, Canada's margins suffer even worse in comparison to the agricultural heartland, producing significantly less than 10% of the total (McCuaig and Manning, forthcoming).

Canada's agricultural margins cover a vast area, face severe physical limitations, generally suffer from a long-term process of circular and cumulative economic decline and currently produce only a minimal proportion of the nation's foodstuffs. But many would argue that some form of government assistance is required to alleviate the economic distress of people in the marginal areas, to assist in improving the efficiency of agricultural production and to promote the effective management of the land and other environmental resources. However, the question arises: Should public assistance be devoted to (1) extending the limits of the agricultural margins and assisting farming operations in the margins to become economically viable or (2) assisting farmers in marginal areas to adjust out of agriculture and helping to convert marginal farmland to more suitable and productive uses such as forestry or recreation?

7.1 Should We Practice Agriculture On The Margins?

Perhaps the most persuasive argument put forward for the agricultural use of marginal lands is that food production will inevitably be forced onto poorer quality land, as more and more prime lands succumb to urban encroachment (Agricultural Institute of Canada, 1979; Wight, 1978). Even if Canada manages to protect its prime agricultural lands, the extension of the nation's farmland base into marginal areas might well occur as world food crises pressure the agricultural industry to increase food production by bringing new frontiers under cultivation (Beacom, 1974). However, there are limits to this argument. Simpson-Lewis et al. (1979) note that the climatic or other physical constraints on the agricultural margins limit both crop production levels and the range of crops that can be successfully grown, in comparison to Canada's agricultural heartland.

Others in favour of the development and stimulation of farming on marginal lands argue that local agricultural potentials have been largely under-estimated in the past. This point is stressed by Wight (1978), who contends that decision-makers in this country have a less than satisfactory comprehension and appreciation of the true value of northern agroclimates. The case for the continuation of farming operations in Canada's marginal areas has also been made from the viewpoint of lifestyle. Wight

(1978) suggests that we must recognize the need to guarantee the rights of future generations to choose the pioneer way of life. But, the risk remains of creating areas of perpetual rural welfare with little medium or long-term prospects of improvement.

7.2 Should Marginal Agricultural Lands Be Converted To Alternative Uses?

Even in the fairly prosperous agricultural region of the Peace River, high expenditures of public monies are required to sustain the regional economy (Fairbairn and Ironside, 1974; Ironside, et al., 1974c). It has therefore been argued that it would be a better public policy to preserve prime agricultural lands, rather than to encourage the farming of marginal lands (Agricultural Institute of Canada, 1979; Bureau of Municipal Research, 1977). The proposition is that it would be more efficient to spend public funds on research and farm support to increase and intensify food production on prime agricultural lands, than to invest in government programs to assist the high cost, low return production on marginal agricultural lands (Ironside, et al., 1974b). Dick (1975, 19) has pointedly made the case: "No matter what technology is used for food production in the future it will always be most productive, most efficient and least expensive on the best agricultural land."

In many cases it has been suggested that the most economically or socially desirable policy is for agriculture on the margins to be guided into the most suitable localities where real prospects exist, while other less suitable areas be abandoned to other competing uses such as forestry or recreation, or left unusued until it is again required for food production (Wight, 1978; Akhurst, 1978a; 1978b; Centre for Resources Development, 1977; Ehlers, 1974; Ironside, 1974c; Clibbon, 1972; Robinson, 1969; Schmitz, 1965).

The tendency of small-scale 'traditional' farmers on the retreating margins to be unreceptive to change, and unresponsive to changing economic conditions is a further argument against large-scale farm support and development programs on the agricultural margins (Trant and Brinkman, 1979). The answer to the dilemma will have to respect physical capability, long-term national and regional economic prospects, and the social requirements of those involved. And, these are not always compatible.

7.3 An Overview Of Government Assistance Programs

In its concern for regional disparities across Canada, the federal government has reacted by creating special agencies and departments, mounting a variety of programs, and funding several investigations concerning rural poverty. Most provinces have at least one major agency which coordinates joint development programs between provincial and federal agencies (Troughton, 1977), as well as numerous additional programs of financial and other assistance to encourage the improvement of unviable farm operations.

The kaleidescope of government programs targeted directly or indirectly at marginal agricultural areas have endeavoured to achieve a variety of disparate and sometimes conflicting goals, including the alleviation of rural poverty, the improvement of agricultural productivity, assistance for

farmers to adjust out of agriculture, and sometimes to leave the region, the development of social infrastructure and the development of other types of industry in the area. These are nearly all programs with social goals, and not programs designated to encourage sound resource management.

Possibly the most notable piece of agricultural assistance legislation is "The Agricultural Rehabilitation and Development Act" of 1961, and its successor, The Agricultural and Rural Development Act (ARDA) of 1966, revised in 1970 and later folded into the General Development Agreements initiated by DREE (Ironside, et al., 1974b). ARDA programs are implemented by the federal Department of Regional Economic Expansion (DREE) and by provincial governments in shared-cost schemes. They are designed to "provide for the rehabilitation and development of rural areas in Canada" (Agriculture Canada, 1977), especially in the 'have-not' rural areas of Canada.

Although the most significant, ARDA is only one of a series of agricultural support programs which have evolved over time. Farm support programs have gradually broadened their scope over time. The first farm support programs, the Prairie Farm Rehabilitation Act, (PFRA, 1935), the Maritime Marshlands Rehabilitation Act (MMRA, 1948) and ARDA I (1961-1965) concentrated heavily on soil management schemes, community pasture improvement, reclamation of poorly drained lands and irrigation projects. Gradually, however, evidence accumulated to demonstrate that agricultural poverty is not simply traceable to the inadequacies of the land cultivated. Projects such as the improving of river channels and the development of new pastures are not converted into more hay, corn or beef, which augment farm incomes, unless a host of other socio-economic variables, such as farm size and the managerial ability, technical skills, financial status and ambitions of the farmer himself are also influenced simultaneously. The improvement of physical resources is a necessary but insufficient condition for ameliorating the precarious economic position of the agricultural sector. As a consequence, ARDA II agreements (1966-1970) and Fund for Rural Economic Development (FRED) projects included soio-economic assistance such as farm enlargement programs, moving allowances for families who abandon economically unviable operations, skills development, and leadership training.

Other trends have also occurred in the evolving regional development and farm support apparatus at the federal level. Development programs in which aid is directed towards broad regions in a nonselective fashion such as ARDA I (1961-1965) have been complemented by efforts directed towards specific areas of particularly high economic distress such as FRED (1966-1976). Ad hoc efforts which basically reacted to the demands of a local community such as ARDA I have been overlaid with comprehensive planning excercises such as the FRED developments for Mactaquac in New Brunswick, the Gaspē in Quebec, and Interlake in Manitoba, as well as the 15-year P.E.I. Development Agreement (1969-1984) all of which attempted to include a balanced program of physical resource development, infrastructure improvement, amenity provision, industrial modernization and labour force re-training.

The latest generation of agricultural and regional development programs, the DREE

Agricultural Sub-Agreements, (1975 onwards), are broad in scope, flexible in terms of activities funded, less comprehensive and structured than the FRED schemes, but more specific in terms of the problems addressed. Typically sub-agreement monies can be used for agricultural research, training programs, infrastructure development and upgrading, land consolidation, as well as for physical support such as land clearance, development of community pastures, and the fencing of rangelands. The emphasis of the Agricultural Sub-Agreements varies from province to province and generally involves a mix of socio-economic and physical support activities.

Some, although not necessarily all farmers in marginal areas, can derive benefit from the public support programs directed specifically at the agricultural industry as a whole, rather than at disadvantaged areas. These programs include agricultural research and extension services, crop insurance, the Farm Credit Corporation, Advance Payments for Crops program and the Agricultural Stabilization Act. These and other programs provide direct assistance to the farming sector. Some, like the Farm Credit Act, or Farm Improvement Loans Act may be denied to the more economically marginal enterprises.

In addition to direct assistance for the farming sector, many federal and federal/provincial policies and programs indirectly influence the use of marginal agricultural lands. Major examples include the Maritime Freight Rates, Feed Grain Assistance, and a variety of transport, construction and regulation programs, all of which affect the relative profitability of different types of farming. Similarly, a wide array of social assistance programs like unemployment insurance, welfare, minimum wage laws, and provincial education programs can influence occupants of marginal lands in their decisions to stay or leave, to farm or abandon their land with agricultural potential.

On the basis of the literature review, it is not possible to provide a definitive assessment of government programs in regard to marginal agricultural areas. Clearly, government programs have been directed towards and partially achieved a variety of different ends in different regions of the country. Government programs have had such contrasting objectives as research and assistance to extend the margins on the advancing frontier, as well as training and assistance for farmers to leave agriculture, and consolidation of farms into viable units. Yet, problems have also occurred such as financial support to sustain a 'lost cause' or programs for the clearance of new land in the midst of abandoned farms on the retreating margins. A particularly thorny issue is the extent to which marginal, low-income farmers should be given public financial assistance. It has been dealt with extensively in the literature and is reviewed below.

7.4 Public Support For The Low-Income Farmer: Generous, Restrictive Or Wasted?

Marginal farmers (e.g., low-income farmers) often do not qualify for assistance from government farm support programs. For example, ARDA schemes frequently have eligibility criteria which effectively prevent marginal farmers from taking advantage of them (Gunn, 1978). Many of the programs are applied only to 'bona-fide' farmers, broadly

defined as those farmers who: derive the majority of their income from farming; have a gross farm income of $10,000 or more (for some programs $5,000); and who devote at least 120 man days per year to farming, or 400 man days per year of hired labour (Crown, 1976; Gunn, 1978). Those farming in marginal areas often do not measure up to these criteria of 'bona-fide' or commercial farming because of their tendency to farm part-time, and because they rarely earn as much as $5,000 gross income as of 1976 (Stock, 1976; Benson, 1976).

The elimination of marginal farmers and other part-time farmers from agricultural assistance programs is analysed critically by Lerner (1976). Of all Canadian provinces, Lerner finds Quebec to be the most restrictive in regard to low-income farmers with its Farm Bureau Credit Policies. These policies define eligibility clauses that are restrictive of part-time farmers, low income farmers, and impose age limitations on farmers applying for grants and mortgage loans for farm enlargement and improvement. Agricultural tax reimbursements are similarly restricted to 'bona-fide' farmers. As another example, Nova Scotia bars any farmers earning less than $5,000, or less than 51% of gross income from farm sources, from applying for Nova Scotia Farm Loan Board Capital Grants, Land Improvement and Commercial Loans (Gunn, 1978). According to Lerner (1976) the provinces of British Columbia and Ontario are least prohibitive with their agricultural programs, although they also have certain restrictions.

The aim of such restrictions is to ensure that public funds assist the commercial farming industry and those who require assistance to become more economic. Such restrictions may also prevent the use of federal and provincial money to promote part-time and hobby farming or to be surrogate rural welfare subsidies. Use of these restrictions is seen as a means of preventing the poor investment of public funds in marginal farms - not throwing good money after bad.

Nevertheless, some reviewers of agricultural policy feel that the restriction of schemes to bona-fide farmers results in an inefficient allocation of resources, and contributes to widespread rural depopulation and decline. These same critics generally agree that most agricultural policies and programs should discard all eligibility clauses, thereby 'legitimizing' the small-scale or part-time farmer (Gunn, 1978; Lerner, 1976; Crown, 1976; Fobes, 1974).

Canada's recent Agricultural Development Strategy and Food Strategy (Agriculture Canada, 1977; 1978) includes among its objectives the improvement of agricultural efficiency, assistance to low-income farmers, and the development and utilization of marginal land forage resources. However, the income stabilization policy is to be specifically developed for 'efficient' farmers, rather than farmers on the margins. Furthermore, program aid shall continue to assist marginal farmers in the adjustment out of agriculture (Agriculture Canada, 1977). An example of previous government attempts to withdraw agricultural settlement from unsuitable marginal areas is in western Alberta's Census Division 14, under a series of ARDA programs (Lamont and Proudfoot, 1974; Ironside, 1970).

Government support for low-income farmers is a difficult issue, fraught with political overtones. Clearly some measure of balance is required. Public money should not be poured into marginal farms and marginal lands to support inefficient, low productivity agriculture in perpetuity when the land is better suited and likely more productive in alternative uses such as forestry. On the other hand, in certain areas, where the land capability is sufficient for agriculture, the location economically feasible and the farm operators show potential for adopting improved farming methods, selected farm support programs, especially training, extension services and supervised loans, are likely in order.

8. CONCLUSIONS

The agricultural margins are the shifting edge of the agricultural ecumene. The reasons why the margins advance in some regions and retreat from others reflect a complex mix of physical, economic and social factors. The work of many authors has been presented to show both the complexity of the agricultural margins and the variety of approaches and interpretations of the processes at work. Clearly, further exploration is required to find practical solutions to the problems presented by the margins - from an environmental and a socio-economic point of view. Only with a clearer understanding of exactly what is occurring on the agricultural margins can government policies and programs be tailored to fit the real and practical needs of these regions. It is hoped that this review and bibliography will contribute in a positive way to the enhancement of understanding of the problems and opportunities of the agricultural margins.

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Agricultural Institute of Canada. 1979. Presentation by the Agricultural Institute of Canada to the National Political Parties. February 1, 1979. Intergovernmental Committee on Urban and Regional Research Mimeograph.

In this report the Agricultural Institute of Canada (A.I.C) identifies some of the major issues and problems concerning agriculture in this country. These issues are categorized under the following headings: Food Strategy; Agricultural Research and Development; Food Safety; Land Use; Energy; and Vertebrate Pests.

