

# A Sample Frame for Rural Canada: Design and Evaluation

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REIMER B. (2002) A sample frame for rural Canada: design and evaluation, *Reg. Studies* 36, 845–859. This paper discusses the design, implementation and evaluation of a national sample frame for research and education in rural Canada. The sample is the basis for a multidisciplinary research project using macro-level and fieldwork in 32 systematically selected rural sites. The sites were chosen to provide comparisons on five dimensions of importance to researchers, policy makers and rural citizens. Information collected since the establishment of the project in 1997 is used to evaluate the internal and external validity of the sample frame. This evaluation points to the complex interaction of economic and geographical processes on local conditions and reinforces the value of systematic designs for rural research.

Rural Canada    Methodology    Sampling

REIMER B. (2002) Un échantillon-type du Canada rural: la conception et l'évaluation, *Reg. Studies* 36, 845–859. Cet article discute de la conception, de la mise en application et de l'évaluation d'un échantillon-type national pour la recherche et l'éducation dans le Canada rural. Cet échantillon sert de base pour des recherches multi-disciplinaires faites sur le plan macro-économique et sur le terrain dans 32 sites ruraux systématiquement sélectionnés. Les sites ont été sélectionnés afin de fournir des comparaisons à cinq niveaux qui intéressent les chercheurs, les décideurs et les citoyens ruraux. On se sert des informations rassemblées depuis le lancement du projet en 1997 pour évaluer la robustesse interne et externe de l'échantillon-type. Cette évaluation semble indiquer l'interaction complexe entre des processus économique-géographiques et le milieu local, et renforce la valeur des conceptions systématiques pour la recherche rurale.

Canada rural    Méthodologie    Echantillonnage

REIMER B. (2000) Ein Stichprobenrahmen für die ländlichen Gebiete Kanadas: Entwurf und Bewertung, *Reg. Studies* 36, 845–859. Dieser Aufsatz behandelt Entwurf, Ausführung und Bewertung eines staatlichen Stichprobenrahmens für Forschung und Bildung in den ländlichen Gebieten Kanadas. Die Stichprobe bildet die Grundlage für ein Mehrbereichsforschungsprojekt; sie stützt sich auf Arbeit im großen Rahmen und auf Geländearbeit an 32 systematisch ausgewählten ländlichen Stellen. Diese wurden so ausgesucht, daß sie Vergleiche fünf, für Forscher, Parteiideologen und ländliche Bevölkerung wichtige Dimensionen liefern. Daten, die seit Beginn des Projektes im Jahre 1987 gesammelt werden, werden dazu benutzt, die interne und externe Gültigkeit des Stichprobenrahmens zu bewerten. Diese Bewertung zeigt die komplexe Wechselwirkung wirtschaftlicher und geographischer Prozesse auf, denen örtliche Bedingungen unterworfen sind, und unterstreicht den Wert systematischer Entwürfe für Forschung auf dem Lande.

Ländliches Kanada    Methodologie  
Stichproben machen

## INTRODUCTION

Rural Canada is undergoing significant changes. It is becoming more diverse, connected and complex. In the process, some locations are experiencing improvements in their economic conditions while others are suffering. The reasons for such differentiation of conditions are unclear, thereby justifying the call from rural citizens, policy makers and researchers for more appropriate research.

Reliable, detailed and comparative information

regarding rural Canada is hard to find, however. Census data provides extensive information on demographic and economic variables, but it excludes a large amount of social, institutional and quality of life information that is critical to assessing the situation in rural areas. National survey data is limited by relatively small sample sizes for rural inhabitants and its focus on individual rather than community or institutional units of analysis.

At the same time, there are many community-level and regional studies that provide rich data regarding the social and institutional aspects of rural Canada, but

they are usually case studies with little attention to comparison (REIMER, 1995). This is understandable given the heavy commitment of time, finances and energy that case study research involves, but it severely limits the learning that can take place through comparative analysis. A more systematic framework is needed to identify and understand the extent and nature of community and regional differentiation.

One such framework was proposed in 1995 (*ibid.*) and subsequently adopted by the Canadian Rural Revitalization Foundation (CRRF) as part of its five-year research initiative entitled *Understanding the New Rural Economy: Options and Choices (NRE)*.<sup>1</sup> It forms the basis for a national programme of research and education in 32 rural sites throughout Canada. Research teams have been operating in most of these sites since 1997, establishing relations with local citizens, profiling site characteristics and preparing materials that are shared throughout the network. We are now in a good position to evaluate the success of this initiative and use it to compare leading and lagging rural locations.

This paper provides such an evaluation. The rationale for the sample frame is presented, along with details regarding the procedures followed. The frame is then used to examine the differences between leading and lagging locations – both to describe those differences and to evaluate the utility of the framework on which they are compared. Finally, several conclusions are identified relating both to the substantive results and suggestions for future research.

### THE NRE SAMPLE FRAME: RATIONALE AND PROCEDURES

The sample frame is designed to meet several objectives and interests. First, it must provide a basis for systematic comparisons relevant to the interests of rural researchers. Second, it must make sense to the rural citizens who reside in rural Canada. Since they are partners in the research they must accept the value of the work and the significance of their inclusion. Third, it must be useful to the potential funders of the project, in order for them to provide the financial support required. We have been able to meet all three sets of interests by integrating both theoretical and strategic considerations.

#### *Theoretical approach*

The theoretical and practical significance of rural areas in the industrialized world is the centre of significant debate. The traditional focus on rural areas from a sectoral (primarily agricultural) point of view (LUCAS, 1971; HODGE and QADEER, 1983) is slowly giving way to new representations of territorial settlement (JEAN, 1997; MARSDEN, 1998). New technology, markets, systems of governance and concerns have

meant that the functions of rural places and spaces have become more extensive and complex (REIMER and APEDAILE, 2000).

As theorists search for more appropriate frameworks for these changes, we find at least three general approaches. First, there are those who argue that the urban–rural distinction is becoming much less important or even irrelevant, often because of the increasing significance of urban economies (JACOBS, 1984; SASSEN, 2000). The disappearance of rural communities and the reduction in power of rural interests is considered an expected outcome of the new economies centred in urban regions. Second are those who examine rural places because they have special consequences in the face of external, more global changes (MURDOCH and MARSDEN, 1994). These theorists often argue that the primary motors of change are located elsewhere, and that: ‘Within these processes neither the environments nor the populations of particular locales hold any particular significance’ (DRUMMOND and MARSDEN, 1999, p. 217). Attention is given to rural places because they face specific challenges related to these external forces, not because they drive the economy in a significant way. The third approach is to treat rural places and spaces as centres of activity and change with their own unique dynamics (LIPTON, 1977; HODGE and QADEER, 1983; MARSDEN, 1998; ERRINGTON and COURTNEY, 1999). These theorists argue that there are special conditions in rural areas that mean they are proactive in the new economies and provide functions that are sustainable and non-substitutable in their own right.

