

# Rural and Small Town Canada

## ANALYSIS BULLETIN



Rural and Small Town Canada Analysis Bulletin  
Vol. 8, No. 7 (October 2011)

Catalogue no. 21-006-X

### Employment shifts in natural resource sectors: A focus on rural value chains

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#### Highlights

- Employment in natural resource sectors (including closely-related sectors in the value chain of each natural resource sector) represented 13% of Canada's total employment in 2001, down from 14% in 1991.
- Employment in natural resource sectors and their related value chains represented a relatively higher share of total employment in predominantly rural regions (22%) in 2001, compared to predominantly urban regions (8%).
- However, the share of workers in predominantly rural regions employed in each of the natural resource sectors (agriculture, fishery, forestry, mining and energy) declined from 1991 to 2001.



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**Rural and Small Town Canada  
Analysis Bulletin**

ISSN 1481-0964  
ISBN 978-1-100-18878-2

Editor: Ray D. Bollman

Published in collaboration with The Rural Secretariat, Agriculture and Agri-Food Canada. The *Rural and Small Town Canada Analysis Bulletin* is an occasional publication of the Agriculture Division of Statistics Canada.

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Special thanks to Bernadette Alain and Véronique Julien for their contribution in the publication process.

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.	not available for any reference period
..	not available for a specific reference period
...	not applicable
0	true zero or a value rounded to zero
0 <sup>s</sup>	value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
P	preliminary
r	revised
x	suppressed to meet the confidentiality requirements of the <a href="#">Statistics Act</a>
E	use with caution
F	too unreliable to be published

## **Introduction**

The economic upgrading from primary production to processing, services and higher value activities is one of the main priorities on the agenda of local and national development officers. This development strategy is even more important for rural communities that have traditionally relied on raw commodity production, which are now increasingly exposed to global competition and fluctuating commodity prices. Although there are several studies that focus on the spatial distribution and performance of primary production *or* processing *or* services activities in isolation, an understanding of the geographic patterns of these vertical linkages is more limited.

This bulletin takes a value chain perspective and assesses the employment shifts between components of the value chain of natural resource sectors within Canada. The analysis also includes a perspective across regions, with an emphasis on Canada's rural and urban regions (Box 1). Understanding the nature of these employment changes is helpful in revealing the relevance of the natural resource sector to the rural economy as well as the contribution of the rural economy to national value chains.

A "value chain" comprises the whole range of activities that are required to deliver a product to final consumers (Kaplinsky 1999). We use an operational definition of natural resource value chains that focuses on one single element: number of individuals employed (Box 2). Although this is a simplification, the analysis is one attempt to bring a value chain perspective into rural development analysis in Canada. For a specification and analysis of resource-sector value chains in 2001, see Natural Resources Canada (2001).

In this analysis, we placed a specific emphasis on the spatial distribution of resource sector employment. We used a spatially lagged employment indicator to compare a region and the

milieu in which the region is located (Box 3). In so doing, we identified regions whose economy is directly linked to a natural resource sector as well as regions which were located in a regional milieu that is highly reliant on the economy of natural resources and their value chains.

Value chain analysis considers regional and international trade relations as being part of a series of networks of producers, traders and retailers, whereby knowledge and relationships are developed to gain access to markets and suppliers. It has been argued that the success of disadvantaged areas in value-adding their production lies in the ability of these regions to access these networks (UNCTAD 2000). This bulletin remains a preliminary exploration of the value chains of natural resource sectors and their relevance to the rural economy.

During the 1990s, the employment changes in Canada's natural resource sectors and their associated value chains were substantial. However, the distribution of these changes varied between each natural resource sector, each component of the value chain and across space. Contrary to what might be generally perceived, employment directly related to the value chains of natural resources has not always declined. Employment in the full value chain of forestry, in fact increased between 1991 and 2001, while declining employment occurred in the agriculture, fisheries, mining and energy value chains. Generally, the employment decline was seen in primary production and processing, while the employment growth was mainly in services to primary and wholesaling.