The A.I.C. recognizes that agricultural production is increasingly being forced into marginal farming areas as better quality land is used up for urban development. This phenomenon is perceived as a problem, for there are higher costs of production and greater agricultural risks associated with the farming of marginal lands. These factors inevitably lead to a greater financial burden on both producers and consumers. In response to this issue the AIC proposes that the federal government adopt a land use policy whereby prime agricultural land is officially designated for agricultural use. Also, provincial and municipal governments are strongly urged to follow any such national guidelines.

Agriculture Canada. 1978. Canada: Food Strategy. Report on the Proceedings of the National Food Strategy Conference. Ottawa. February 22-23, 1978.

The Food Strategy Conference brought together over 400 representatives, from all sectors of the food system, and officials from several Federal departments. Their aim was to present a national food strategy, complete with programmes befitting of strategy goals.

This report comprises summaries of the various addresses, discussions and workshop reports presented at the conference. The following issues were central to the six workshop discussions: income stabilization and support; trade policy and safeguards; research, information and education; marketing and food aid; processing, distribution and retailing; and, consumer concerns.

Canada's agricultural development strategy is also outlined in this report, as introduced in an address by the Minister of Agriculture.

Key to this strategy are the related objectives of increasing agricultural efficiency, improving the lot of low-income farmers, and promoting the development and utilization of forage resources. The need for income stabilization programs is therein recognized, however, it was decided that such supports should be directed towards the efficient farmer, rather than the marginal farmer.

Agriculture Canada. 1977. An Agricultural Development Strategy for Canada. Ottawa. November.

The federal government's commitment to help the plight of farmers in marginal agricultural areas is evident in this strategy paper. Part-time farmers are recognized for the role they play in the agricultural economy of the country, and the importance of joint-employment enhancement for some farmers is discussed. Assistance to low-income farmers is pledged, whether it be in terms of program aid to improve farming, or to assist in the adjustment of farmers out of agriculture.

Akhurst, K. 1978a. The Impact of Possible Agricultural Development on Other Land Use Values in Selected Areas of the Yukon Territory. Department of Indian Affairs and Northern Development. Ottawa.

The purpose of this report was to compare those areas in the Yukon Territory having agricultural potential with current and future alternative land uses, and to assess both positive and adverse impacts on land values that would result from agricultural development. The areas of agricultural potential studied by the author are those that were identified and classified by the Saskatchewan Institute of Pedology in a 1977 report. (see: Rostad and Kozak, 1977.)

On the basis of his findings, Akhurst selects several areas which would be most suitable for agriculture and which would involve few negative impacts or conflicts with other land uses. Several recommendations are suggested within the text of the concluding section.

Akhurst, K. 1978b. The Impact of Possible Agricultural Development on Other Land Use Values in Selected Areas of the Northwest Territories. Department of Indian Affairs and Northern Development. Ottawa.

This report on the impacts of agricultural development on other land uses in the Northwest Territories accompanies Akhurst's analogous study for the Yukon. Both of these inquiries assess the possible impacts of agriculture on such other northern land uses as forestry, mining, hunting-trapping and fishing, hydro-power development, tourism and recreation, road and pipeline land use, land use by wildlife, and land use by archeological, historical, and park sites. The possible impacts of other land uses on agriculture are similarly considered by the author.

Alberta. Land Use Forum. 1976. Land Use Forum: Report and Recommendations. January. Alberta.

This report is the culmination of a wide-encompassing study of land use issues in Alberta. Part Three of the volume focuses upon several selected land uses including agriculture, urban

development, housing, recreation, forestry, other resource industry, and transportation.

Atlantic Provinces Economic Council. 1977. Background Paper on Agricultural Industry. Prepared for, "A Strategy for the Economic Development of the Atlantic Region: 1971-1981." Atlantic Development Council. March.

The Atlantic Development Council's strategy for agricultural development is examined in this background paper with a view to the changes in economic conditions that have occurred since the strategy was formulated in the late 1960's. Each Atlantic province is reviewed in terms of agricultural development and the impact of agricultural policies. The persistence of uneconomic small-scale farming and the predominance of unimproved land continue to hinder competitive advantage in agricultural production. Variability in the returns to farmers is reflective of inadequate government policy and poor services, such as marketing systems and transportation infrastructure.

This paper urges rationalization of the agricultural industry by the encouragement of farm consolidation and extension of the land base. A small-scale rural manufacturing structure is proposed in order to employ farm labour displaced through consolidation, and to stimulate rural communities.

Beacon, S. 1974. "Northern Agriculture: Northern Saskatchewan and Manitoba." Agrologist. December, 13-17.

It is argued in this article that as world-wide pressure for food production increases, the agricultural potential of the Canadian north will be developed. High prices for beef, grain and marketable forages will render food and feed production in the presently marginal framing areas of the north more economically viable.

Northern Saskatchewan has 3 million acres of potentially arable land, and an equal areas that has possibilities for forage production. Manitoba's northern potential is approximately half that of Saskatchewan. Little of this land is in agricultural use at present.

The author describes the numerous problems faced in bringing this marginal land into production and discusses the findings of agricultural experiments carried out at locations in northern Manitoba and Saskatchewan.

Belanger, M. 1972. "Le Quēbec Rural." Studies in Canadian Geography: Quebec. Edited by L. Trotier and F. Grenier. pp. 31-46. University of Toronto Press. Toronto.

The evolution and transformation of agricultural systems in Quebec are traced in this paper from the early years of seigneurial system, through successive waves of colonization and emigration to contemporary trends of population adjustments out of perispheral agricultural areas.

Expansive agricultural areas in Quebec are either stagnating or in retreat, while others have already been largely abandoned.

The response of different regional plans to changing political, economic and social conditions in rural Quebec is discussed with particular attention to their effectiveness in checking rural depopulation.

Benson, R.C. 1976. "Part-time Farming in a Physically Marginal Area of Northern Ontario." Part-time Farming: Problem or Resource in Rural Development. Edited by A.M. Fuller, and J.A. Mage. pp. 114-125. Geo Abstracts. Norwich, England.

In 1973, Benson surveyed 116 farms in the Rainy River District of Northwestern Ontario in order to analyse the nature of part-time farming in a region where agriculture is physically marginal. The hishest incidence of part-time farming, or multiple jobholding in the province occurs in the Rainy River District which indicates that part-time farming is in many cases, spatially associated with physical marginality. The area is rendered agriculturally marginal by a moderately harsh climate, and soil conditions.

The evidence of long-term and persistent part-time farming is rooted in the historical development of agriculture and forestry in the district. The early homesteaders established farms in order to supply local woodsmen and residents with agricultural products, but when faced with the harsh climate and difficulties of frontier development, most farmers were forced to work, at least part of the hear, in the forest industry. As a result, a symbiotic relationship between agriculture and forestry became the sustenance of agriculture in the area.

Winter bush work continues to be a major factor associated with the perpetuation of farming in the Rainy River District, and further provides the farmer with needed supplementary income.

The author concludes that the Rainy River District is exemplary of how part-time farming can successfully relieve low income farming problems in a physically marginal area. The agricultural economy of the area should be maintained, therefore, with the help of forest management policies for Crown Lands, A.R.D.A. holdings and deeded lands.

Biays, P. 1964. "Problèmes de l'Agriculture Marginale dans la zone Pionnière de l'Est du Canada." Cahiers de Géographie de Québec. Vol. 8, No. 6, 219-229.

The author suggests that both the human and physical factors that cause marginal agriculture must be examined in order to make political decisions concerning them.

Black, W.A., and J.W. Maxwell. 1972. "Resource Utilization: Change and Adaption." Studies in Canadian Geography: The Atlantic Provinces. Edited by L. Trotier and A. Macpherson. pp. 73-136. University of Toronto Press. Toronto.

This paper complements an earlier chapter, "The Physical Geography of the Atlantic Provinces", by Ian Brookes, published in the same volume. While Brookes appraises the resources of the Atlantic provinces in an absolute sense, the authors of this study seek to describe and analyse their utilization by man. An account of the utilization of agricultural resources in this region is given with the help of 1966 Census data.

The persistence of marginal agriculture is attributed to several major problems. These issues include: the limitations of climate and soil; the high cost of modernizing and adapting to commercial operations, coupled with inadequate capital resources; inaccessability of farms to markets; severe competition in products from other regions; and, ineffective farm management practices.

Bollman, R.D. 1979. Off-Farm Work by Farmers. Statistics Canada Census Analytical Study. Ministry of Supply and Services. Ottawa.

The 1971 Census Agriculture-Population linkage (Ag-Pop) project, from which data became available in 1975, is the basis of this census analytic study. Using 1971 Ag-Pop data, Bollman analyses the inter-relationship between the farm operation and off-farm work of farmers. Two central issues are focused upon: the relationship between part-time farmers, or off-farm work and food production; and the role of off-farm employment in enhancing farmers' income. Bollman's findings resolve the latter issue by indicating that part-time farming can be a desirable and feasible solution to the problems of low farmer income and rural depopulation. With respect to the issue of efficiency of food production among part-time farmers, Bollman contends that off-farm work by farmers ia a non-issue of public policy. That is, public policies aimed at increasing the efficiency of food production should apply to all producers, and not discriminate against the part-time farmer, as has been the case. Where off-farm work does have implications for public policy-making is in the consideration of a farmer's total income for income support mechanisms.

As an economic analysis of the determinants of 'on-farm-off-farm' work by farmers, this report is congruous to Paul Shaw's 1979 census analytic study, Canada's Farm Population: Analysis of Income and Related Characteristics.

Booth, J.F., and G.C. Retson. 1966. The Agriculture of Newfoundland and Labrador. Atlantic Development Board, Economics Branch, Canada Department of Agriculture. Ottawa.

This report embodies a fairly comprehensive study of Newfoundland's agricultural development to 1961. An introductory summary and list of 9 suggestions and recommendations reveal that the province's agriculture is largely marginal in both a physical and economic sense. However, the authors forsee that with improved management and inputs, these small scale and inefficient farming operations have potential for commercial development.

Brierley, J.S. 1977. "Changing Patterns in the Prairie Provinces." Great Plains - Rocky Mountain Geographical Journal. Vol. 6, No. 2, 147-153.

Internal migration has long characterised the demographic fabric of the Canadian Prairies. During the 1970's, change in the economic climate of the region (resulting from the energy crisis, high wheat prices, and increased land and housing values) have affected the established patterns of population mobility. The changes in these patterns are examined at the provincial and census divisional levels employing 1976 statistics. Reduced farm out-migration, metropolitan spill-over, and growth in northern areas are features of migration in the Prairie Provinces during the 1971-76 intercensal period.

British Columbia. Ministry of Agriculture. 1978a. Agriculture on Vancouver Island and the Gulf Islands. Publication of the British Columbia Ministry of Agriculture No. 78-4.

Although there are good soils for agriculture on Vancouver Island and the Gulf Islands (Vancouver Island has 74,581 hectares or 184,294 acres of class 1, 2, and 3 soils capability ratings) they occur in scattered pockets surrounded by poorer soils with limitations for agriculture. The scattered nature of soils and competing uses for land have lead to the development of scattered, small-sized farm holdings incapable of producing adequate family incomes. Thus, many farm holdings can be considered as marginal operations.

Similar circumstances prevail on the Gulf Islands where shortages of irrigation water and extra transportation costs further restrict commercial agricultural development.

In spite of the marginal nature of much of the farming on Vancouver Island and the Gulf Islands, opportunities do exist for successful intensive agriculture on a commercial scale. These opportunities are outlined in this handbook.

British Columbia. Ministry of Agriculture. 1978b. Agriculture in the Peace River. Publication of the British Columbia Ministry of Agriculture No. 78-10.

A general overview of agriculture in the Peace River region is given in this booklet. The production of cereals, oil seed, forage crops, seeds and field crops is described, as well as that of livestock and horticulture.

Soils of the Peace River region are generally suitable for agriculture within the restrictions of climate. Variability of climate and soil fertility renders the region somewhat submarginal for agriculture, though sound farm management practices have lessened the impact of physical difficulties and made for a prosperous agricultural economy.

Bumpus, G. 1977. "Land Cheap, Mounties Plentiful." Harrowsmith. Vol. 11:2, No. 8, July-August, 30-35.

It is with the spirit of success that the author writes of his homesteading experience in the North Peace of Alberta. Agriculture in the Peace River Region is prosperous in spite of such adversities as a short growing season, marginal soils, pests, predators, and the need to clear new land. The key to successful farming in this northern region is in the selection of hardy varieties of grains, forage, fruits and vegetables.

Bureau of Municipal Research. 1977. "Disappearing Farmland: So What?" Food for the Cities: Disappearing Farmland and Provincial Land Policy. Toronto. June, 1-11.

The decline of improved farmland acreage is a major political issue in the province of Ontario. This discussion paper gives perspective to the problem by outlining its scope, causes and significance, as well as the implications of agricultural land withdrawal for provincial policy.

According to this paper, the major influence in farmland retrenchment is pressure from non-farm uses of rural land, or "urban field influence" demands. Another cause is states as the internal adjustment theory, which contends that land is taken out of production primarily as a short-term response to the cost-price squeeze on farming operations.

That Ontario's best farmlands are being lost to other uses is of great significance, and this report emphasizes the implication of future reliance on an agricultural land base of lower class and capability.

Canada. Parliament. Standing Senate Committee on Agriculture. 1976. Kent County Can be Saved:

An Inquiry Into The Agricultural Potential of Eastern New Brunswick. Ottawa.

As is suggested in the title of this report, the agriculture of Eastern New Brunswick can be salvaged from a state of decline to one of prosperity. The physical characteristics of Kent County indicate that there are few major limitations on agricultural potential beyond the availability of land and capital. To overcome the scarcity of the land resource, it is suggested that 44,000 acres of good agricultural land be reclaimed from once farmed areas, abandoned from 1955 onward.

Modern agricultural and management techniques offer excellent opportunities for farmers in Eastern New Brunswick to increase production of vegetables, fruits, beef, hogs, poultry, and feed grains. Co-ordinated government support for development programs can stimulate agricultural production, as well as enhance the overall economic prosperity of the region.