For the purposes of developing our sampling frame, we do not take a strong position on one or other of these approaches. Instead, we adopt a more strategic approach by starting with units of analysis identified at the local level and ensuring that they are clearly and systematically linked to regional, national and international levels of analysis. This will ultimately allow us to test the relative merits of all three approaches to rural areas.

The geographically identified rural locality was used as the focus of attention for several reasons. We wished to determine whether it continues to be a useful concept for understanding rural areas, what forms it represents and the ways that people relate to those forms. We also chose it to meet the more pragmatic objectives of our partners – to identify the options and opportunities available to rural communities under changing conditions.

From a social and political point of view the local community has been an important entity. It constitutes a powerful basis of socialization (ETZIONI, 1996; BAUMAN, 2001), a crucial source for social support (WELLMAN and LEIGHTON, 1979; STATISTICS CANADA, 1991; FITCHEN, 1991), an important channel of information (O'BRIEN and HASSINGER, 1991; ALLEN and DILLMAN, 1994), and a fundamental

component of identity (COHEN, 1985; FITCHEN, 1991; MASON, 1996). Even in the context of urban concentration, global trade and the regionalization of administration, the local community continues to play an important mediating role in the relationship between general processes and the individual.

The analysis of rural locales also makes sense from a policy development point of view. Most policies formulated at a national or provincial level do not specifically target types of communities, yet many of them are mediated by community or regional structures. Programme delivery and impact are significantly altered depending on the community size, density, social services, economic base, history and many other local characteristics. In spite of this, most policy analysis has depended on data that is oriented to individuals, households or industrial sectors.

Policy makers can also benefit from community-level analysis since so much of the political agenda is influenced by collective action. Business development, social support, political action, training, moral development and community vitality all require coordinated activities resting on common interests, trust and social legitimation. These depend on relations between people, not individual characteristics alone, and they are rooted in the local social structure and processes. Analysis at a local level is therefore necessary if we wish to understand the impact of policy decisions on these relations.

At the same time, the value and definition of community continues to be a controversial issue within the social sciences (BELL and NEWBY, 1971; DASGUPTA, 1996; BAUMAN, 2001). It has been used to denote social structures based on a wide range of features such as the location, economic activity, social interaction or perception, often with some combination of these characteristics. It has also been directly and indirectly dismissed as an important unit of analysis in the face of urban dominance (JACOBS, 1984; SASSEN, 2000), and corporate hegemony (MURDOCH and MARSDEN, 1994). We do not expect to identify a unit of analysis that meets the needs of all these perspectives, but instead focus on those aspects of community that promise to have wide acceptability – or at least provide a strong basis for assessing their relevance to analysis and policy.

Our concern with rural Canada imposes a geographical aspect to the research that plays a central role in operationalizing the unit of analysis (BRADLEY and LOWE, 1984). By this criterion alone we are limiting ourselves to collectivities that are relatively small and to regions that have a relatively low population density. Small settlements are special because they reflect differences in the immediate social environment of rural people and proximate bases for social action. Even though improvements in communication and transportation have expanded the distance over which people relate to others, local social relations and

opportunities influence the options that are available to them. Local community people and organizations provide goods and services, social support and often operate as the context for policy development and implementation (CHRISTENSON *et al.*, 1994, pp. 50–51). The geographical and demographic location of a community will also place limits on the resources and power that are available to them (LABAO, 1990). This is especially the case for those settlements and regions that are a long distance from major urban centres.

The most convenient Canadian census unit for this level of analysis is the census subdivision (CSD). The CSD includes formally identified units such as municipalities, towns and villages, as well as Indian reserves, Indian settlements and all of the unorganized territory that is found in rural Canada (STATISTICS CANADA, 1992). As such, it is exhaustive of rural places and spaces in Canada, thereby improving the representativeness of the final sample. In addition, it reflects the administrative units that are important for policy and community development research.

On the other hand, CSDs have certain limitations from a theoretical point of view. Since they are primarily administrative units, they do not correspond ideally with local perceptions of community networks, labour force regions or other geographical regions typically found in the literature. Indeed, some CSDs are structured as locations totally encircling others – the latter often representing small municipalities. In spite of these limitations, we chose the CSD from the 1991 census of Canada as the basic unit for our sampling frame since it offered the best compromise between the demands of the theoretical literature on community, the existing empirical studies in rural locales, the centres of policy formation and administration, and the availability of data.

The limitations of the CSD have their strongest impact only during the early stages of our research. Once we selected the sites for analysis, the social and economic boundaries and networks were re-evaluated. The research focuses on the people in the CSD and uses them as a point of departure for identifying more theoretically relevant geographical spheres of activity. By identifying their patterns of work, commerce, administration and recreation, we have subsequently redrawn the boundaries and networks to reflect their actual behaviour. In this way, we can examine the changes over time, without prejudging the social and political landscape.

#### *The dimensions for comparison*

The sample frame is designed to ensure five important comparisons for the analysis of rural Canada. These comparisons emerged from more than eight years of research and collaboration among the participants in CRRF activities. As a result, they reflect the concerns of three major types of people: policymakers, researchers

and local citizens. The first four dimensions focus on characteristics of processes that are felt to significantly affect the options available to rural communities and the last emphasizes potential outcomes of these processes.

*Dimension 1: The extent of exposure to the global economy.* The internationalization of economic markets has had a considerable impact on nations, regions and rural communities. It has been associated with the demise of the gold standard, the centralization of world-scale banking, a decline in the power of labour, a de-emphasis on social programmes (ESPING-ANDERSEN, 1990) and a shift in policy concerns from distribution to economic efficiency (TASK FORCE ON PERSISTENT RURAL POVERTY, 1993, p. 322).

For rural areas, this has meant increased exposure to international competition, a decrease in place-specific support programmes and an increase in labour mobility (*ibid.*, p. 314; MARSDEN, 1998; DRUMMOND and MARSDEN, 1999). The more integrated a location is to this global economy, the more vulnerable it is to the processes involved (MARSDEN, 1998). For this reason, our sample frame is designed to ensure that comparisons can be made between communities that are highly exposed to global economies, and those that are relatively isolated from them.

*Dimension 2: The relative stability of the local economy.* Unstable economies make planning difficult. Those communities that face highly fluctuating economic conditions will find it difficult to plan for the long term and will be relatively unattractive to industries and enterprises looking for new locations. Most resource industries are particularly susceptible to these problems because of their cyclical nature. The strategic options of communities dependent on fluctuating economies will therefore be significantly different from communities which experience long term economic stability. The sample frame ensures that both types of locales are selected.

*Dimension 3: The adjacency to large metropolitan centres.* The trends to urbanization, commuting and trade have made access to urban centres a critical element in the economic condition of communities and regions. Large urban centres provide a population base for commerce and employment, a wide range of services and institutional resources, and cultural aspects that are often glamorized in the popular media (JACOBS, 1984; NEWBY, 1986; SASSEN, 2000). Proximity to these centres, therefore, opens significant opportunities and pressures for nearby rural communities.