In Canada's predominantly urban regions (Box 1), both the employment decline in natural resources and the employment growth in other sectors have been faster than in predominantly rural regions. As a result of this, by 2001, employment in primary production was relatively more

concentrated in predominantly rural regions than it was in 1991. Rural metro-adjacent regions generally saw some increase in specialization in advanced components of the natural resource value chains (services and first-stage processing). As a result, these regions have been able to upgrade and diversify their employment base and compensate for the decline in primary production employment. In contrast, the more rural regions,

specifically rural non-metro-adjacent regions, have not been able to replicate this.

Thus, the spatial distribution of this employment shift was not uniform. Employment in primary production and in services to primary became more spatially concentrated over the 1990s. In contrast, the employment shift within processing and wholesale activities was more evenly distributed across space.

### Box 1: Geographic level of analysis

In this bulletin two types of geographies are used: census divisions and regional types.

A census division (CD) is the general term for provincially legislated areas (such as county, *municipalité régionale de comté* and regional district) or their equivalents. Census divisions are intermediate geographic areas between the province/territory level and the municipality (census subdivision).

In our study, a census division (CD) represents a region which is the basic geographical building block from which regional types are generated. As CD boundaries change from census to census, our data are tabulated using the constant geographic boundaries of 1996. There were 288 CDs in 1996.

Regional type is defined using the Organisation for Economic Co-operation and Development (OECD) typology. An OECD **rural community** is a community with a population density less than 150 people per square kilometre. Using this definition of rural community, the following classification of regions is used by the OECD:

- **Predominantly rural regions:** more than 50% of the population lives in a ‘rural community’;
- **Intermediate regions:** 15% to 49% of the population lives in a ‘rural community’; and
- **Predominantly urban regions:** less than 15% of the population lives in a ‘rural community’.

Predominantly rural regions are further broken down to recognize diversity within predominantly rural regions. There are three types of predominantly rural regions: **rural metro-adjacent regions**, **rural non-metro-adjacent regions** and **rural northern regions** (Ehrensaft and Beeman, 1992).

**Rural and Small Town Canada Analysis Bulletins** address issues of interest to rural Canada such as employment trends, education levels, health status, Internet usage and number of firms by type, among others.

As discussed in Puderer (2009) and du Plessis et al. (2001), there are numerous possible operational definitions of urban and rural areas. In this bulletin, we are using the definition that we judge to be the most appropriate for this analysis.

## **Box 2: Data source and definition of the value chain of resource sectors**

The employment data used in this analysis are from the Censuses of Population for 1991, 1996 and 2001 and refer to the experienced labour force for both genders 15 years of age and over. The experienced labour force refers to individuals who were employed during the week prior to census day plus those who were unemployed but who had last worked for pay or in self-employment since January 1st of the previous year.

The delineation of value chains used in this analysis is based on the 1980 Standard Industrial Classification - Establishments (hereafter referred to as SIC-E) (Statistics Canada 1980).

For the purpose of this research, we defined comparable value chain structures for each resource sector. Five natural resource sectors are considered: (1) agriculture; (2) the fishery; (3) forestry; (4) mining; and (5) energy. Appendix Table A.1 shows the comparable components of the value chain of each resource sector together with the corresponding industry codes for each component in each value chain.

We use Standard Industrial Classification (SIC-E) codes, instead of the more recent North American Industry Classification System (NAICS) codes (Statistics Canada 2003), because only the SIC-E codes can be applied to the census data for 1991, 1996, and 2001. This provides a better historical perspective (a similar analysis can now be carried out by comparing 2001 and 2006 using the NAICS classification). Employment data on the Census of Population was coded at the 3-digit level of the SIC-E. Thus, our classification is constrained to the 3-digit level. The entire set of SIC-E codes available for use in this analysis is available online on the Statistics Canada web page (Statistics Canada 1980).