An extensive list of recommendations, pertinent to an agricultural strategy, accompanies this report.

Carlyle, W.J. 1979. "Government Acquisition of land in Manitoba." Prairie Forum. Vol. 4, No. 1, 55-82.

Under the Alternate Land Use, Land Adjustment, and Resource for Tomorrow programs, 159, 670 acres (250 square miles) or marginal agricultural land were transferred to public ownership in southern Manitoba between 1966 and 1976. The land acquired was highly concentrated in its distribution, for five purposes: forestry, wildlife, agriculture, parks, and water control. Specified multiple uses are allowed and encouraged on land under each category of management. Since purchase, the vegetative cover has been significantly altered on only a small proportion of the total area. The ALU and RFT programs have achieved their stated purposes for the most part. The LA program, however, did not in the main produce the benefits anticipated. All three programs have now been terminated and, with the present restraint in government spending, there is little likelihood of their being revived.

Carrier, R. 1979. "Un Projet Autogestionnaire: La Coopérative de J.A.L." Archives de Sciences Sociales de la Coopération. No. 47, January-March, 137-151.

Carrier describes the efforts of three submarginal villages in Eastern Quebec to survive by organizing the J.A.L. agro-forestry cooperative of Temiscouata. The persistent economic pressures on the "jalois" have prompted them to call for a new economic order in Quebec that would tolerate the survival of marginal communities.

Centre for Resources Development. 1977. The Evaluation of Alternative Methodologies for Rural Land Evaluation. Report prepared for Soil Research Institute, Research Branch, Agriculture Canada. Centre for Resources Development Publication No. 82. March. University of Guelph. Guelph.

In the third chapter of this book, a positive attitude is taken concerning the abandonment of marginal farm lands in Ontario and Quebec. The reverting of marginal land to rural non-farm uses is optimistically viewed in terms of the lands potential for forestry and recreation.

Centre for Resources Development. 1972. Planning for Agriculture in Southern Ontario. University of Guelph. Guelph.

This paper analyzes the spatial distribution of part-time farming in Southern Ontario, including those marginal agricultural areas of the southern tip of the Canadian Shield. High concentrations of part-time farming (townships with over 50 percent of farmers reporting off-farm work) were evident in the Shield area in both 1951 and 1966. While the highest rates of off-farm committment (largest numbers of days devoted to off-farm work) were in those regions in closest proximity to the major urban centres, the peripheral Shield farmers are increasingly responding to pressures of "the cost-price squeeze" by seeking supplemental income from off-farm sources.

Chapman, L.J., and D.M. Brown. 1966. The Climates of Canada for Agriculture. Canada Land Inventory Report No. 3. Revised 1978. Lands Directorate, Environment Canada. Ottawa.

This report is one of a series of Canada Land Inventory surveys carried out to determine land capability for various uses. The climate of the settled parts of Canada is analysed and classified using a reconnaissance approach.

Background information on weather conditions and climate is outlined in the first two sections, followed by the final section on land classification as it relates to field crops.

Clibbon, P.P. 1972. "Evolution and Present Patterns of the Ecumene of Southern Quebec." Studies in Canadian Geography: Quebec. Edited by L. Trotier and F. Gremier. pp. 13-30. University of Toronto Press, Toronto.

This paper gives particular attention to the agricultural ecumene of Southern Quebec, its evolution, present extent, and trends such as marginal farming and increasing land abandonment. Areas of marginal farmland are identified as those located on the outcropping slopes and in the course valleys of the interior Laurentians, on the uplands of Appalachian counties such as Mēgantic and Frontenac, and the outwash plains of northern Lake St. John, as well as on the

Abitibi clay plains. Within the St. Lawrence lowland the badly drained 'mer-flene' area of the south shore between Drummondville and Quebec is described as being unsuitable for agriculture.

The trend of marginal farmland retrenchment is one that will continue to accelerate as competing land use demands are put upon marginal acres, and as the forces that act to further render agriculture marginal become more accentuated.

Where urbanization growth is not the principle cause of marginal agriculture, the author suggests several solutions to the problems of Quebec's marginal areas. Regrouping of unviable farm holdings to form large pastures and similar agricultural projects that provide alternative employment opportunities for farmers can help make viable marginal operations. However, such projects are not always practical and it is anticipated that farm abandonment will continue nonetheless. Similarly, reforestation and recreational land use of abandoned land can offer only a partial solution to the large scale problem of marginal farmland in the province.

Comeau, J.E. 1974. "Northern Agriculture: Northern Ontario and Quebec." Agrologist. Vol. 3, No. 6, November-December, 18-22.

Clay Belt agriculture in northern Ontario and Quebec is reported upon in this article. Climate and soil are the two major limiting factors to agriculture in this region. However, experimental farms have shown that the agricultural potential of the clay belt is underdeveloped, and that high yields can be attained when effective management is undertaken.

The area is being farmed extensively at present, with low yields and poor returns the norm. Thousands of acres have been abandoned and are reverting to forest. Future success in agriculture can only be achieved through intensive farming practices, and this will require high capitalization, improved farm credit, more effective farm management, and better government planning.

Crabb, P. 1969. "Some Aspects of Agriculture in Newfoundland". Essay presented at the Canadian Association of Geographers Annual Conference held August, 1969 in St. John's, Newfoundland. Memorial University. St. John's.

Crabb describes the small agricultural industry of Newfoundland in this essay. Relative to the rest of Canada, Newfoundland's agriculture is a small-scale activity in terms of farm size, value of products marketed, mechanization and capital investment. Physical restrictions to agriculture include poor soil fertility and conditions, the harsh climate, and the geomorphology of the island.

Agriculture has traditionally been of a subsistence nature and supplementary to fishing and logging in the province. Certain trends of farm abandonment suggest that agriculture is in decline in many of the scattered farming areas. However, the province's agricultural potential is underdeveloped, and with the aid of governmental programs, the sector could become more efficient and prosperous. The answer seems to lie in larger, more capitalized farm units serving local markets.

Crown, R.W. 1976. "What Should be Done About Part-time Farming: Implications for Policy." Part-time Farming: Problem or Resource in Rural Development. Edited by A.M. Fuller and J.A. Mage. pp. 198-206. Geo Abstracts. Norwich, England.

Crown suggests that the best public policy with respect to part-time farming is one of "benign neglect"; a strategy that is indifferent to the part-time farming issue. Furthermore, present policies which have eligibility criteria referring to "bona fide" farmers, however defined, should be broadened to include anyone having an agricultural enterprise. Restricting program aid to bona fide farmers can, in some cases, prompt rural depopulation and counter rural development strategy.

Dalichow, F. 1972. Agricultural Geography of British Columbia. Versatile Publishing Company. Vancouver.

This book contains a region by region survey of agriculture in British Columbia, and supplies data on land use, land value, labour, capital investment, equipment, and production. Two themes that are developed are: physical geography as a natural limitation to agriculture; and the effects of human geography on the agricultural industry of British Columbia.

Dick, B.R. 1975. Agricultural Land: Its Use and Misuse. New Brunswick, Department of Municipal Affairs, Community Planning Branch. New Brunswick.

Described in this report are the mechanisms of land resource allocation in relation to their ability to produce maximum short-run and long-run benefits for society. Three major factors are attributed to the mis-allocation of agricultural land to other uses: the problems continue to advance (albeit at a reduced rate) a corollary follows: that optimum long-run land allocation must be responsive to increased demands for agricultural products and different production abilities.

The improper allocation of prime agricultural land will have several implications for marginal agricultural land use in the future. As more and more prime agricultural land is taken out of production for non-agricultural uses, such as urban development, farming will be pushed

into restricted areas of economically accessible land and into areas of marginal agriculture.

Agricultural production in these areas yields smaller supplies of products and involves greater costs than in prime agricultural areas. In turn, food costs will escalate as the process evolves.

Although such a course will push agricultural production onto more economically and physically marginal land, other forces operate to discourage production on marginal farms. If less than favourable conditions of farm size, capital, and management skills render a farm economically unviable, there is pressure for its abandonment.

Physically marginal acres are those most likely to be completely taken out of agricultural production in rural regions.

While it is probable that technological advancements will improve agricultural production on marginal land, the green revolution is slowing down and cannot be counted upon to solve all agricultural problems.

Enhances plant varieties, fertilizer, disease and pest chemical development, and improved management techniques will come to the aid of marginal farms. However, modern machinery is little suited for use on marginal land that is rocky, hilly, or wet, or on farms which are divided into small, irregular fields.

Dickinson, G. 1970. Socio-Economic Factors Related to Farm Size, Farm Income, and Efficiency of Orchardists. A.R.D.A. Socio-Economic Research Project/ University of British Columbia. Vancouver.

Sixty orchard operations in the South Okanagan Valley were analyzed in an attempt to integrate socio-economic characteristics of farmers with economic factors in an analysis of farm efficiency. Certain social characteristics of orchardists were found to be relevent to the variability of economic achievement in farming, especially those of age, experience, education, and contact with agricultural extension services.

Dilley, R.S., and T.F. Loghrin. 1975. "The Thunder Bay Community Pasture." Canadian Geographer. Vol. 19, No. 4, 299-307.

The Thunder Bay Community Pasture is a joint federal-provincial A.R.D.A. A scheme that was set up in the late 1960's help improve marginal farming in the area. Great strides have been made in farming of the pasture in the years since the land was first cleared and local interest in the scheme has outstripped its carrying capacity. However, persistent marketing difficulties

in this agricultural outlier add to the realm of physical problems inherent to marginal lands.

Donham, P.B. 1979. "The Low Road to Agricultural Oblivion." Harrowsmith. Vol. IV:3, No. 23, October, 53-55, 66.

Agriculture has long been a declining industry in the Atlantic provinces. In recent years, however, there has been somewhat of a local agricultural revival, arising from escalating transportation and energy costs. It is against such a background that the author writes of present-day threats to the viability of farming in the maritime provinces.

Donham describes the effect of competing land use values and inadequate land use controls, on both the 'bona fide' commercial farmer, and the small-scale subsistence farmer. Government efforts to curtail large-scale losses of agricultural land to non-resident buyers and other non-agricultural uses have not been altogether successful. Notwithstanding ineffectual land use regulations, the purchase of farmland by non-residents is slowing. According to the author, this recent trend is also attributable to the soaring costs of energy, which have discouraged non-residents, particularly Americans, from buying summer retreats that make long-distance travel necessary.

Ehlers, E. 1974. "Recent Trends and Problems of Agricultural Colonization in Boreal Forest Lands." Frontier Settlement. Edited by R.G. Ironside, et.al. pp. 60-78. Department of Geography, University of Alberta. Edmonton.

Ehlers gives support to the opinion that the future of agriculture in the marginal areas of the subarctic must be viewed with pessimism. His paper provides a general appraisal and comparison of the marginal agricultural development of land resources in the Great Clay Belt and Peace River county of Canada, parts of northern Finland and Alaska. These frontiers of agricultural settlement share similarities in their marginal nature for agriculture in respect to physical setting, climate, natural vegetation cover, geomorphology. However, differing processes of colonization have given rise to distinct agricultural practices. For instance, while Finnish legislation has maintained a traditional symbiotic relationship between agriculture and forestry, Canadian forests have been destroyed in the process of agricultural land settlement.

Ehlers discusses the economic aspects and trends of frontier agriculture in the Clay Belt of Ontario and Quebec, indicating that it is in a state of decay and retreat due to factors of unfavourable market conditions; agricultural mechanization (which establishes a minimum scale for economic viability); high costs of farm maintenance and development; increased need for costly inputs of fertilizer, pest control and machinery; increases in yields per unit of area and improved cultivation and harvest techniques in non-marginal areas.

The Peace River region differs somewhat in that the frontier is actually advancing by the expansion of existing farms and the colonization of new lands. Although this area is quite distinctive as the exception to the process of marginal land stagnation in the frontier, the author reiterates that agriculture is declining in economic importance, generally, for the marginal areas of the subarctic. In conclusion, he suggests that alternative land uses be considered for previously cleared land that is abandoned.

Ehrensaft, P. 1976. "Canadian Agriculture and the Political Economy of the Biosphere." Alternatives. Vol. 5, No. 3-4, 36-52, 62.

The political economy of Canadian agriculture is reviewed with a historical perspective, using concepts of colonial annexation, European heartland, corporate capitalism and food power strategy.

Ehrensaft contends that the agricultural revolution has separated agricultural practices from environmental constraints, and has imposed an alien technology on a landscape unsuitable for that kind of impact.

Elliot, B. 1974. "Northern Agriculture: The Peace River Area." Agrologist. Vol. 3, No. 6, November-December, 9-11.

The Peace River area is a good example of a physically sub-marginal region where prosperous agriculture has been achieved of a total area of over 40 million acres, about half is potentially arable, and 5 million are cultivated. An additional 13 million acres have potential for livestock grazing.

The agricultural economy of the Peace River area is described in this article, as well as the challenges of its future.

Environment Canada. 1976. Land Capability for Agriculture: A Preliminary Report. Canada Land Inventory Report. Lands Directorate. Ottawa.

The significant facts which have resulted from Canada Land Inventory data analyses are highlighted in this report of the series.

Marginal land for agricultural production is defined as that land having Class 6 soils. This class of land makes up one and one-half percent of Canada's land area, but is generally not in agricultural production.

Environment Canada. 1972. Soil Capability Classification for Agriculture. Canada Land Inventory Report No. 2. Lands Directorate. Ottawa.

Since it was first published in 1965, this classification system of soil capability for agriculture has been extensively applied throughout Canada. Other countries have also considered the C.L.I. system as a model in developing soil classification schemes of their own.

This report describes the seven soil capability classes and thirteen capability subclasses of the Canada Land Inventory. Guidelines for placing soils in classes and subclasses are outlined in an appendix to the report.