Unfortunately, returns to rural periphery areas have been less than the resources and capital taken from them (LIPTON, 1977; TOMASKOVIC-DEVEY, 1988; FRESHWATER and DEEVERS, 1992). The out-migration to the urban core has been selective, leaving

the labour force in remote rural areas less able to compete and exacerbating their relative deprivation. Advances in transportation and communication have helped to integrate rural areas with urban centres but, except for outmigration, the major effects are felt only by those communities that are relatively adjacent to those centres (STABLER and OLFERT, 1992). Communities in the northern parts of the country are especially vulnerable to transaction costs and remoteness effects. To ensure comparisons on this dimension, the sample frame includes those communities that are close to major urban centres and those that are relatively remote.

*Dimension 4: The level of community capacity.* The level of social and institutional capacity will greatly affect the opportunities that a community can identify and create. Recent literature discussing the role of human and social capital and community capacity has begun to provide early support for the importance of skills, abilities, formal and informal social networks; health, education, and service institutions; and an ability to mobilize resources as important conditions for economic and social development (KNACK and KEEFER, 1997; FLORA, 1998; BOLLMAN, 1999). These conditions provide the means for learning about opportunities, building trust and taking collective action (GRANOVETTER, 1985; PUTNAM, 1993). The extent to which they exist in a particular location will provide significant opportunities for organizing work, finding employment, dealing with adversity and providing social support.

*Dimension 5: The extent to which the community is leading or lagging.* This dimension is different from the first four since it focuses on the outcomes of structures and processes. Its inclusion is unusual since it implies the creation of a *post hoc* design for our research. It is included, however, for two reasons. First, it was of particular interest to the policy makers and rural citizens in our network. They wanted to make comparisons between communities that were doing relatively well and those that were suffering significant economic and social challenges. The identification of leading and lagging locations ensured that these types of problems could be compared. Second, the distinction permits us to relate our work to major projects in Europe and Japan that are comparing these two types of regions.

The distinction between leading and lagging was first employed on a large scale by OECD researchers referring for the most part to levels of employment or income (ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT, 1994; TERUIN *et al.*, 1999). Our plan was to broaden the concepts to consider a greater range of outcomes and the relationships between them. This research resulted in the identification of several dimensions of leading

and lagging status as reflected in a number of socio-economic indicators (REIMER, 1999).

This approach provides a framework that promises to contribute in a number of ways. First, it ensures comparisons between locales that link them to broader processes in a consistent fashion. Second, it maximizes the likelihood that the comparisons reflect important differences as identified in the theoretical and empirical literature. Third, it allows us to test hypotheses, not only about changes within locales, but how they might be linked to regional, national and internationally-based processes. Fourth, it maintains considerable flexibility to accommodate the multiple frameworks required for understanding and regulating new rural conditions (MARSDEN, 1998), and finally, it makes it possible to locate existing and future local and regional studies in a comparative manner.

#### *Operationalizing the basic framework*

*The operational unit of analysis.* There were 6,009 CSDs for all of Canada in 1991 (STATISTICS CANADA, 1992). Our first task was to select those that are rural. Since our strategy provides many opportunities to refine the details of the selection, we gave priority to established practices for this selection. Statistics Canada provides the most generally used classification based on Census Metropolitan Areas (CMA) and Census Agglomerations (CA). The CMA is an urbanized core of at least 100,000 population and a CA is the main labour market of an urbanized core with a population of at least 10,000. The CMAs and CAs are further subdivided into three parts: an urbanized core, an urban fringe and a rural fringe. This provides us with a classification into five groups:

- the urbanized core of a CMA or CA (456 CSDs)
- the urban fringe of a CMA or CA (61 CSDs)
- the rural fringe of a CMA or CA (544 CSDs)
- an urban area outside of a CMA and CA (607 CSDs)
- a rural area outside of a CMA and CA (4,338 CSDs).

We treat rural areas as those within categories 3 and 5 above: the rural fringe of CMAs or CAs, and rural areas outside of CMAs and CAs. This permits us to include towns and villages up to a population size of 10,000, yet exclude those areas that are likely to be strongly integrated into one of the larger centres. It leaves us with 4,882 rural CSDs to consider.

*Operationalizing the five dimensions.* Each of the five dimensions identified for comparison was operationalized using variables available on the 1991 census database for CSDs. This was not an easy task since the emphasis we placed on trade, social and institutional factors is not well represented in the data. As a result, we expected considerable imprecision in the selection

Table 1. *Industries by exposure to global economies*

Exposed to global economies	Less exposed to global economies
Agriculture and related services	Construction
Fishing and trapping	Transportation and storage
Logging and forestry	Wholesale trade
Mining (milling), quarrying, and oil wells	Retail trade
Manufacturing	Real estate and insurance agent
Communication and other utilities	Government services
Finance and insurance	Education services
Business services	Health and social services
	Accommodation, food and beverage services

of CSDs and planned for the eventual evaluation of this problem once more detailed information was received from the field sites.

*Dimension 1: Exposure to global economic processes.* The extent of exposure to global economies was operationalized using the type of industry at the employment base of the community. We divided CSDs into those that have high levels of employment in industries that are exposed to global economic processes from those that are less exposed. We recognized that this classification was fraught with danger since each industry is made up of many diverse subsectors but the available data required such a simplification. Our plan is to re-evaluate this selection once the collection of more detailed information is complete.

On this basis, CSDs are classified into two types using the percentage of individuals employed in the industries as identified in Table 1. CSDs with more than 42% of their labour force in industries exposed to global markets were classified as globally exposed and those with more than 67% in industries exposed to local markets were classified as locally exposed. These values represent the 60th percentiles for the two types of markets.

*Dimension 2: Economic fluctuations.* The employment base of the CSD was also used to measure its economic stability. As with the previous dimension, we expected this to provide only a rough indicator that will be refined once we begin more detailed data analysis in the field. CSDs were classified into stable or fluctuating based on the division represented in Table 2. CSDs with more than 31% of their labour force in industries in fluctuating economies were classified as fluctuating and those with more than 77% in industries in stable economies were classified as stable. These values represent the 60th percentiles for the two levels of stability.

*Dimension 3: Metropolitan adjacency.* The third dimension relates to the proximity of major urban centres to the rural location. Since this criterion implies a regional, not community basis, we used the characteristic of the Census Division (CD) in which the CSD

Table 2. Industries by economic fluctuation

Fluctuating economies	Stable economies
Agriculture and related services	Manufacturing
Fishing and trapping	Transportation and storage
Logging and forestry	Communication and other utilities
Mining (milling), quarrying, and oil wells	Wholesale trade
Construction	Retail trade
Finance and insurance	Business services
Real estate and insurance agent	Government services
	Education services
	Health and social services
	Accommodation, food and beverage services

is located as a measure of adjacency. The modified Beale classification as developed by EHRENSAFT and BEEMAN, 1992, served as the basis for classification (see Table 3). We divided CSDs in Census Divisions of Beale codes 1, 2, 3, 4, 6 and 8 into metro adjacent and the others into rural.

This approach produces some anomalies for those CSDs that are in unusually large Census Divisions. In some cases, CSDs may be classified as metro-adjacent even though they are more than 100 km from a large metro area. These problems were addressed after the sites were chosen.

*Dimension 4: Local capacity.* As outlined above, local capacity is a reflection of the individual skills and institutional infrastructure of the CSDs. The census provides few variables directly relevant to this infrastructure, however, so we were forced to use indirect indicators. Occupational categories linked to education, health and government services were used for this purpose but they were calculated on a larger geographical unit than the CSD. The percentage of people employed in these industries for the relevant Census Consolidated Subdivision (CCS) was used,<sup>2</sup> providing for the fact that many of these services are regionally based. People are likely to make use of institutions that lie outside their CSD. Along with

these CCS-based variables we considered several indicators of human capital that contribute to the capacity of the various locations.

Given the multidimensional nature of capacity and the obtuse nature of the available indicators, we conducted an exploration of the variables using factor analysis. This technique uses inter-correlations between the variables as a basis for identifying any dimensions of capacity that might be reflected in the census data. As such, it provides a type of confirmatory analysis that moves the indicators beyond simple face validity.

Fifteen variables were considered as indicators of local capacity. Six were removed after preliminary analysis to eliminate high co-linearity leaving nine variables as the basis for the factor analysis (REIMER, 1995). The list of variables is provided in Table 4.

From these variables, the analysis identified three major factors related to local capacity, reflecting 51.3% of the variance (see Table 4). The first reflected the level of human capacity – primarily loading on the level of education in the CSD, along with the proportion of people employed in managerial and professional occupations. This is consistent with the literature emphasizing the importance of human capital for local economic development (BOLLMAN and BRYDEN, 1997; BOLLMAN, 1999). The second factor loads high on self-employment along with relatively low levels of employment in government service and education at the CCS level. This pattern implies a different form of capacity – one that is less tied to bureaucratic or corporate skills and more to entrepreneurship and the artisan skills associated with small-scale primary production. The third factor loads high on age, health and government service occupations, suggesting institutional capacity associated with the care of the elderly. Those CSDs with easy access to health care and other service institutions are in a better position to attract and retain their populations than those without. Each of these factors reflects a different form of capacity for the CSDs, yet each of them can provide resources for communities to respond to changing conditions. In order to recognize the variety of capacities, we

Table 3. Beale code definitions for Census divisions

Codes	Description	Operational definition
0	Central counties of large metro regions	Standard metropolitan statistical area (SMSA), 1,000,000 +
1	Fringe counties of large metro regions	SMSA, 1,000,000 +
2	Medium metropolitan	SMSA, 250,000–999,999
3	Small metropolitan	SMSA, 50,000–249,999
4	Nonmetro-urbanized, adjacent to metro region	Urban population, 20,000–49,999 (urban = settlements of 2,500 +)
5	Nonmetro urbanized, not adjacent to metro region	Urban population, 20,000–49,999
6	Nonmetro less urbanized, adjacent to metro region	Urban population, 2,500–19,999
7	Nonmetro, less urbanized, not adjacent to metro region	Urban population, 2,500–19,999
8	Nonmetro, rural, adjacent to metro region	No. places of 2,500 + population
9	Nonmetro, rural, not adjacent to metro region	No. places of 2,500 + population
10	Northern remote	Selected, very isolated areas

Table 4. Selected statistics from the factor analysis of capacity variables

Component	Initial eigenvalues: total	% of variance	Cumulative (%)	Rotation sums of squared loadings: total
1	1.890	21.000	21.000	1.805
2	1.691	18.791	39.791	1.730
3	1.036	11.514	51.305	1.197
4	0.991	11.016	62.322	
5	0.856	9.513	71.834	
6	0.836	9.284	81.119	
7	0.759	8.433	89.552	
8	0.592	6.582	96.134	
9	0.348	3.866	100.000	

Pattern matrix	Factor		
	1	2	3
% females with post-secondary education	0.895 <sup>+</sup>	0.269	-0.005
% males with post-secondary education	0.824 <sup>+</sup>	-0.010	0.031
% intellectual, managerial, artistic occupations	0.442 <sup>+</sup>	-0.270	-0.004
% of workers self-employed	0.197	0.737 <sup>+</sup>	-0.085
% from CCS in government service industries	-0.038	-0.732 <sup>+</sup>	-0.253
% from CCS in education service industries	0.092	-0.547 <sup>+</sup>	-0.039
Old dependency ratio: over 64 yrs	-0.137	0.249	0.769 <sup>+</sup>
% from CCS in health and social service industries	0.155	-0.183	0.664 <sup>+</sup>
% from CCS in communication and utilities industries	0.100	-0.333	0.219

Notes: Extraction method: principal component analysis (both sections of the table). Rotation method: Oblimin with Kaiser normalization.

<sup>+</sup>High loading variables used for simplified capacity index.

identified CSDs that were high on at least two of the three factors as having high capacity. The rest were considered to be relatively low.<sup>3</sup>

*Dimension 5: Outcomes.* The identification of lagging and leading locales was conducted by considering a large number of variables since there was wide variation in outcomes considered in the literature. As with the previous dimension, we used factor analysis to explore the interrelations between the variables, reduce the number to consider, separate the various types of outcomes and confirm our expectations regarding the types. After eliminating those with high inter-correlations, factor analysis was conducted using 14 variables (see Table 5). Three dimensions were identified (REIMER, 1995). The first loaded high on variables related to employment and the receipt of employment income. Low unemployment rates were likely to be found in those CSDs with high labour force participation rates, high levels of self-employment, and a high percentage of people receiving employment income. As expected, these locations are also low with respect to the receipt of government transfer payments.

The second factor identified is associated with housing tenure and marriage. Leading CSDs have a high proportion of dwellings that are owned whereas lagging sites have a high proportion where rents take up a substantial portion of the renter's expenses. High rents are also likely to be found where there is a high proportion of divorced people. The third factor is related to income levels. Leading sites have high incomes, more expensive houses and are less likely to

have a high proportion of people living below the Statistics Canada Low Income Cut Off Line.

Within each dimension, those CSDs with factor scores in the top 40% were considered to be leading and those in the bottom 40% were considered to be lagging. An overall indicator for leading was constructed by identifying CSDs that were leading in at least two of the dimensions. Similarly, CSDs that were lagging in at least two of the dimensions were designated as lagging sites. CSDs that were outside of these two categories were excluded from the sample frame.

This approach serves to provide a classification that is theoretically grounded and empirically operational. The factor analysis confirms the multidimensional nature of the two latter dimensions and provides a basis for the selection of specific indicators from the data available in the census. Important limitations remain, especially with respect to the sensitivity of the variables at our disposal, but the process so far enables us to strategically focus our resources in order to improve that sensitivity.

#### *The sample grid*

The decisions outlined above result in a sampling grid composed of 32 cells ( $2 \times 2 \times 2 \times 2 \times 2$ ). This provides a basis for comparisons that reflects most of the concerns identified by the NRE participants. All site choices were based on information regarding site conditions in 1991. By combining CSDs on many dimensions or combinations of dimensions, a large number of specific comparisons can be made.