Erskine, D. 1968. "The Atlantic Region." Canada: A Geographical Interpretation. Edited by J. Warkentin. pp. 231-280. Meuthen. Toronto.

Fairbairn, K.J., and R.G. Ironside. 1974. "An Appraisal of the Public Component of the Peace River Regional Economy." Frontier Settlement. Edited by R.G. Ironside, et.al. Department of Geography, University of Alberta. Edmonton.

This paper describes the role of federal, provincial, regional and local governmental expenditures in the development of the Peace River Regional Planning Commission region. The absolute and relative size of these expenditures are indicated. Public monies constitute the second highest net inflow to the region relative to the basic economic sectors, specifically agriculture, forestry, mines, quarries and oil wells, and manufacturing.

The Peace River region is primarily an agricultural and extractive one, and the importance of agriculture as an economic base has been sustained, though it is, at present, expanding at a reduced rate. With the exception of agriculture, the returns to the region from enterprises in the various sectors is low compared to the inflow of government monies. However, the impact of these expenditures would be greater if there was a co-ordinated provincial plan for public investment related to an overall regional development policy.

Flower, D.J. 1972. "Changing Farm Patterns in the Southern Prairies of Canada." Paper submitted to the 22nd International Geographical Congress, Canada. International Geography 1972. Edited by W.P. Adams, and F.M. Helleiner. pp. 718-720. University of Toronto Press. Toronto.

An examination of various farm categories represented in the Medicine Hat region of Alberta indicates various problems of adjustment that farmers face in view of difficult natural and

economic circumstances.

The future of the small farmer in this drier area of the Prairies is especially uncertain, and substantial adjustments in farming patterns need to be made if such farmers are to survive.

Fobes, W. 1974. "Part-time Farmers: The Forgotten Men." Axiom. Fall, 34-35.

It is the author's contention that the time has come for part-time farming to be "legitimized" in Canada. Fobes argues that government programs, such as farm enlargement schemes, support the institutional concept of the full-time "bona fide" farmer and often result in an inefficient allocation of resources. After reviewing the concept of "bona fide" farming, and questionning its value, Fobes concludes that part-time farming should be "legitimized" in order to promote a more efficient allocation of resources, and more populated rural communities.

Fortin, G. 1962. "La Détermination des Zones Agricoles Sous-Marginales." Agriculture. Vol. 19, No. 1, 16-21.

In this early paper, the author defines the concepts of marginal farm, submarginal farm and commercial farm, outlining several criteria which can be used to determine marginality of agriculture. Fortin suggests that, in order to better analyse the problems of marginal and submarginal farms, their location and extent in particular zones or areas must be identified and mapped.

Francis, R.J. 1970. "The Significance and Usage of the Term Marginal in Fringe Settlement Studies." Geographica. Edited by H.D. Foster. pp. 23-40. Western Geographical Series. Vol. 2. University of Victoria. Victoria.

Francis discusses ideas of marginality in the context to fringe settlement regions. The usages of the term to describe locational, physical, economic, and social conditions are explored and clarified in this review of relevant North American literature.

Governmental land use reports and regional case studies frequently are concerned with physical marginality of land resources, most particularily agricultural resources. Geographical studies also deal with themes of physical marginality, locational marginality and limits to agricultural production in fringe and frontier regions. Similarly, another traditional approach to agricultural marginality is one that refers to ecological and environmental limits of production.

Non-ecological circumstances of marginality include adverse conditions which affect support facilities in fringe settlements. Economic marginality can refer to costs incurred in fringe areas of overcoming problems of distance from markets, the lack of economies of scale, and the need for public investment and subsidy. In addition, the term economic marginality is used in the context of low levels of return to investment on farms operating at, or near the subsistence level, and with reference to capital deficiency of farm operations.

Social marginality pertains to the availability of social services and amenties, and the social characteristics of human resources in fringe settlement areas.

In conclusion, the author asserts that the different ideas of marginality can aid in the identification and understanding of problems in areas of fringe settlement.

Friedmann, J. 1972. Urbanization, Planning, and National Development. Sage Publishers. Beverly Hills, California.

Friedmann's heartland-hinterland paradigm and general theory of polarized growth is presented in this text. Heartlands are defined as territorially organized subsystems of society that possess a high capacity for generating innovative change. Hinterlands are all the regions peripheral to the heartlands whose growth and change depends upon their relationship to the heartlands.

Agricultural regions are found in the hinterlands, which according to Friedmann, can be categorized as either upward transitional areas, downward transitional areas, resource frontiers or special problem areas. The economic weakness of the latter three categories of marginal regions contrasts most sharply with the locational advantage of growth centres or heartlands.

Fuguitt, G.V. 1975. "Critique: 'A Typology of Part-time Farming' (J.A. Mage) and 'The Problems of Part-time Farming Conceptualized, (A.M. Fuller)". Part-time Farming: Problem or Resource in Rural Development. Edited by A.M. Fuller and J.A. Mage. pp. 57-62. Geo Abstracts. Norwich, England.

In his critique of Fuller's paper, "The Problems of Part-time Farming Conceptualized," Fuguitt points out the subjectivity of perceiving a 'subsistence' level of income. Fuller had suggested that a farmer makes the decision to farm part-time out of necessity or by choice, and that choice described behaviour based on more than subsistence income considerations. It is Fuguitt's observation that while one farmer may feel forced to supplement his income, another farmer in the same circumstance may be willing to subsist at that income level.

Fuller, A.M., et.al. 1977. A Directory of Part-time Farming Studies. Vol. 1. North America and Western Europe. Department of Geography, University of Guelph. Guelph.

The six sections to this volume are:

1) published bibliographies and comments on research trends: pre 1965;

2) names of contributors and authors;

3) annotated bibliography of part-time farming studies since 1965;

4) bibliography of other studies since 1965;

5) detailed description of research in progress;

6) and a classificatory index to the studies cited.

Fuller, A.M. 1976. "The Problems of Part-time Farming Conceptualized." Part-time Farming: Problem or Resource in Rural Development. Edited by A.M. Fuller and J.A. Mage. pp. 38-56. Geo Abstracts. Norwich, England.

Having recognized that part-time farming is a heterogeneous phenomenon in agriculture, Fuller undertakes to sort out the kinds of problems and their implications that the various part-time farming groups pose, in relation to programs for rural development and agricultural adjustment.

Fuller contends that the basis for understanding the problems associated with part-time farming is in the motivational behaviour of farmers. Two basic decision-making stimuli are identified: 1) the need to supplement family income out of necessity because of marginal opportunity; and 2) the pursuit of opportunity maximization through individual choice. The decision to farm part-time is largely determined by one or the other of these factors.

A survey of 187 part-time farmers in Hastings County, Ontario, revealed that poor structural attributes of farms (marginal physical quality, or small farm size) afforded 47 per cent of all farmers only a marginal opportunity to farm. Such marginal farm units require low work commitments and thus farmers choose to part-time out of necessity. Fuller points out that the low farm work requirements of marginal areas is likely a good resource allocation, whereas adjusted farm work by choice to accomodate an off-farm job in a good agricultural area presents a less desirable situation. Another relevant situation which causes concern is that where a part-time farm unit (that provides less than a 250 day year's work for the farmer) is run full-time by the underemployed operator who chooses not to hold a second job.

Further on the subject of marginal farm practices and structure, Fuller suggests that a severe underutilization of land resources occurs when a high concentration of part-time farmers operate farms requiring less than 100 days/year work commitment in an area. For example, Fuller's survey included 30 such operations (requiring less than 100 days of work per year), of which 73 per cent recorded a deficit at the end of the survey year, 40 per cent of which had net losses of over 200 per cent.

Whether or not part-time farming constitutes problems or resources in rural development depends primarily upon the rural location where it occurs. Fuller defines three generalized spatial contexts of part-time farming: 1) the marginal rural area with poor physical resources for agriculture, low market opportunities, and an aging population; 2) the ongoing agricultural area where conditions for viable farming are favourable; and 3) areas in the urban shadow which may have either or both of the above traits.

Part-time farming as a resource in terms of marginal agricultural zones is conceptualized by the author as a process which serves to maintain the land in agriculture, where it otherwise might have been abandoned. Part-time farming might also, in some cases, provide a stimulus to a suffering local economy by infusing capital and innovation into it. Part-time farming can also function as a selective process in the withdrawal of marginal lands from agricultural production.

While part-time farmers may stimulate community development in marginal areas, economic costs of servicing the dispersed communities may cause serious problems, and in areas of prime agricultural land part-time farming may serve to underutilize the available resources.

Fuller, A.M., and J.A. Mage eds. 1976. Part- time Farming: Problem or Resource in Rural Development. Proceedings of the First Rural Geography Symposium held June 18-20, 1975. Geo Abstracts. Norwich, England.

This book of symposium proceedings presents a series of papers intended to deal with the following issues:

1) the identification of who are the part-time farmers;

2) the assessment of whether part-time farming represents a problem or resource;

3) the identification of the relationship between new farmers and part-time farming; and,

4) the identification of policy implications of part-time farming.

The part-time farming phenomenon is interpreted with reference to areas in North America, most particularly Canada, and regions of Europe. (Individual papers are identified separately.)

Fuller, A.M. 1970. "The Part-time Farm Problem: A Scheme for Geographers." Paper presented to the Annual meeting of the Canadian Association of Geographers held June 1970 at the University of Manitoba. Winnipeg.

Fuller contends that the study of part-time farming should first address whether or not a farm operation requires a full man-year of labour. After this factor is determined, the reason for part-time farming will become apparent, be it from "necessity" or for "opportunity". Thus, the operation of uneconomic farm units tends to necessitate part-time farming and off-farm employment.

Galloway, J.I. 1975. "The 'Persistent' Part-time Farmer." Paper presented to the Regional Conference of the Canadian Association of Geographers held March 1975 at Carleton University. Ottawa.

Surveys conducted in Lambton, Dufferin, and Hastings Counties, and the Rainy River district of Ontario show that 50 percent of the part-time farmers are 'persistent', having farmed part-time for six or more years.

Gartner, G.J. 1968. "Development and Adjustment Policy for a Low Income Farm Area." Canadian Journal of Agricultural Economics. Vol. 16, No. 1, 21-28.

The focus of this article is on the low income problems of the Broadview Development Area of southeastern Saskatchewan. A variable resource planning technique is analyzed as a tool for determining optimal resource allocation in a low income area.

Gruber, S.J. 1971. "An Analysis of Agricultural Adjustment Through Multiple Job Holding." Unpublished MSc. Thesis, Department of Agricultural Economics, University of Guelph. Guelph.

Based on a 1971 survey of 100 farms in Grey County, Ontario, Gruber concludes that multiple jobholding has a higher incidence for farm operators with small gross farm sales, as well as for younger operators, operators with other special training, and farmers with beef operations as opposed to those with dairy farm operations.

Gruber cites two American studies to suggest that while periods of most rapid entry into

part-time farming have in some cases corresponded exactly with periods of sharpest reduction in total net farm income, multiple jobholding is not, in fact, a function of low net farm income.

Gunn, T.C. 1978. "Part-time Farming in Nova Scotia." Canadian Farm Economics. Vol. 13, No. 5, October, 25-41.

Part-time farmers make up a significant part of Nova Scotia's agricultural sector in terms of numbers, resource use, and farm sales. The author describes various socio-economic characteristics of the province's part-time farmers in summarizing the results of a study initiated by Agriculture Canada in 1976.

An analysis of the problems associated with part-time farming reveals that farming operations must be upgraded if economic returns are to be improved. However, such farm improvement is difficult in view of the provincial and federal government assistance programs, which are biased towards the 'bona-fide' full-time farmer.

Hall-Beyer, B. 1976. "Back to the Yukon (and Back): Fighting Wolves, Frost, Impoverished Soil and the Federal Bureaucracy." Harrowsmith. Vol. 1, No. 4, November-December, 40-45.

Only four square miles of farmland were reported in the Yukon for the 1971 Census, and, of the twelve genuine farms there, only three had annual sales of over $2,500.

Indeed, few attempts at farming are successful in the territory, where the poor soils and harsh climate impede production of all but the hardiest of crops and livestock.

Having had two years experience as manager of a farming project in the Yukon, the author describes with authority the limitations of northern agriculture. An exacting picture is drawn, in this article of the physical, economic and political constraints to farming in the Yukon. One learns much about the burden of extra-high costs for farm inputs such as fertilizer and feed grains, and of the added risks of raising goats or cattle as opposed to chicken, sheep, or rabbits.

Harris, R.E., and A.C. Carder. 1975. Climate of the Mackenzie Plain. Agriculture Canada Publication No. 1554. Ottawa.

This publication describes the climatic features of the Mackenzie River plain of northern Alberta and the Northwest Territories with respect to the region's agricultural potential. Weather conditions favourable for crops growth include warm summer temperatures, low wind speeds, and stable, protective winter snow cover.

Those conditions which impose constraints to crop and livestock production are: the short growing season, frequent summer drought, unseasonable killing frosts, wet autumns and severely uncomfortable winters.

Harris, R.E., et.al. 1972. Farming Potential of the Canadian Northwest. Agriculture Canada Publication No. 1466. Reprinted 1972. Ottawa.

This publication is designed to help prospective farmers assess the viability of their plans to farm in northern Alberta, British Columbia and the Northwest and Yukon Territories. Research results from experimental farming stations are summarized, as well as information about the experiences of pioneer farmers in the Northwest. Data on climate and soils, and crop and livestock production are outlined in terms of agricultural opportunities and constraints.

Harrison, P. 1975. "Agricultural Land Use in the Ville-Marie Region." Geoscope. Vol. 6, No. 2, November, 1-9.

Harrison incorporates the results of a sample survey in this examination of agricultural land use in a physically marginal area of northwestern Quebec.