Table 5. Selected statistics from the factor analysis of leading and lagging variables

Component	Initial eigenvalues: total	% of variance	Cumulative (%)	Rotation sums of squared loadings: total
1	4.347	31.053	31.053	3.358
2	2.326	16.615	47.667	2.203
3	1.447	10.336	58.003	3.360
4	1.136	8.113	66.117	
5	0.944	6.743	72.860	
6	0.843	6.022	78.882	
7	0.652	4.660	83.542	
8	0.569	4.062	87.604	
9	0.493	3.520	91.124	
10	0.401	2.862	93.986	
11	0.354	2.525	96.511	
12	0.210	1.499	98.010	
13	0.189	1.348	99.358	
14	0.090	0.642	100.000	

Pattern matrix	Factor		
	1	2	3
Unemployment rate, both sexes 15+	-0.811 <sup>+</sup>	-0.151	0.023
Government transfer payments (%)	-0.805 <sup>+</sup>	-0.173	-0.307
Participation rate, both sexes 15+	0.794 <sup>+</sup>	-0.210	0.113
% of workers self-employed	0.679 <sup>+</sup>	-0.408	-0.402
Employment income (%)	0.600 <sup>+</sup>	0.165	0.336
% of households where gross rent $\geq$ 30% of household income	-0.061	0.742 <sup>+</sup>	-0.193
% of dwellings owned	-0.104	-0.736 <sup>+</sup>	0.065
% divorced	-0.036	0.642 <sup>+</sup>	0.131
Median household income	0.248	-0.056	0.789 <sup>+</sup>
% of households below the low income cut-off	0.003	0.198	-0.782 <sup>+</sup>
Average value of dwellings	0.092	0.223	0.615 <sup>+</sup>
Median income, females 15+	0.191	0.206	0.578 <sup>+</sup>
Index of family income inequality	-0.023	-0.263	0.468
Owners major payments $\geq$ 30% of household income	-0.026	0.319	0.425

Notes: See Table 4.

+ High loading variables used for leading/lagging index.

Table 6. Number of rural CSDs by sample frame classification

	High capacity		Low capacity	
	Leading	Lagging	Leading	Lagging
<b>Globally exposed</b>				
<i>Fluctuating markets</i>				
Metro adjacent	175	27	46	15
Not adjacent	251	13	124	44
<i>Stable markets</i>				
Metro adjacent	4	26	8	19
Not adjacent	5	16	18	30
<b>Less globally exposed</b>				
<i>Fluctuating markets</i>				
Metro adjacent	4	5	4	9
Not adjacent	12	16	5	13
<i>Stable markets</i>				
Metro adjacent	12	100	7	45
Not adjacent	15	99	16	56

Table 6 identifies the cells proposed with the number of rural CSDs that are located in each cell. Of the 6,006 CSDs in Canada, 114 were removed because they did not meet our criteria for being rural.

Additional CSDs were excluded from the analysis since they were missing information from at least one of the variables in the factor analysis. The technique for identifying the dimensions excluded more CSDs since they were not at the extremes of one of the dimensions. This left 1,239 CSDs in the sampling frame.

#### Adaptations of the grid

Our initial sample of 32 CSDs was constructed using a simple random selection from each of these cells. This procedure was modified to some extent in order to meet the regional interests represented by the NRE and to make more efficient use of existing community research and experience. The modification procedures were the following:

- initially, one CSD was randomly selected from each cell
- we exchanged several selected CSDs with other ones from within the same cell in order to ensure adequate representation by the rural population in each province; this procedure used randomization techniques
- people in the NRE network were invited to propose



exchanges of the selected CSDs for others from within the same cell in order to accommodate special characteristics specific to the regions involved; changes of this type were made in only four cells.

The resulting identification of sample sites within the NRE Sample Frame is shown in Table 7 and Fig. 1.

**EVALUATION OF THE NRE SAMPLE FRAME**

There are three ways in which the sample frame was evaluated. The first relies on the census data for all rural CSDs and examines the extent to which the first four dimensions of the frame might account for

Table 7. The NRE sample

Global exposure	Stable/fluctuating economy	Metro adjacency	Capacity	Lagging	Leading
Low	Stable	Not adjacent	Low	Twillingate, NF	Arctic Bay, NT
Low	Stable	Not adjacent	High	Springhill, NS	Girouxville, AB
Low	Stable	Adjacent	Low	Indian Br 14, NS	Okanese 82, SK
Low	Stable	Adjacent	High	Tweed, ON	Cap à L'Aigle, QC
Low	Fluctuating	Not adjacent	Low	Néguac, NB	Upper Liard, YT
Low	Fluctuating	Not adjacent	High	Benito, MB	Lot 16, PE
Low	Fluctuating	Adjacent	Low	Pic Moberg S, ON	N. Plantagenet, ON
Low	Fluctuating	Adjacent	High	Ferintosh, AB	Carden, ON
High	Stable	Not adjacent	Low	Taschereau, QC	Port Alice, BC
High	Stable	Not adjacent	High	Armagh, QC	Seguin, ON
High	Stable	Adjacent	Low	St Roch de Mékinac, QC	Mackenzie, BC
High	Stable	Adjacent	High	Winterton, NF	St. Damase, QC
High	Fluctuating	Not adjacent	Low	Blissfield, NB	Tumbler Ridge, BC
High	Fluctuating	Not adjacent	High	Spalding, SK	Wood River, SK
High	Fluctuating	Adjacent	Low	Ste Françoise, QC	Rhineland, MB
High	Fluctuating	Adjacent	High	Hussar, AB	Usborne, ON

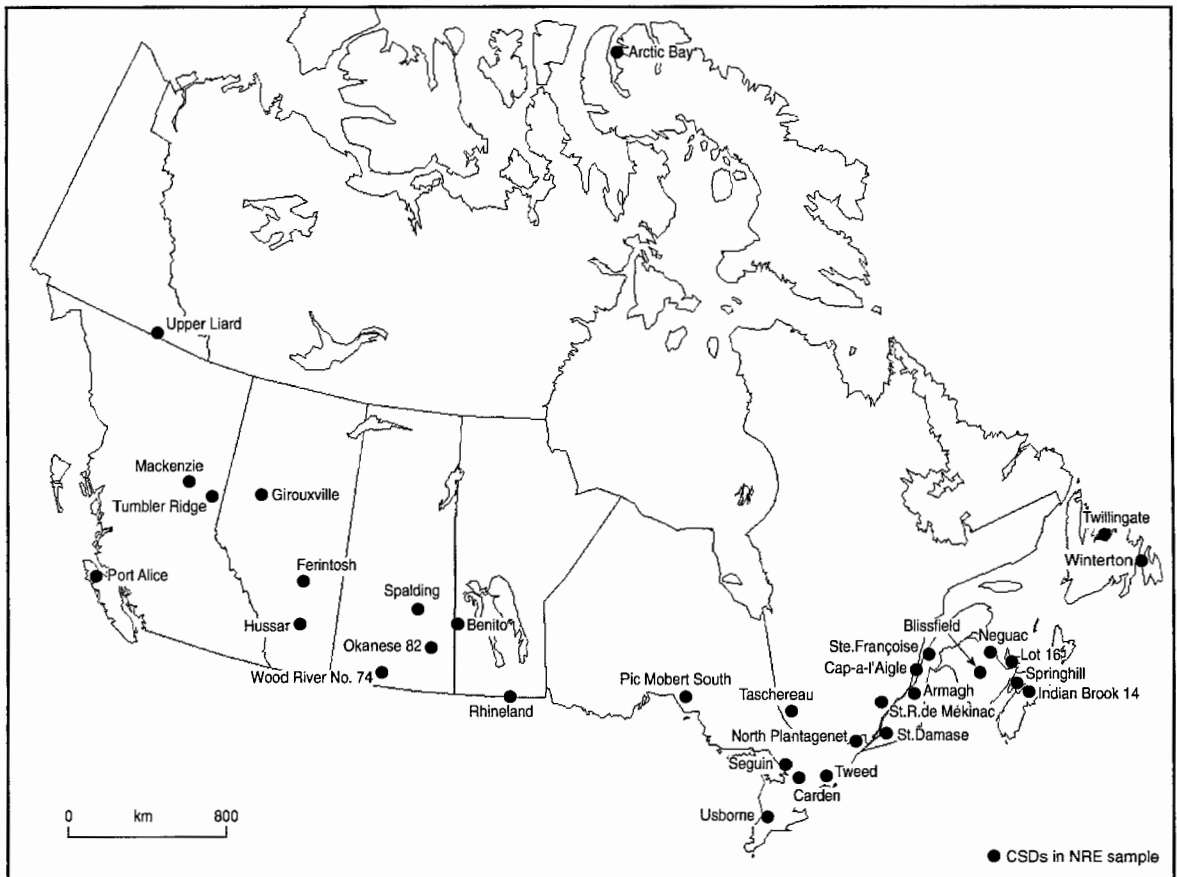


Fig. 1. NRE project: Canadian field site locations

variation in the last. This approach makes use of the assumption that the first four are conditions and the last can be viewed as an outcome. The second type of test uses the field site data collected in 25 of the 32 sites. Local observations and interviews are utilized to assess the accuracy of the classification established using the census data. The third type of test examines the external validity of the frame by comparing distance to local services by three of the sample frame dimensions.

#### Leading and lagging status

The sample frame includes the identification of CSDs with respect to their leading or lagging status on several economic indicators. This dimension was explicitly chosen as an outcome variable to ensure that we have representative sites of both types. The implicit assumption in this choice is that the first four dimensions are likely to be related to the fifth. This assumption can now be examined. By doing so, we not only test the value of the sample frame, but we are able to learn something about the relationships proposed.

Our first examination involved an analysis of variance of the leading or lagging status of all rural CSDs by a full factorial model using the other four dimensions. The leading or lagging status was measured by the factor scores for the third or income factor, thereby yielding a continuous variable from those that were highest on the income and housing variables to those that were lowest. Interaction terms were included in the model since we expected that the complexity of the processes involved would make them likely. The non-significant terms were removed and the final model was used in a multiple regression equation (see Table 8). The variables are ranked in their order of importance with respect to the standardized coefficients.

Table 8 shows that one of the three-way, three of the two-way interactions and all of the direct effects remained significant. Global, fluctuating, metro-adjacent and high capacity sites all had higher levels of leading/lagging status than local, stable, non-metro

Table 8. Regression on income factor by sample frame dimensions (significant relations only)

	B	Standard error	Beta	Significance
Interaction: glo/loc × stab/fluc	0.995	0.122	0.461	0.000
Institutional capacity	0.553	0.086	0.251	0.000
Metro adjacency	0.553	0.073	0.244	0.000
Interaction: adj. × cap.	-0.554	0.092	-0.232	0.000
Stable/fluctuating	-0.407	0.119	-0.186	0.001
Interaction: stab/fluc × cap.	0.359	0.117	0.160	0.002
Interaction: glo/loc × adj. × cap.	-0.267	0.120	-0.120	0.026
Global/local	-0.186	0.093	-0.083	0.046
(Constant)	-1.102	0.287		0.000
R <sup>2</sup>	0.310			

adjacent and low capacity. This fits well with our initial expectations regarding the significance of these dimensions except for the stable/fluctuating dimension. We expected that stable economies would more likely be leading than lagging. A closer look at the interaction effects reveals some of the complexity producing these unexpected results.

The most influential effect according to the regression analysis is the interaction between the global/local dimension and the stable/fluctuating dimension. Fig. 1 demonstrates the nature of this interaction. Among stable economies, being connected globally or locally bears little relationship to the leading or lagging status of the site. On the other hand, for fluctuating economies, being globally connected means a much greater chance of taking a leading status over being locally connected. Indeed, we find that having a fluctuating economy is an advantage within those locations that are globally connected, whereas it is a disadvantage within CSDs that have locally connected economies.

A similar relationship is found in the interaction between metro adjacency and capacity. As shown in Fig. 2, being metro adjacent or not makes little difference for those sites with high levels of capacity. On the other hand, low capacity sites are significantly disadvantaged if they are far from metropolitan centres. An implication of this relationship is that the impact of schools, hospitals and similar institutions on economic performance is greater within those sites far from metropolitan centres than those that are close to such centres.

These results reinforce the value of the sample frame in a number of ways. First, they demonstrate the importance of the frame dimensions by confirming their impacts on the economic performance of the

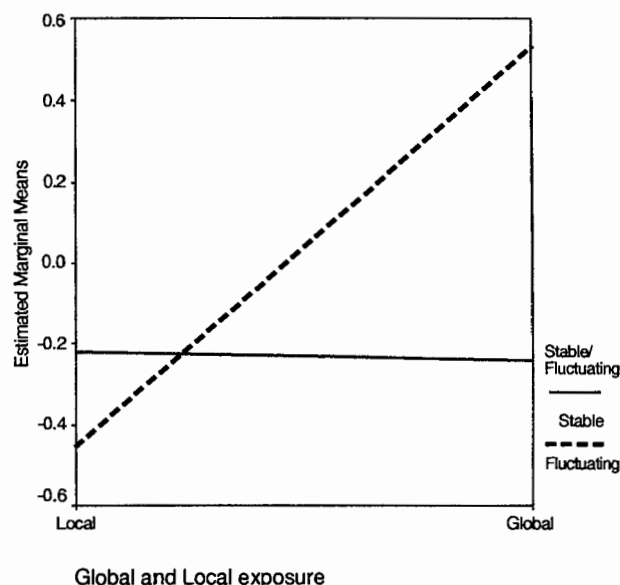


Fig. 2. Income factor by global/local exposure and the stability of the local economy