Heighton, V.A. 1970. Canadian Agriculture: A Synposis of Statistical Data Assembled to Study Structure and Capacity. Economics Branch. Agriculture Canada. Ottawa.

Using Census data on off-farm work for the years 1961 and 1966, Heighton defines sub-provincial areas of off-farm work by farm operators on the basis of farm relation to urban markets, and on the basis of soil types in the Prairie provinces.

Overall, the number of part-time farmers increased from 1961 to 1966 in Quebec, Ontario, and the Prairie provinces, most particularily in areas in the urban fringe and regions defined as either "market central" or "market outlying". In the Maritimes, and British Columbia the decrease in reported off-farm work was least in areas in close proximity to reported off-farm work in markets.

Generally, the peripheral and marginal agricultural areas were not consistent throughout Canada. A decline in the average number of days of off-farm employment for these areas showed up in the Maritimes, Quebec and the "Parkland" soil regions of Manitoba. The peripheral and physically marginal areas of Quebec, Manitoba, Saskatchewan, Alberta and British Columbia showed increased numbers of operators reporting off-farm work between 1961 and 1966, though the average days of off-farm work may have decreased. Average days decreased in general due to the increased

numbers reporting small number of days of off-farm work.

Herndier, G.W. 1973. An Evaluation of the Effectiveness of Part-time Farming as an Adjustment Vehicle. Unpublished M.Sc. Thesis, University of Saskatchewan. Saskatoon.

The author notes that almost all of the research on part-time farming has been done in areas having high concentrations of part-time farms. These areas of high concentrations have either of the following characteristics:

1) The farms are small and subsistent marginal operations, having generally infertile soils, or geographic features discouraging viable farming. The operators farm part-time and supplement low farm incomes from off-farm work out of necessity.

2) Farming conditions may be satisfactory, but certain "pull" mechanisms attract farmers to off-farm work in areas where industrial development has a high concentration.

Herndier found that the major barrier for part-time farmers in finding off-farm employment was their lack of marketable skills such as "education and formal training, age, skills and experience".

Hills, A. 1948. "Rural Settlement in the Great Clay Belt of Northeastern Ontario." Annals of the Association of American Geographers. Vol. 38, No. 1, 61-62.

This early paper examines the difficulties in using the clay belt land for agricultural development. The settlement history and evolution of agriculture is described for this marginal farm area.

Hoyt, P.B., M. Nyborg, and D.C. Penney. 1974. Farming Acid Soils in Alberta and Northeastern British Columbia. Agriculture Canada Publication No. 1521. Ottawa. 1974.

The problem of soil acidity in Alberta and northeastern British Columbia causes low crop yields on farms each year. This publication describes the effect of soil acidity on certain crops and indicates how liming is a practical economic solution to low crop yields. Research data from small-plot experiments are given.

Ironside, R.G., et.al. ed. 1974a. Frontier Settlement. Papers presented at an International Geographical Union Symposium held August, 1972 in Edmonton and Saskatoon. Department of Geography, University of Alberta. Edmonton.

A series of revised papers from a Symposium on 'Frontier Settlement on the Forest-Grassland Fringe' are presented in this volume. Nine papers are related to frontier settlement of North America, of which six are specific to Canada.

Four themes are focused upon: 1) population dynamics in frontier areas; 2) frontier retreat 3) the character of contemporary frontier advance, and 4) the diversity of agencies in frontier development. (Individual papers are listed separately).

Ironside, R.G., et.al. 1974b. "Frontier Development and Perspectives on the Western Canadian Frontier." Frontier Settlement. Edited by R.G. Ironside, et. al. pp. 1-45. Department of Geography, University of Alberta. Edmonton.

This paper specifically outlines the various issues apparent with frontier settlement and development in Northern Saskatchewan, and Northern Alberta. The authors introduce the reader to the western Canadian Frontier by providing a historical perspective to its settlement, and by discussing the climate, soils and vegetation of the frontier. Socio-economic characteristics of these marginal lands are described with reference to government land policy. A sector by sector analysis of the economic bases is given, including agriculture, lumbering and forest production, mineral extraction and the energy industries, commercial fishing, trapping and hunting, the secondary manufacturing industries and the service activities.

Agriculture in the western frontier has evolved from subsistence operations to a mixed farming economy that is export oriented. Generally, the same crops that are grown in southern areas make up the staple export products in both the better farming areas and the physically marginal ones. Livestock production is underrepresented in the larger area, Prairie region, and this is most likely because of the farmers' desire, and perceived need to supplement farm income from off-farm sources thereby making difficult the keeping of livestock.

The authors indicate two related problems associated with marginal frontier farm operations.

The first issue involves the emphasis placed on cereal, especially wheat, production on northern farms. The authors contend that a diversification of enterprise, and increased production of higher valued products would help overcome the problem of high transport costs and economic disadvantage compared with southern producers located nearer to markets. Similarly, the second issue relates to the tendency of farmers to shy away from beef production. Beef production is, at present, far less than the frontier region has potential for. Provincial agricultural programs could be very useful in the encouragement of more profitable farm operations by giving capital aid for the production of beef.

Other issues which relate to marginal farming on the western frontier include small farm size, rural poverty and government homesteading projects, and the viability of continuing frontier agricultural development. The authors raise the question as to the need for frontier agriculture in view of the increased and intensified production capabilities of prairie farms south of the frontier. However, frontier agriculture does have an important role as the major economic activity for most of the population, and in sustaining local economies.

Ironside, R.G., et.al. 1974c. "Discussion and Conclusion." Frontier Settlement. Edited by R.G. Ironside, et al. pp. 262- 274. Department of Geography, University of Alberta. Edmonton.

In their discussion of papers presented at the Symposium on "Frontier Settlement in the Forest-Grassland Fringe", the authors reiterate several salient agricultural characteristics of the Canadian forest - grassland frontier. On the theme of the retreat of farm settlement, certain agricultural problems became apparent concerning areas capable of subsistence and limited commercial farming. These marginal areas have inadequate resources and organization to sustain economically viable farming by present standards. Although farm depopulation is occurring in the frontier, much of the farm land is remaining in use. The availability of off-farm work has been related to the success of farming in some areas. Farm size expansion and diversification of farming practices from growing cereals to beef production, oil seeds, honey or forage seed production have also improved the viability of some farms. These trends indicate that other sectors must develop in order to provide indirect support to farming and agricultural expansion along the frontier. Even in the fairly prosperous agricultural region of the Peace River, farming by itself cannot sustain the economy - public expenditures and non-agricultural economic activity in this region are moreover responsible for maintaining the population. The presence of physically cultivable land cannot in itself curtail the retreat of the agricultural frontier, or ensure economically viable agriculture.

Ironside, R.G. 1970. "Planning for Rural Development: Census Divisions 12 and 14 in Alberta." Geographica. Edited by H.D. Foster. pp. 41-55. Western Geographical Series. Vol. 2. University of Victoria. Victoria.

The objective of Ironside's paper is to indicate gaps in the information on spatial aspects of rural poverty in Canada, and suggest research proposals which would be useful for rural planning. In a brief review of literature, Ironside illustrates how most research had been landuse oriented and descriptive (and neglectful of economic and social statistics) prior to the time of his report.

With reference to A.R.D.A. field surveys for Census Divisions 14 and 12 in Alberta, it is suggested that there is a great need for analytical work on the impact of distance to markets,

scale, and location on rural poverty in physically and economically marginal areas. Numerous other basic statistics should be gathered for areas smaller than the census division, and the carrying out of mapping and statistical techniques would have utility in rural planning. This is especially the case for planning decisions concerned with public investment - what kind of investments, in which projects, in what locations.

J.A.L., Collectif de Travailleurs. 1979. "Le J.A.L. Par Ses Travailleurs." Archives de Sciences Sociales de la Coopération. No. 47, January-March, 127-136.

J.A.L. is a cooperative community that was created by the people of three marginal villages in Eastern Quebec: Saint-Just, Auclair, and Lejeune (hence, J.A.L.). J.A.L. includes several forms of cooperatives.

In this paper the J.A.L. community members describe their cooperative movement and the problems they face in view of persistent economic and social pressures inherent to free enterprise systems. They contend that the socio-economic order of Quebec creates marginal communities, and, therefore, should be changed.

Johnston, A., and S. Smoliak. 1976. "Canada's Pasture Potential." Canadian Farm Economics. Vol. 11, No. 2, April.

Interest in forage production for livestock feed has grown in recent years in response to increasing world grain prices. The authors advocate the production of forage on marginal lands unsuitable for crop production and estimate that there are 22 million acres of range and marginal cropland in the Prairie region that is especially suitable in economic terms, for forages.

Other regions of marginal agriculture are discussed and rejected for their forage potential.

Jones, W.D., and Fu-lai Tung. 1977. "A Regional Comparison of Structural Change and Resource Use in the Canadian Farm Industry 1961-1971." Canadian Farm Economics. Vol. 12, No. 5, October, 20- 31.

Using census data from 1961 to 1971, the authors analyse structural changes of Canada's farm industry and the impact of change on resource use. Farm numbers have been decreasing across the country while average farm size and use of resources have increased. These changes have occurred at unequal rates among regions and farm-size classes.

The proportion of farm sales attributable to small farms in relation to large farms indicated that there are economies of size on the larger farms. The incidence of part-time

farming increased for all farm-size classes, but was highest for the smaller size classes.

The differences in resource use and growth rates between regions and farm-size classes is expected to continue and if so, a more divergent and regionalized farm industry structure will result.

Kent, J. 1966. "Agriculture in the Clay Belt of Northern Ontario." Canadian Geographer. Vol. 10, No. 2, 117-126.

The agricultural characteristics and farming history of the submarginal clay belt is discussed for the area stretching from Hearst to New Liskeard, including the communities of Kapuskasing, Cochrane, and Timmons, Ontario.

Lamont, G., and V.B. Proudfoot. 1974. "Recent Changes in Population in Northern Saskatchewan and Alberta." Frontier Settlement. Edited by R.G. Ironside, et. al. pp. 92-112. Department of Geography, University of Alberta. Edmonton.

Lamont and Proudfoot analyse population changes for the decade 1961-1971 in northern Saskatchewan and Alberta using census data. One third of the total population live on farms, though there has been a general decline in the farm population and a 20 percent decline in number of farms over the ten year period. This loss in farm population is accounted for by people abandoning agriculture, mostly older persons retiring. An enlargement of farm size has accompanied this trend. While this rural depopulation has been most marked in the older settlements, and in the central area of the Peace River region, relatively small increases of population has occurred along and consolidated the agricultural fontier.

The limits of agaricultural settlement have not been extended to any great degree except in the Peace River region.

Since 1961, there has been an increase in total area farmed of 23 per cent in northern Alberta, and just less than 5 per cent in northern Saskatchewan. Improved farmland has increased, most particularly along the frontier of settlement.

Both provinces have attempted to improve the viability of agriculture with governmental programs of small farm consolidation and enlargement. Other A.R.D.A. programs have attempted to discourage agricultural settlement from more physically marginal areas, such as Census Division 14 in western Alberta.

Future development of the forest and extraction industries is likely to provide farmers with some increased opportunities for off-farm work.

The authors also discuss the hierarchy of rural service centres and regional centres in this paper.

Langmann, R.C. 1975. Poverty Pockets: A Study of the Limestone Plains of Southern Ontario. The New Canadian Geography Project. McClelland and Stewart. Toronto.

Poor economic characteristics of this limestone landscape in Southern Ontario reveal distinct regional disparities. This book is a study of the pockets of rural poverty in the shallow soil regions of the Limestone Plain.

Laut, P. 1974. A Geographical Analysis and Classification of Canadian Prairie Agriculture. Manitoba Geographical Series 2. University of Manitoba. Winnipeg.

Laut employs a computer-based classification technique to determine agricultural regions in the Prairies. A series of maps illustrate the distribution of variables selected to characterize and measure Prairie agriculture.

Techniques of principal component analysis and cluster analysis are used for this regional approach. Laut's treatment of quantifiable variables results in a set of regions having a high degree of internal homogeneity in terms of physical and socio-economic characteristics, or influences.

Laut, P. 1973a. "The Development of Community Pastures in Saskatchewan: A Case Study in the Development of Land Policy." New Themes in Western Canadian Geography: The Langara Papers. Edited by B.M. Barr. B.C. Geographical Series. No. 22. Tantalus Research Limited. Vancouver.

see also

Laut, P. 1973b. "Public Policy and Marginal Land Resource Utilization - The Development of the Community Pastures System in Saskatchewan." Paper presented at the Annual Meeting of the Canadian Association of Geographers held May, 1973 at Thunder Bay.

In both these papers, Laut describes the evolution of the Community Pastures system in Saskatchewan between 1908 and 1969. The concept "community pasture" is explored along with the development of Prairie Farm Rehabilitation Act (P.F.R.A.) Pastures in conjunction with the Land Utilization Board, Provincial, Pastures, and the Cooperatives.

Since the late 1930's about 3.05 million acres of land regarded as submarginal for arable farming were incorporated into these three types of pastures. However, in recent years the economic efficiency of community pastures has been questioned, and the rate of their expansion is slowing. It seems likely that the community pasture system of Saskatchewan is at or near its peak of development.

Laut, P. 1973c. "Agricultural Research on the Northern Margins of the Ecumene." Developing the Subarctic. Edited by J. Rogge. pp. 67-90. Manitoba Geographical Series 1. University of Manitoba. Winnipeg.

From his study of agriculture and agricultural research in Canada's northern fontier, Laut concludes that the time has come for governments to begin planning for future agricultural development of more marginal environments.

In the first section of this paper, Laut suggests two approaches which might be undertaken to efficiently expand northern agriculture. He then analyses the different factors of climate which contribute to agricultural marginality. A third section examines past trends of agricultural settlement along Canada's frontier using census data. The final section describes research programs which have been carried out in the past, or are on-going in the study area.