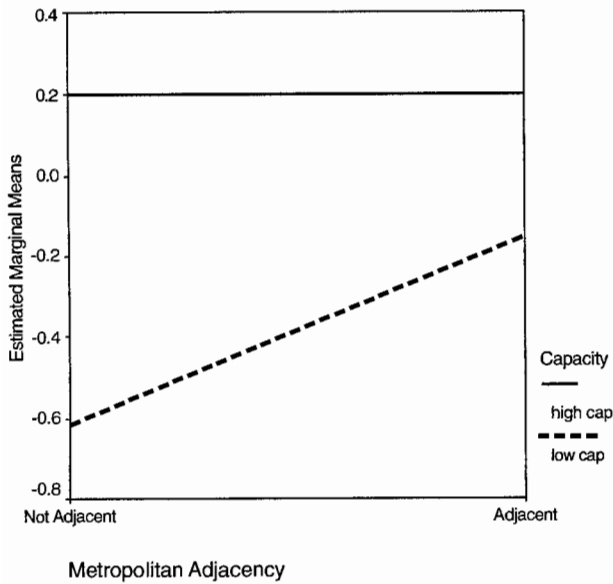


Fig. 3. Income factor by metro adjacency and institutional capacity

rural CSDs. Each of the dimensions has a significant relationship to the leading or lagging status of the sites – even when higher order interactions are controlled. Second, the results reinforce our expectation that the relationships between the dimensions are complex. Both higher order and direct effects remain significant in the analysis. This means that simple explanations for the processes involved are unlikely to be found, and simple research designs are likely to be misleading. The full complexity of the sampling frame must be taken into account in future analysis. Third, the results point us to specific substantive issues that must be considered in that analysis. They suggest that the global/local and stable/fluctuating statuses of the sites are most important in interaction: the economic impacts of one are conditional on the status of the other. They also suggest that the importance of metro adjacency and institutional capacity lies both in their independent impacts and in their interaction. Once again, the status on one dimension has important implications for the status on the other. Providing appropriate explanations for these relationships should be high on the research agenda.

*Field site verification*

Since its formation in 1997, statistical profiles have been completed for all the NRE sites using census data and research teams have collected more extensive information in 25 of the sites. This information includes socio-demographic, historical and administrative data regarding the sites. The profiles also include detailed information regarding access to government services in the sites (REIMER, 1998). The site profile data provides an opportunity to

Table 9. Suggested changes from field teams

Dimension	1st to 2nd	2nd to 1st	Total changes
Global/local	1	0	1
Stable/fluctuating	0	4	4
Adjacent/not-adjacent	3	1	4
High capacity/low capacity	3	8	11
Leading/lagging	2	0	2
Total changes	9	13	22

evaluate the appropriateness of our site identification with respect to the sampling grid. At this stage the evaluation will focus primarily on the last three dimensions since the first two require analysis of financial and trade data which is not available through the profiles.

Local field teams were asked to evaluate the sites on each of the dimensions in the sample frame. Over the 25 sites considered, 22 changes were suggested out of the 125 possible classifications. These suggestions reveal some important conclusions regarding the reliability of the classification using available census information (see Table 9).

Five of the 22 changes were in the first two dimensions of the sample frame (global/local and stable/fluctuating). These were based on impressionistic judgements by the site teams since a full inventory of the economic and trade data has not yet been conducted in the sites. Most of the suggestions focused on the extent of agricultural trade in the local area: three of the field teams argued that the structure of agricultural activities in their area rested on stable rather than fluctuating markets.

Four adjustments were suggested with respect to the metropolitan adjacency dimension. The site teams were asked to identify if a major metropolitan area was within commuting distance. Using this as a criterion for metro-adjacency, three sites were reclassified as 'not adjacent' and one was reclassified as 'adjacent'. In most cases this reclassification reflected our reliance on census divisions as a basis for the initial classification. Some of the sites were in CDs with a metropolitan centre, but at considerable distance from the centre due to the elongated shape of the CD. In one case, the commuting distance criteria justified a reclassification due to road conditions.

It is relatively easy to improve the reliability of the metro-adjacency dimension. At a general level, this could be accomplished by more sophisticated measurement of the distances (using, for example, smaller units than CDs), and at a local level, it could be done with a systematic collection of travel information. Our strategy will be to include such travel information in local surveys that are planned for the future.

The dimension reflecting local social and institutional capacity produced the greatest number of suggestions for changes from the field teams. Eleven of the 22 changes were on this dimension. Eight of the eleven

suggested moving from low capacity to high capacity. In most cases this was justified on the basis of institutions and opportunities that exist in the local sites but were not reflected in the census data. Private enterprises, voluntary groups, municipal facilities and local amenities were most often mentioned as features of the local scene which boost the capacity of the site. None of these are clearly represented in the census data.

Three field teams suggested reclassifying the sites from high capacity to low. These were instances where the services mentioned above were missing or declining. In one case the field team pointed out how a rapid increase in the number of retired people meant that the existing services (educational and recreational) had become inappropriate for the new population distribution. These results point to the insensitivity of census data to the institutional and social environment within the field sites. It has stimulated our research programme to develop a survey instrument for identifying these resources and services.

Field teams suggested that two of the sites should be reclassified on the final dimension. Both of them involved moving from leading to lagging status. In one case, the change was justified since the population structure and industry in the site was on the decline, a feature not picked up by the synchronic nature of the census. In the other case, it was a reflection of missing data: the site was missing important data on income because of its suppression by Statistics Canada. The local team felt that the income structure was sufficiently low to justify moving the site to lagging status.

These results point to a number of critical problems with census information for small area and community research:

- Census information is limited to demographic and economic information and insensitive to institutional, organizational, finance, trade, and amenity characteristics
- Census information is difficult to use for the analysis of change; our reliance on data from a single census year left us unaware of the transformation taking place in the field sites
- Census information is unavailable for the study of very small places because of the confidentiality constraints under which Statistics Canada operates; this is particularly important for income data.

#### *External validity*

The NRE Project includes a special study of access to government services within 25 of the field sites (REIMER, 1998). This study provides data to conduct rudimentary analysis of the validity of the indicators by comparing them with external factors. Our objective at this stage is to consider whether the comparisons integrated into the sample frame produce expected relations to other variables.

The Access to Services study gathered information regarding the distance to a large number of local services provided by all three levels of government and local voluntary associations. This distance was estimated for 1981 and 1998. Although the relationships are complex, we expect to find that the five dimensions of the sampling frame produce some differences in the distance to these services. This is most likely to be found with respect to the metro-adjacency, local capacity and leading/lagging dimensions.

To examine this expectation, we compared the average distances to these services on the basis of the last three dimensions. Table 10 provides the average distances for those services where the differences were significant using *t*-test analysis.