Lerner, A. 1976. "Classifying Part-time Farmers for Agricultural Policy Purposes." Unpublished paper, University of Guelph. Guelph.

This paper reviews the conditions of eligibility that are stipulated in provincial agricultural programs with reference to full or part-time farm operation, size of farm sales and net farm income and assets. Most government programs apply only to bona fide full-time farmers, though the criteria for distinguishing this group are often vague and uncertain.

The author suggests that, in some cases, multiple jobholding makes for the most efficient use of resources, and, therefore, the difference between full and part-time farms and full and part-time farmers should be considered for agricultural policy purposes.

Lill, W. 1979. "Working for the (Corporate) Man." Harrowsmith. Vol. IV:3, No. 23, October, 56-57, 67-68, 97.

New Brunswick potato farmers are struggling to survive the cost-price squeeze that is fracturing their net incomes and driving them into debt. Fluctuating trends in potato pricing and uncertainty in the market threaten the livelihood of farm families. Thousands have abandoned their land, having found potato farming economically unviable.

It is against this background of small-scale farm retrenchment that large-scale corporate farming of potatoes is expanding.

Mage, J.A. 1976. "A Typology of Part-time Farming." Part-time Farming: Problem or Resource in Rural Development. Edited by A.M. Fuller and J.A. Mage. pp. 6-37. Geo Abstracts. Norwich, England.

In this paper, Mage presents a methodology to identify general factors associated with the regional distribution of part-time farming, along with the results of an analysis which indicates who part-time farmers are.

The regional analysis shows the following 3 main factors to vary positively with the degree of part-time farming throughout the counties of southern Ontario: 1) socio-economic characteristics depicting low farm income and aging farmers; 2) structural variates indicating small farms and few acre enterprise type; and 3) intensity of urbanization.

Based on a micro-level approach to identifying part-time farmers, Mage presents and describes six groups of part-time farming types for Waterloo County. These farming groups are: 1) small scale hobby and miscellaneous situation; 2) the aspiring element situation 3) the part-time farming persistence situation 4) the sporadic part-time situation 5) the prosperous large scale hobby situation; and 6) the unique situation.

In conclusion, Mage cautions that while such typologies are derived from measurable data associated with objective socio-economic characteristics of the farmer, and structural attributes of the farm operation, one must incorporate more subjective elements such as motives, aspirations and needs in the interpretation of part-time farming situations.

Mage, J.A. 1973. "Economic Factors Associated with Part-time Farming in Southern Ontario and Waterloo County." Paper presented to the Geographical Inter-University Resource Management Seminar held October 1973 at Waterloo Lutheran University (University of Waterloo). Waterloo.

Using regression analysis, Mage compares the percentage of farms classified as part-time in 1966 in each county in Ontario against the percentage of small scale farmers in each county. Some counties in Eastern Ontario, where off-farm opportunities are poor, showed an overprediction of off-farm work based on farm scale.

The 1966 Census defined a part-time farmer as an operator receiving $750 or more from off-farm work, or working 75 days or more in off-farm employment during the past 12 months.

Small scale farms were defined as units with gross farm sales of less than $2,500.

Manitoba. Department of Agriculture. 1975. In Search of a Land Policy for Manitoba: A Working Paper. Winnipeg.

The main concern of this working paper is with farm land issues of political interest in Manitoba. Of particular importance are issues of rising land prices and foreign ownership of agricultural land, and their socio-economic effects on rural Manitoba.

An introductory chapter describes the objectives of public land policy, and further defines certain goals for rural development in Manitoba that can be achieved through land policy. Undesirable developments that are counter to these goals are also identified. The second chapter outlines recent trends in absentee ownership of farmland, followed by a third chapter which discusses land prices. A final chapter deals with the structure of the agricultural industry and land ownership in Manitoba.

Three appendices accompany this report: the first discusses policy controls on land use and land ownership for eight Canadian provinces; the second appendix provides statistics of land ownership for Manitoba municipalities; and the third appendix gives the statistics of land purchases by groups of residents, non-residents and foreign buyers over a 30 month period for rural municipalities in Manitoba.

McClatchy, D., and C. Campbell. 1975. "An Approach to Identifying and Locating the Low-Income Farmer." Canadian Farm Economics. Vol. 10, No. 2, April, 1-11.

The objective of this paper is to find a method of determining who and where low income farmers are. It is suggested that it is impossible to accurately identify and locate low income farmers on a national scale using current available data: this finding has important implications for government programs designed to assist low income farmers.

In order to measure real farm family income from all sources, five components are included: real capital gains on farmland; rental value of farm house; value of food and farm produce consumed by the farm family, off-farm family income; and net farm cost income after farm expenses.

McCuaig, J.D., and E.W. Manning. 1981. Agricultural Land Use Change In Canada: Process and Consequences. Land Use in Canada Series No. 21. Lands Directorate. Environment Canada.

This paper, using a new, census based data set gives changes over time in the use of land

in the agricultural districts of Canada. The paper differentiates between the retreating agricultural market and the advancing frontiers of agriculture on the basis of rates of change in area in use and under improved agricultural practices. While the paper focuses on the processes of agricultural land use changes in the agricultural heartland, a large amount of data is provided on such factors as changes in acreage size of farm unit, changes in capitalization per farm and per unit area, and rates of farmland abandonment, as well as the relationship between land quality and land use in heartland and marginal regions. Examples of the Gaspé region and Northern New Brunswick, where over half of all farmland was abandoned from 1961 to 1975 are given and related to other variables at a regional scale. The Peace region on the advancing frontier is also broken out for specific statistical presentation.

Myrdal, G. 1957. Rich Lands and Poor: The Road to World Prosperity. Harper and Brothers Publishers. New York.

Gunnar Myrdal's renowned treatise discussing circular and cumulative causation and its consequences for economic systems is stated in this book.

Put simply, Myrdal's principle is that circular and cumulative processes work in both positive and negative directions to further intensify the disparities between regions or between countries. A poor region is caught in the 'vicious circle' of poverty, where one negative factor is both cause and effect of other negative factors. At the same time, more prosperous regions gain further advantages when positive factors give rise to others through the process of circular and cumulative causation.

Myrdal uses the term "backwash effect" to describe the adverse changes in a locality that are caused by economic expansion in another locality. Circular causation in a cumulative process eventually leads to the drain of resources from the disadvantaged to advantaged locality if left unchecked. Included as backwash effects are the consequences of out-migration of human and capital resources, as well as the effects of trade and social amenity deficiencies.

Countering backwash effects are certain "spread effects", which, if strong enough, can cause a new momentum of economic expansion from the advantaged centre to the disadvantaged locality. Poorer agricultural regions can thus benefit from the opening of new markets for their products in nodal centres of expansion.

However, Myrdal also states that since industralization is the dynamic force behind economic development, poorer agricultural regions often remain disadvantaged. He continues by stating that, "In these regions, also, not only manufacturing industry and other non-agricultural pursuits but agriculture itself show a much lower level of productivity than in the richer regions."

Noble, H.F., and J.M. Purvis. 1973. A Socio-Economic Study of New Farm Operators in Eastern Ontario. Ontario Ministry of Agriculture and Food. Toronto.

This study follows up on two earlier surveys carried out by Noble for the Ontario Ministry of Agriculture and Food in 1965, and 1967. Between 1963, when the original survey was done, and 1970, the percentage of off-farm work reported for both part-time and full-time farm operators increased. Farm acreage and gross sales increased during this period on the farms operated by new farm families. Despite this increase in farm acreage, gross sales, and substantial farm consolidation, the 1970 level of net farm income was considerably lower than in 1963, indicating a declining economic viability for farming in the area surveyed.

Normandeau, A. 1978. "Organisation Territoriale et Agriculture au Québec." Bulletin de l'Association de Géographes du Québec. No. 17. Trois-Rivières, 25-37.

Large regional disparities exist with the agriculture in Quebec due to the disparate farming practices and conditions in different regions. Under-utilization of resources and competing land uses also add to the problems of agriculture.

The author proposes that production be optimized according to location and proximity to market through application of a zoning system.

Nowland, J.L. 1975. The Agricultural Productivity of the Soils of the Atlantic Provinces. Research Branch, Agriculture Canada. Monograph No. 12. Ottawa.

In this publication, a brief assessment of the agricultural potential of the Atlantic Provinces is given with reference to the extent of the agricultural land base and the physical, social, and economic factors which limit production.

The possible amelioration of certain socio-economic and physical limitations to agriculture would enhance the development of farming resources to its full potential. Some of the influences on productivity are: location and extent of fertile soils; farm size and scale; land use practices by farmers; choice of crops and livestock by farmers; reliance on imported inputs; intensity of capital and labour inputs; technological and managerial skill of farmers; availability of markets; and governmental programs and policies on subsidization, supply management, price supports, income support for marginal farms, and crop insurance.

Ontario Economic Council. 1966. People and Land in Transition: Opportunities for Resource Development on Rural Ontario's Marginal and Abandoned Acres. A Report of the Ontario

Economic Council. Toronto.

The objective of this study was to assess the economic and social cost of the increasing abandonment of Ontario's marginal and sub-marginal rural lands, and to suggest what might be done to make them more productive, or use them to better advantage. The following six representative townships were selected as study areas: Monteagle and Carlow townships in North Hastings County; Lindsay in Bruce County; Harley and Brethour townships of the District of Temiskaming; and the McCrosson-Tovell twin township in the Rainy River District.

Separate sections outline detailed recommendations for forest management, agriculture, land assessment and taxation, recreational development and rural housing.

Parson, H.E. 1977. "An Investigation of the Changing Rural Economy of Gatineau County, Quebec." Canadian Geographer. Vol. 21, No. 1, 22-31.

In this paper, Parson assesses the impact of several factors which contribute to the changing rural economy of an agriculturally marginal area. Two types of variables are considered: internal factors, such as socio-economic characteristics of the human resource and family land-use history; and external factors including the economic and technological environment. Agricultural trends were analysed in terms of the above parameters.

Much emphasis is given to the reasons why farms are being abandoned and allowed to revert back to bush, as well as to the traditional relationship between farming and forestry in the Gatineau Valley.

Parson, H.E. 1975. "The Rise and Fall of Farming in a Marginal Area: The Gatineau Valley, Quebec." Cahiers de Géographie de Québec. Vol. 19, No. 48, December, 573-582.

Parson traces the evolution of farming on the southern margins of the Canadian Shield in Quebec from its difficult beginnings in 1800, through prosperous years in the 19th and early 20th centuries, to its modern state of decline.

Paterson, J.H. 1972. "Report from the I.G.U. Symposium 'Frontier Settlement on the Forest - Grassland Fringe', July 31 - August 8, 1972." Geoforum. Vol. 12, 89-91.

Some of the important themes and issues that were the subject of the Symposium on Frontier Settlement on the Forest-Grassland Fringe are recapitulated in this article. In addition, the author discusses the rationale behind present-day agricultural frontier development and puts forward several questions concerning the future of the agricultural frontier.

The focus of such questions is one of policy-making and regional planning.

Pawlick, T. ed. 1979. "All This Land, and Nowhere to Grow." Harrowsmith. Vol. IV:3, No. 23, 48-52. October,

In the time of the Klondike Gold Rush of 1898-1900 the Yukon was largely self-sufficient in food production, vegetable gardens, livestock, and fields of forage were tended in order to feed a population of thousands. Today, there are barely a dozen farms in the territory and foodstuffs are imported from as far away as Mexico.

The decline of farming cannot be solely attributed to the physically marginal conditions for agriculture in the north. Past farming successes of Yukon farmers and experimental stations have shown that small-scale agriculture is indeed physically viable. Rather, political, economic and social conditions are to blame for the failure of present day agriculture. By far the greatest hindrance is the lack of available land for farming. The cost of private land is out of reach for would-be farmers. And, the traditional agricultural route of leasing Crown land from the federal government has been closed since 1975.

A freeze on the granting of farm leases seems to have come about for several reasons. However, the Federal government's official explanation was that time was needed to carry out a soil inventory and to allow the territorial government to develop a farm policy. Native land claims also might have influenced the moratorium decision, as could the need to curtail further land degradation caused by clearing and its consequences of damaged wildlife habitats, and erosion.

Notwithstanding, the present difficulty of aquiring farm land, the potential for agricultural self-sufficienty exists.

Furthermore, this potential has been affirmed in the now published soil inventory for the Yukon, and in a complementary study of agricultural impact on land use for the northern territories. Still, the future of agriculture in the Yukon is pendent upon a lifting of the land freeze and the development of a territorial agricultural policy.

Pich, G., and B. Proudfoot. 1971. "Persistence in Extensive Land Use: County of St. Paul." Albertan Geographer. Vol. 7, 1-5.

This paper is a study of the impact of Alberta's plan to improve marginal farmland in the northeastern region of the province through more intensive farm practices. The authors conclude that the plan will fail and the area will continue to be farmed extensively because of the

facility in which additional land can be obtained.

Poetschke, L.E. 1968. "Regional Planning for Depressed Rural Areas: The Canadian Experience". Canadian Journal of Agricultural Economics. Vol. 16, No. 1, 8-20.

This study outlines problems of rural poverty and governmental program response to it. Details are given of programs in areas of northern Nova Scotia, Northeast New Brunswick, and the Interlake region.

Pringle, W.L. 1974. "Northern Agriculture: North of the 60th." Agrologist. Vol. 3, No. 6, November-December, 4-7.

Pringle, a researcher in forage ecology at the Agriculture Canada Research Station in Beaverlodge, Alberta, discusses the agricultural potential of four areas in the Northwest Territories and the Yukon. The areas are: the Takhini and Dezadeash Valleys in the Yukon; the Liard River Valley in the N.W.T.; the Upper Mackenzie area in the N.W.T.; and the Slave River Lowlands in the N.W.T.