These results generally support our expectations regarding the importance and direction of the sample frame dimensions. Except for two comparisons, the distances are greater where the sites are not adjacent to metropolitan centres, low in institutional capacity and socio-economically lagging. The two variations from this pattern can be found with respect to legal and transportation distances in 1981. In 1981, legal services were closer where the site was not adjacent to a major metropolitan centre and transportation services were closer where institutional capacity was low. The former difference could be explained through a closer examination of the data. In 1981, three of the relatively isolated sites used local citizens to provide their notary services (a town clerk in one, an insurance agent in the other and a citizen in the third). The distance to legal services was therefore small. On the other hand, those living near metropolitan centres were required to travel to those centres since the services were not nearby. The unexpected result with respect to transportation was due to the move of a train station from one side of a river to another, thus creating a longer trip to catch a train.

These results can be understood as support for the utility of the comparisons in the sample frame even as they raise questions about the processes involved in accessing services. Several significant differences were found based on the sample frame dimensions and they were within our expectations regarding the direction of effects. Additional analysis using taxfiler data supports the value of these distinctions (REIMER, 2000).

#### *Sample site adjustments*

Based on the evaluations above, we made a number of adjustments to the original cell location of sites in our sampling frame. Rather than drop or include new sites, we chose to honour the commitments made to the people in the original sites and deal with the empty cells at a future date. This decision was reinforced by our expectation that the original cell locations would continue to change somewhat as we learned more about each of the sites.<sup>4</sup> We also expect that the cell

Table 10. Significant mean distances from site centroids by three sample frame dimensions ( $p < 0.05$ )

Services	Adjacency		Capacity		Leading/lagging	
	Adjacent	Not adjacent	High	Low	Lead	Lag
Financial (1981)			9 km	27 km		
Legal (1981)	36 km	11 km				
Transportation (1981)			50 km	17 km		
Transportation (1998)					34 km	66 km
Education (1998)	32 km	75 km				
Medical (1998)			28 km	56 km		

location of sites will change over time. In fact, the extent and conditions related to these changes are important foci of analysis. As a result, even the existing sites might be relocated to some of the empty cells as we consider changes over time.

#### *Dimension indicator adjustments*

Subsequent to the creation of the sample frame we were asked to consider its application to other countries and other data sets. As a result, we explored less complex indicators of local capacity and leading or lagging status. One variation used the non-weighted, standardized sums of the high loading variables identified for each component in the factor analysis (identified by + in Tables 4 and 5). Combining them in the same fashion as our original procedure resulted in a classification that placed 98.7% of the rural CSDs in the same category of capacity as our original sample frame and 99.4% of the CSDs in the same category of leading or lagging status. Another variation used single variables for each of the factor dimensions. This yielded a correspondence of 86.8% for local capacity (using the percentage of females with post-secondary education, the percentage of self-employed workers and the old dependency ratio) and 64.5% for leading and lagging (using the unemployment rate, the percentage of dwellings where the rent is more than 30% of the income, and the median household income).<sup>5</sup> The relative simplicity of the second approach warrants its consideration for future applications of the sampling frame. The relatively poor representation of the single variables supports the case for a multidimensional approach to measuring these outcomes.

## CONCLUSIONS

The NRE Sampling Frame and resulting sample of sites provide a valuable resource for rural research in Canada. It is the only national, comparative framework for rural analysis in the country. It combines analysis at the macro, meso (site) and micro (household) levels with a structure that facilitates the examination of linkages between them. It does so within a multidisciplinary context that ensures a flexibility of perspective and methodology.

The research activities in the field sites provide a strong basis for future endeavours of both analysts and educators. Each site team is building a database that includes details about the social and political history of the site, its socio-economic characteristics, its institutional structure and the involvement of citizens in voluntary associations. They have also systematically interviewed about 2,000 households over 20 of the field sites. This has provided detailed information on their demographic structure, labour force activities, local participation, informal economic activity and strategies for dealing with stress. In the process, the site teams have established working relationships with local people and begun the process of exchange and discussion that reinforces the development of a local learning culture. Although this approach is likely to have reactive effects on local communities, the value of close and sustained collaboration with people in the sites offsets the problems created. Details of that collaboration are maintained by each field team in order to assess this aspect of our work.

A crucial element of the sample frame is its comparative structure. By choosing the sites on the basis of five key dimensions, it ensures their selection reflects analytically meaningful comparisons instead of the accidental and arbitrary nature of many case studies. This framework dramatically increases the power of each field case since it places the richness of the site work within a context that permits one to separate the idiosyncratic from the general (MARSDEN, 1998). By linking local rural areas with regional, national and international levels the NRE sample provides a strong basis for evaluating the interactions and relative importance of processes at all levels. This facilitates stronger and more elaborate tests of the numerous positions emerging within the globalization and rural-urban debates.

The NRE Sampling Frame also overcomes several of the problems occurring with the use of census materials. By conducting intensive and collaborative work in the field sites, we are building a base of information that goes well beyond the demographic and economic data of the census. By monitoring the local interactions and identifications, we can treat local boundary identity as a topic of investigation rather than an artifact of administrative decisions. By involving

local people in the research we are able to access information within a context promoting openness, accountability, and capacity building.

The Sampling Frame is being developed as the basis for a long term 'Rural Observatory' for research and education. This includes the expansion of the sites both within Canada and beyond. For example, we have recently established an agreement with partners in Japan to include two Japanese sites using the basic structure of our sampling framework. We look forward to including similar comparisons from other nations. At the same time, we are considering the expansion of our national sites in two ways. The first is to select sites in those 'cells' that became empty after our reevaluation exercise. This can only occur as our financial and human capacity increases. The second is to include sites investigated by other researchers or teams. In this case, the site would be located with respect to the NRE sample framework and some exchange of research instruments would occur in order to develop a common base of information. This approach is very promising since it would quickly increase the comparative power of both projects.

The full value of the NRE approach can only be realized by responding to the collaboration opportunities it creates. For this reason we are actively soliciting the involvement of other researchers, policy makers and rural people in our activities. For the research community, the NRE Sample Frame is a useful context for involvement. We welcome the interest of researchers who share our concerns with rural issues and are open to possible collaboration that might emerge from such interests. We operate on the simple principle that those who provide sustained analytical, informational or financial support to the NRE Project are entitled to access the full range of information and expertise

we have at our disposal (limited only by confidentiality agreements we might have with some partners). The utility of the project to date confirms the wisdom of this decision and holds considerable promise for the future.

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## NOTES

1. Details regarding CRRF and the NRE Project can be found via the CRRF web page (<http://www.crrf.ca>) and the NRE web page (<http://nre.concordia.ca>).
2. A Census Consolidated Subdivision is usually a group of small CSDs (less than 25 km<sup>2</sup>) aggregated with a proximate large CSD. They were developed to better reflect labour market areas – primarily for the dissemination of census of agriculture data (STATISTICS CANADA, 1992, p. 110).
3. The 60th percentile of the factor scores were used as the lower cut-off for high values on each dimension.
4. The original cell locations are all identified in terms of site conditions in 1991. Modifications to those locations refer to new information arising about the 1991 conditions, not changes in the cell locations over time.
5. As noted by one reviewer, since factor models are not uniquely identified, these variations remain consistent with the theoretical significance of the factors as outlined in the second section.

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