Farming opportunities and constraints to agriculture in the North are indicated with reference to soil surveys conducted in these four areas, as well as to examples of present and past agricultural ventures, including those carried out at experimental stations.

If agriculture is to be successful in the North many problems of marginality will have to be overcome. A declining trend in agricultural production in most centres of the Territories indicates that the cost of overcoming numerous problems is more than the cost of importing food north.

Proudfoot, V.B. 1974. "The Northern Limits of Agriculture in Western Canada." Climatic Resources and Economic Activity. Edited by J.A. Taylor. pp. 121-134. David and Charles, Newton Abbot, London.

Proudfoot critically reviews the body of literature that deals with the northern limits to agriculture in Western Canada. The difficulty of defining northern limits to crop production is illustrated in a discussion of the literature and the parameters that must be considered.

Proudfoot contends that policy makers and propagandists have frequently been mislead by studies based on uncertain assumptions and unreliable data.

Proudfoot, V.B., and J. Wilson. 1973. "An Evaluation of Expanding Agriculture in the Saskatchewan River Delta of Northeastern Saskatchewan." Proceedings: Symposium on the Lakes of Western Canada. The University of Alberta. Edmonton, 100-112.

The expansion of agriculture in a marginal area of northeast Saskatchewan is critically examined in this paper. The authors base their study on the rationale that there are continuing arguments advanced in favour of developing the agricultural potential of physically marginal areas in northern Canada.

An investigation of the agriculture in the Carrot River-Arborfield area of Saskatchewan leads to the conclusion that there is doubtful justification for the encouragement of agricultural development in the adjacent Delta Development Project Area and in other less favourable locations.

Proudfoot, V.B. 1972. "Agriculture." Studies in Canadian Geography: The Prairie Provinces. Edited by P.J. Smith, and L. Trotier. pp. 51-64. University of Toronto Press. Toronto.

The evolution of the Prairie agricultural economy is traced in this paper, from the beginnings of agricultural settlement in the early 1800's, through a century and a half of agrarian dominance. Technological advances and favourable market conditions made the 1960's a decade of continued agricultural expansion and one of large scale foreign wheat sales. A range of changing circumstances, however, have altered traditional agricultural practices from a predominantly wheat, family farm industry to one of large scale, more diversified operations. recent trends indicate that the abandonment of uneconomic, and small marginal farms will likely continue.

The author discusses both historical and current pressures which affect agriculture in the northern marginal areas of the three Prairie provinces, as well in other physically marginal areas such as in eastern Manitoba. These pressures include competition for alternative land uses such as recreation or mining, and the need for crop diversification and local specialization of production.

Ray, D.M. 1972. "The Economy." Studies in Canadian Geography: Ontario. Edited by L. Gentilcore, and L. Trotier. pp. 45-63. University of Toronto Press. Toronto.

An interesting aspect of this paper is Ray's discussion of the heartland paradigm as it relates to agricultural productivity in Ontario. The disparity between southern Ontario's prosperous agriculture and the marginal farming of eastern Ontario is said to accentuate the division of Canada's urban/industrial heartland into two parts. A break in the Windsor to Quebec City heartland occurs in eastern Ontario, where the development of agriculture and urban industry

is relatively poorer.

Reeds, L.G. 1972. "The Environment." Studies in Canadian Geography: Ontario. Edited by L. Gentilcore, and L. Trotier. pp. 1-22. University of Toronto Press. Toronto.

Reeds provides a good general analysis of Ontario's agriculture and agricultural capability in this paper. His discussion includes the physical factors of landforms, location, soil, and climate which influence the capability of land for agriculture, as well as socio-economic variables which offset the importance of physical land capability.

Also described is the trend of marginal land abandonment in the fringe areas of Ontario.

Richards, J.H. 1968. "The Prairie Region." Canada: A Geographical Interpretation. Edited by J. Warkentin. pp. 396-437. Meuthen. Toronto.

Robinson, J.L. 1969. Resources of the Canadian Shield. Methuen Publications. Toronto.

The sixth chapter in this book deals with agriculture in the Canadian Shield, most particularly in the clay belt farming areas of Ontario and Quebec. After a descriptive analysis of the environmental conditions related to Shield agriculture, climate and soils, Robinson traces the regional history of agricultural settlement in different regions. These regions are: the south-central Shield area, and the Saguenay Valley - Lake St. John settlements of Quebec, the southern fringe of the Shield in Ontario, and the clay belts of both provinces.

The general trend in Shield agriculture has been one of decline. Improved farmland acreage and number of farms are decreasing as farmers abandon the marginal land.

In conclusion, the author states that as long as there is no strong demand for agricultural production in the Shield the areas of potential farm resources will likely remain undeveloped.

Romahn, J. 1979. "Mining the Soil." Harrowsmith. Vol. IV:3, No. 23, October, 36-37.

Ontario farms and farmland are being impoverished by the intensive production of corn. High prices for both prime and marginal land have motivated increasing numbers of farmers to grow corn for maximum profits. In some cases, the land is being abused to the point of ruin. In many other cases, soil productivity has decreased so drastically that restoration will be a long and costly process.

It is the large-scale farm machinery needed for corn production that is harming the land by compacting the soil, and thereby imparing drainage. In order to combat this problem farmers then deep-plough their fields which results in the burying of much of the fertile topsoil. Land erosion is another problem associated with corn production practices.

Not only does the erosion of soil by wind and water serve to downgrade the quality of agricultural land, but it contributes to the pollution of streams and lakes.

Unfortunately these problems are not likely to disappear until either the price of land comes down, or other circumstances put an end to the continuous cropping of corn across Ontario.

Rostad, H.P.W., and L.M. Kozak. 1977. Agricultural Potential of Selected Areas in the Northwest Territories. Saskatchewan Institute of Pedology Publication S176. University of Saskatchewan. Saskatoon.

This report is based upon interpretations of several soil surveys, climatic data, and field work undertaken for certain areas having agricultural potential in the Northwest Territories. These areas are: the Slave River Lowlands, the Upper Mackenzie River region, the Liard and Mackenzie River area, and the Hay River Valley.

A distinction is made between agricultural and grazing capability of the soils, and the agricultural potential of the area. Soil and climatic characteristics determine the capability of the soil for agriculture, and grazing capability is determined by grazable forages already present. Agricultural potential for an area depends on the above characteristics as well as the size of suitable soil areas and several economic factors such as present forest stand, land clearing, ease of access, natural hazards and markets. Competing land uses such as forestry, recreation, or wildlife are also considered, though not in great detail.

The general conclusions drawn from the study are that while the soils of the Northwest Territories are not generally fertile enough to support agriculture without problems of inadequate plant nutrition, there are some areas where these problems would not be too serious and where reasonable levels of production could be achieved with little to no inputs of fertilizer.

Sahir, A.H. 1972. "Some Aspects of Agriculture in Saskatchewan." Southern Prairies Field Excursion Background Papers. Edited by A.H. Paul. pp. 107-128. Department of Geography, University of Saskatchewan, Regina Campus. Regina.

The author describes the trend of rural depopulation in Saskatchewan in relation to the general increase in farm size and abandonment of marginal farms.

Where grain cultivation is restricted by climate and soils, ranching has proved to be feasible.

Schmitz, A. 1965. "Agricultural Resource - Use Efficiency in Northwestern Saskatchewan." Canadian Journal of Agricultural Economics. Vol. 13, No. 2, 34-46.

Schmitz suggests readjustments of agriculture for northwestern Saskatchewan including the retrenchment of marginal land from agriculture and intensification by farming practices.

Shannon, E.N. 1974. "An Evaluation of the Physical Resources of the Meadow Lake Region." Frontier Settlement. Edited by R.G. Ironside, et.al. pp. 130-150. Department of Geography, University of Alberta. Edmonton.

Agriculture has dominated the economy of the Meadow Lake Region of north-central Saskatchewan throughout its development as a frontier, and will continue to do so for quite some time. Although this region differs in some ways from other frontier settlements, its most important and problematic characteristics can be considered as typical of many forest/grassland fringe areas of the Prairie provinces. The region has an isolated location within a largely unoccupied and undeveloped forest land, and like the larger Peace River agricultural frontier, the Meadow Lake Region is poorly served by railways and far from agricultural markets. Its historical development was marked by years of subsistence type agriculture that afforded settlers meagre incomes and lower standards of living than the prairie average.

In describing the climate, physical characteristics, and agricultural resources of the region, the author illustrates the degree to which it can be considered as marginal in comparison with more southern locations. The most limiting factor to agricultural production is the climate, not the soils; and changes in natural vegetation cover and in agricultural practices from south to north reflect harsher temperatures, longer growing season, and greater precipitation. The best farmland and soils are not contiguous, unfortunately, but are found in sporadic pockets over a distance of approximately 120 kilometres. This factor, coupled with the region's isolation make social services costly to provide.

Extensive farming methods, and low yields per area for some crops, are unable to support a large farm population in the region. Furthermore, increased mechanization and farm enlargement trends have resulted in a decline of farm population. Despite the improvement of new land each year and the potential for agricultural expansion, unemployment is a continuing problem. Out-migration seems to be the only solution to unemployment in the region.

Much of the poorer land, which is generally non-arable, is used for livestock production and

ranching. Provincial and federal programmes have tried to encourage farm diversification throughout the region, but trends indicate that increasing numbers of farmers are specializing in either grain production or cattle ranching, and that mixed farming is on the decline.

The author also assesses mineral, forest, recreational, and human resources of the Meadow Lake Region, and concludes that forest and recreation industries are increasing in importance, though agriculture will continue to dominate the region's economy.

Shaw, P. 1979. Canada's Farm Population: Analysis of Income and Related Characteristics. Statistics Canada Census Analytical Study. Ministry of Supply and Services. Ottawa.

Canadian agricultural policy cannot be formulated without the use and understanding of socio-economic data on the farm population. Unfortunately, Census of Canada agricultural data is in many respects inadequate and fragmentary in dealing with farm population characteristics. However, since 1971 a special project has been undertaken to infill agricultural data gaps. The project is called the 1971 Census Agriculture - Population Linkage, or more familiarly, the Ag-Pop Linkage. This present study represents the consequence of the Ag-Pop Linkage project, and compliments the census study Off Farm Work by Farmers, by Ray Bollman.

The major analytical concerns of the inquiry are: 1) to discern general demographic, geographic, and socio-economic characteristics of Canada's 1971 farm population through the use of Ag-Pop data; 2) to determine and quantify farm income; and 3) to design a framework for enterpreting the effects of human factor variables, off-farm work opportunities, characteristics of farm enterprises, and regional differentials on farm family income and the farm operator.

Major research and policy questions are addressed by using statistical techniques to manipulate the Ag-Pop data. With respect to marginal farming operations, low income farmers are typologized in the fourth chapter, although an in-depth study of the relationship between farm operation characteristics and marginal farmers is not undertaken, so as to avoid overlap with other planned census monographs. Still--the general findings of this study provide useful insight into the socio-economic characteristics and circumstances of marginal farm operations.

Siemens, A.H. 1972. "Settlement." Studies in Canadian Geography: British Columbia. Edited by J.L. Robinson, and L. Trotier. pp. 9-31. University of Toronto Press. Toronto.

Agricultural settlement was a significant force in the opening up of certain regions of the province of British Columbia. In this paper, the author provides a historical perspective to the settlement landscape of the province.

A region by region analysis of rural landscapes illustrates how certain processes have

served to change agricultural patterns over the years. The small farms of post-war British Columbia have been for the most part, abandoned in the face of improved technology, giving way to larger consolidated farmsteads and agro-businesses. Marginal agricultural land is being sub-divided into smaller cottage lots, and converted for recreational and tourism uses. Cattle ranches and orchards are similarly being taken over by competing land uses.

In some cases, where land is not strictly physically marginal off-farm employment opportunities, such as in forestry, have retarded the economic prosperity of agriculture by promoting part-time farming.

Simpson-Lewis, W. et al. 1979. Canada's Special Resource Lands: A National Perspective of Selected Land Uses. Map Folio No. 4. Lands Directorate. Ottawa.

This publication is an atlas, picture-book and general reference text all in one. Each chapter considers Canada's special resource lands by addressing important land use issues for six selected uses: agriculture, recreation, wildlife, forestry, urban growth and energy development. Illustrative maps, photographs, tables and figures combine with the comprehensive text of each chapter. Extensive bibliographies are also provided in reference to the six land uses.

Highlighting the chapter on agriculture are: descriptions of special soil and climatic regions, and the Canada Land Inventory; economic considerations of land use including economic risks, major production areas for selected crops, and value of agricultural sales; and factors of agricultural change such as urban growth pressures on farmland, trends in farm characteristics, and climatic variation. The chapter concludes with a case study of the Niagara fruit belt.

Sitwell, O.F.G. 1966. "The Relationship of the Agricultural Revolution to Economic Development: the Case of Nova Scotia." Albertan Geographer. No. 2, 41-44.

Agriculture in Nova Scotia is described as generally weak, partly because of inefficient farming practices. The failure to accumulate capital further weakens the base of the agricultural economy of the province.

Smith, E. 1972. "Planning with People: the Gaspé Project." Making It: the Canadian Dream. Edited by B. Finnigan, and C. Gonick. pp. 332-344. Mclelland and Stewart. Toronto.

The author surveys the BAEQ (Bureau d'Aménagement de l'Est du Québec/Eastern Quebec Planning Bureau) project of the 1960's, and discusses the organization's plan for the years 1972-1982. BAEQ objectives concerning agriculture in the depressed region of eastern Quebec are outlined along with other sectoral planning.

Stock, G.E. 1976. "Off-farm Work by Small Scale Farmers in Ontario." Part-time Farming: Problem or Resource in Rural Development. Edited by A.M. Fuller, and J.A. Mage. pp. 68-82. Geo Abstracts. Norwich, England.

Stock presented this paper during that session of The First Rural Geography Symposium (University of Guelph, June 1975) entitled "Problems Associated with Part-time Farming--Economic Marginality". An analysis of the relationship between small-scale farming and part-time farming in Ontario is given using 1971 Census of Agriculture data. Small-scale farms are defined by the author to be non-commercial farms with gross agricultural sales of less than $5,000. This definition also applies to the economically marginal farm, where gross sales of up to $5,000 are insufficient to provide an adequate family income, to adequately utilize a farmer's labour, or to yield satisfactory rates of return to the resources which are used in agricultural production.

A general description of the small-scale farm situation reveals that the quality, quantity, or balance of land, labour, capital, and management inputs is limited in such a way as to negatively affect the productive capacity of the farm. Small-scale farms are characteristically smaller in size and less capitalized than commercial farm operations. Marginal areas of poor soils, harsh climates, and with remote locations are particularly characterized by small scale farms that lack a commercial production orientation and that render under-employed the farm family. In response to such economically marginal agricultural conditions of inadequate farm income potential and labour over-supply the small-scale farmer usually makes the adjustment into part-time farming. This adjustment is not always easily made, for certain characteristics of the small-scale farmer limit his off-farm employment opportunities. Stock reasons that non-farm labour demand is such that small-scale farmers, who are relatively more numerous in the younger and older age categories, have limited off-farm employment possibilities due to their age characteristics.

Stock identifies six types of areas based on off-farm work characteristics:

1) Areas of full-time off-farm workers;

2) Areas of full-time farmers;

3) Areas where off-farm work in services is distinctive;

4) Areas of part-time off-farm work and rural occupations, and construction work;

5) Areas of part-time off-farm work; and

6) Areas of urban professions.

Marginal agricultural operations have the greatest incidence in areas 1, 4, and 5. Dispersed areas of marginal agriculture in northeast Ontario, near the industrial cities of Sudbury and Sault Ste. Marie are characterized by relatively large percentages of small-scale farmers participating full-time in off-farm work. Several census divisions in northern central Ontario, including Manitoulin Island, which are characterized by marginal agriculture, have the highest percentage of part-time farming combined with part-time off-farm work, rural occupations, and construction work. An extensive block in northwestern Ontario is affected by poor soils, harsh climate, and remoteness to markets. The majority of farmers in this region (70 per cent) participate in part-time off-farm employment in a variety of resource extraction and rural-oriented tertiary occupations. The opportunities are generally limited in this area, and many off-farm jobs are insecure and seasonal. This lack of secure year-round off-farm employment, added to the problem of limited employability of part-time farmers, has important implications for the adjustment of farm labour in marginal areas.

In a review of Stock's paper, Arthur Lerner points out that although off-farm work is a successful form of adjustment of redundant labour resources out of agriculture in marginal areas, the development of off-farm employment opportunities can also serve to maintain some resources in agriculture. Lerner suggests that keeping northern resources in agriculture would be socially useful, especially where they have little value for alternative productive use. In this way, government programmes which check rural depopulation can help marginal areas, as well as reduce pressures on the more populated urban areas in the south of the province. (See: Lerner, A. 1976. "Discussion of the Paper by G. Stock on Off-farm Work by Small Scale Farmers in Ontario." Part-time Farming: Problem or Resource in Rural Development. Edited by A.M. Fuller, and J.A. Mage. Geo Abstracts. Norwich, England.)

Stone, K.H. 1972. "Rural Settlement Regions at the Ecumene's Edge: Europe and North America." Paper submitted to the 22nd International Geographical Congress, Canada. International Geography 1972. Edited by W.P. Adams, and F.M. Helleiner. pp. 767-769. University of Toronto Press. Toronto.

In this short paper, the author briefly examines the various ways in which Europe and North American rural fringe settlements have been mapped. In addition, the utility of mapping systems for geographers and planners in other disciplines is indicated.

Szabo, M.L. 1965. "Depopulation of Farms in Relation to the Economic Conditions of Agriculture on the Canadian Prairies." Geographical Bulletin. Vol. 7, No. 3/4, 187-202.

For the period 1951 - 1961, Szabo analysed the decline in Prairie farm population, confirming the hypothesis that, "where conditions on the farms created a relatively high number

of part-time operators who gave up farming as a sole means of living...it is likely that the same conditions also induced a relatively high number of people to leave the farms." Four independent variables relevant to farm size were used in a multiple regression equation. These variables, which explain 62% of the spatial variation in net farm depopulation, were: 1) proportion of small commercial farms; 2) proportion of small scale farms; 3) rented area per farm; and 4) paid labour per farm.

In conclusion, the author states that after 1965 off-farm migration would be significantly smaller scale than during the 1950's, and that part-time farming and off-farm employment would likely increase as an alternative to off-farm migration.

Szplett, E.S., and D.B. Szplett. 1977. "Some Aspects of Farm Depopulation in Northeastern Ontario." Great Plains-Rocky Mountain Geographical Journal. Vol. 6, No. 2, pp. 238-335.

Some 123 variables thought to be related to farm depopulation were formed into nine groups of related variables by cluster analysis. Nine respresentative variables, one from each cluster, were used as independent variables in a multiple regression equation containing percentage of farm depopulation as the dependent variable. When the residuals from the regression are mapped, three definite patterns emerge. The first pattern involves overprediciton in areas of rural and farm stability and underprediction in less stable areas. Underprediction in subdivisions experiencing rapid urban growth is the second pattern. The third pattern involves overprediction in areas with environmental conditions favourable to agriculture and underprediction in less favourable areas. The relevancy of this model to other Canadian agricultural areas is discussed. Suggestions for additional research on the topic of farm out-migration are also presented.

Tosine, T.P. 1979. "Response to Marginality." An Overview of Land Use in Central Canada. Economics Branch. Ontario Ministry of Agriculture and Food. Toronto. August, 36-37.

Under the heading 'Response to Marginality' Tosin briefly outlines the decline of farmland in the marginal areas of the Canadian Shield. The abandonment of marginal farmlands in Quebec has occurred at a greater rate than in Ontario. Recent trends indicate that the decline in farmland is now occurring at a decreased rate.

Trant, M.J., and G.L. Brinkman. 1979. "A Classification of Limited Resource Farmers." Canadian Farm Economics. Vol. 14, no. 1-2, February - April.

The objective of this study is to identify the characteristics and problems of limited resource farmers, and to design a classification system that could be used to indicate groups of farmers for public and private assistance. Limited resource farmers are defined as those

operators in 1970 having $15,000 or less gross sales and those with $25,000 or less in 1975.

Twelve groups of limited resource farmers are classified for Ontario based on socio-economic characteristics of behaviour, farm resource use, and farm and off-farm income. Implications for agricultural programs are drawn from the very heterogeneous classification system.

Travers, R. 1970. Report on Small-Scale Agriculture in Newfoundland. A.R.D.A. Project No. 1008. St. John's.

This project, carried out during the mid-1960's, undertakes to evaluate the technical problems and possibilities of small-scale agriculture in Newfoundland. Means to overcome the difficulties of physically and economically marginal agriculture are suggested, along with recommendations for the development of government programmes designed to benefit and promote small-scale farming. Five broad proposals are outlined as: 1) the selection of areas with suitable land resources for agriculture; 2) the subsidization of land development; 3) the provision of promotional, educational, and technical advisor services; 4) the creation of organizations for study, joint ownership of equipment, purchases and marketing; 5) creation of programmes to ensure the availability of subsidies, and credit organizations.

Troughton, M.J. 1979. "Application of the Revised Scheme for the Typology of World Agriculture to Canada." Geographia Polonica. No. 40, pp. 95-111.

A typology of world agriculture, developed by the International Geographical Union Commission on Agricultural Typology, is applied to Canada in this paper. A discussion of its applicability to Canada is presented by the author, and in conclusion, a valid typology consisting of eight well defined model types is outlined.

Troughton, M.J. 1977. "Persistent Problems of Rural Development in 'Marginal Areas' of Canada." Rural Development in Highlands and High-Latitude Zones. Edited by L. Koutaniemi. Proceedings of a Symposium held August 22-28, 1977 by the International Geographical Union's Commission on Rural Development, at the University of Oulu. Oulu, Finland.

Troughton seeks to defend by example the hypothesis that persistent problems of marginal rural areas of Canada are resultant of the failure by human groups to come to grips with both the absolute and relative disadvantages imposed by the physical conditions in these areas.

The declinng trend of agriculture in Canada's marginal areas can be attributed to a maladjusted human response to the limitations of harsh environments throughout time. Examples of this chronic phenomenon are cited for different marginal regions across Canada: the Peace River

district of British Columbia and Alberta; the northern Prairies; the Shield and clay belt regions of Ontario and Quebec; and the Appalachian countryside of the Atlantic provinces.

Troughton, M.J. 1974. "Agriculture and the Countryside." The Countryside in Ontario. Edited by M.J. Troughton, et.al. Proceedings of the Countryside in Ontario Conference held April 19-20, 1974, at the University of Western Ontario. London.

Troughton's paper gives support to the argument that the countryside must be recognized as a provincial resource system, appreciated for its social, ecological, and aesthetic values by the total population. This theme is discussed with a special agricultural focus under four headings: definition, image, functions, and relationships. References to marginal land are made under each of these headings.

Under 'definition' Troughton depicts a hierarchy of landscapes, in which farmland represents a large percentage of the municipally organized area of Ontario, and the scattered marginal farm areas. Canada's total agricultural area is a bare 6 per cent of the total land area, and as Troughton points out, much of this is physically marginal land in terms of climate and soil conditions.

A discussion of the image of marginal farmlands reveals scenes of rural poverty and disparaged human resources. Retreat and abandonment of marginal lands leaves them "scarred", and "derelict". However, in suggesting the need for stricter land management, the author envisages improved schemes having economic and amenity-related functions that would, in effect, tidy up the poor image and reality of marginal lands.

Wampach, J.-P. 1968. "Aspects Economiques de la Pauvretē Chez les Agriculteurs Quēbēcois." Economie Rurale. Vol. 77, No. 3, 3-17.

In the first part of this economic study of rural poverty in Quebec, the author defines poverty in terms of farming incomes, and summarizes the characteristics of the marginal farmer and farm. Certain economic factors and mechanisms, such as productivity of labour, and the adaptation of agriculture to changing economic conditions, are analysed in relation to rural poverty in the second section. The concluding part of this study evaluates governmental policies for agriculture (particularly those of A.R.D.A.) and policies concerned with poverty in general.

Ward, R.J. 1975. "A Preliminary Economic Analysis of Multiple Jobholding by Manitoba Farm Operators." Unpublished Msc. Thesis, University of Manitoba. Winnipeg.

In his analysis of 1,561 Canadian Wheat Board Permit holders in Manitoba for 1972, Ward

found one factor related to the incidence of off-farm work to be the smaller gross farm sales of farm operators. Based on his analysis of multiple jobholding by Manitoba farmers, Ward concludes that off-farm employment has potential as a means to ameliorate the low income problem of many family farms.

Wight, I. 1978. Planning and the Agricultural Community in the Peace River Region of Alberta. Peace River Regional Planning Commission. Peace River. Alberta.

As Senior Regional Planner of the Peace River Regional Planning Commission (P.R.R.P.C.), Ian Wight presents a series of salient issues pertinent to the role of regional planning in a largely rural area.

Although the farm population of the Peace River Region of Alberta has declined over the years, and is continuing to do so, the agricultural sector in this region remains highly valued. Regional planners thus emphasize the importance of Peace River agriculture in the long term, appreciating that future generations will demand more farmland and increased agricultural production. It is for these reasons that planners strive to preserve the high capability farm land of the region by directing rural non-farm developments, such as urban expansion, residential subdivision, recreational land use, or industrial building onto the most physically marginal land, or land rendered economically marginal for agriculture by its small and severed extent.

A desire by planners to encourage the opening up of new farm land in the region reflects their belief that the northern agro-environment of the Peace is in many ways superior to that of agricultural regions to the south. Marginal agriculture can, in some respects, be attributed to the unsuitable application of 'southern' technology in a northern environment.

The author incites an appealing argument with his contention that the decision-makers of this country have a less than satisfactory comprehension and appreciation of the true value of northern agro-climates. This point is further exemplified by the rejection of Canada Land Inventory definitions of good agricultural land by northern planners, in favour of rural assessment sheet data for these regions.

Williams, G.D.V. 1974. "Physical Frontiers and Crops: the Example for Growing Barley to Maturity in Canada." Frontier Settlement. Edited by R.G. Ironside, et.al. pp. 79-92. Department of Geography, University of Alberta. Edmonton.

This paper examines ways of mapping the four physical frontiers of agriculture: temperature, moisture, soils and topography, with special reference to growing barley in agricultural frontier regions. The importance of these four factors in determining the absolute limits of cultivability makes it essential to analyse the physical requirements for certain crops

quite separately. Unfortunately, there is a pancity of information on soil-topological aspects in the agricultural fringe area, as compared to climatic data.

The usefulness of information on the soil-geomorphic-climatic frontier will become increasingly apparent if shortages of agricultural land develop and the frontier is expanded. The author stresses the need to preserve Canada's limited agricultural resources.

Wonders, W.C. 1975. "Marginal Settlement." Scottish Geographical Magazine. Vol. 91, No. 1, 12-24.

Agricultural settlement of frontier regions has stopped short of its physical limits because there is no longer pressure steering farmers to marginal lands. The economic and social backwardness of marginal areas is now of equal, if not greater, consequence than physical marginality for agricultural settlement. Agriculture has thus remained stagnant, or is decline in many of Canada's marginal areas.

Despite such constraints, Canadian policy for northern development encourages agrarian settlement of lands north of the more traditional agricultural belts.

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