The focus of our analysis is on primary production, services to primary production, wholesaling and the first-stage of processing (i.e. manufacturing). Beyond the first-stage of processing, it becomes increasingly difficult to assign an industry to a specific value chain. Based on the detailed description of the SIC-E codes (Statistics Canada 1980), we assigned industries that appear to have reasonably strong linkages with the natural resource sector. For some industry codes, the Statistics Canada Input-Output Tables 2000 were used to ascertain major industry linkages along the production chain. Although we did not use fixed thresholds, the Input-Output tables provided enough insight to determine major linkages in order to assign the SIC-E code to a specific value chain.

We acknowledge that the operational delineation of a value chain, in general, and that based on an industry code system, in particular, remains challenging. First, it is conceptually difficult to delimit the chain because the sectoral linkages from one stage to the next stage of processing become increasingly complex as we move to higher value-added activities. There are a number of activities where the association with a specific sector is difficult if not impossible to assign (this problem is typical of some service sectors such as insurance, transportation, packaging, etc). An insurance establishment or a trucking establishment may have customers associated with different value chains. Thus, these establishments, generally, can not be allocated to a given value chain. The complexity and substitutability of production inputs also increases as we move away from the primary production stage, which makes it difficult to assign an establishment to a specific value chain. Second, the demarcation of a value chain is problematic because of the way industry statistics are reported. For example, the standard industrial classification does not always overlap with a specific sectoral chain. As a result of these challenges, the operational definition of a value chain, even if in broad sectoral terms, implies a certain degree of simplification.

In spite of these limitations, the classification presented in Appendix Table A.1 represents our attempt to develop a framework that allows some comparability across major natural resource sector and permits an analysis of their changes across space and time.

### Box 3: Methodology: Measuring spatial association

To assess the spatial distribution of value chain segments we use a set of indicators and analytical methods. All these methods rely on the definition of spatial interactions as captured by a spatial weight matrix.

**Spatial weight matrix (W).** A spatial weight matrix defines the spatial arrangement of observations across space. The elements of the matrix,  $w_{ij}$ , express the presence or absence and the degree of spatial interaction between each possible pair of locations. We use a distance-based weight matrix. Hence,  $w_{ij}$  is computed as the inverse of the squared distance between geographic centroids of each pair of census divisions (CDs). Our centroid measure is the geographic centre of each CD. We assume that interaction exists within the distance radius of 1,200 km between CD centroids and beyond this radius the value of the weight is set equal to zero. The matrix is row standardized. The same spatial weight matrix is used in all the computations reported below.

**Spatial autocorrelation of value chain segment.** Spatial autocorrelation occurs when the spatial distribution of the variable of interest exhibits a systematic pattern. The degree of spatial autocorrelation of segments of the value chain is measured by the Moran's I statistic, which is defined for each reference year as follows:

$$I = \frac{n}{s} \cdot \frac{\sum_{i=1}^n \sum_{j=1}^n w_{ij} (x_i - \mu) \cdot (x_j - \mu)}{\sum_{i=1}^n (x_i - \mu)^2}$$

where  $w_{ij}$  is the element of the spatial weight matrix **W** for the observation pair  $i,j$ ;  $x$  is the indicator of concern for the locations  $i$  and  $j$ , with mean equal to  $\mu$ ;  $n$  is the number of observations and  $s$  is a scaling factor equal to the sum of elements of **W**, which in the specific case of row-standardized matrix is also equal to  $n$  (since each row sums to 1). Moran's I is similar but not equivalent to a correlation coefficient. However, the statistic is not centered around 0. The theoretical mean of Moran's I is in fact  $-1/n-1$ . But the value of Moran's I ranges from  $-1$  (perfect negative spatial autocorrelation) to  $+1$  (perfect positive spatial autocorrelation).

**Assessing spatial association between segments of the value chain.** It can be shown that the Moran's I is equivalent to the slope of the regression line between the local indicator and its spatial lag. The "local indicator" that we are using in this paper is the "location quotient", as defined in Box 4. To assess the degree of spatial correlation between a segment of a value chain and another segment of the same value chain, we estimate a set of regressions:

$$WLQ_i^a = \alpha + \beta LQ_j^a + \varepsilon$$

where  $WLQ$  is the spatial lag value of the location quotient for a segment  $i$  of the value chain  $a$ , while  $LQ_j$  is the location quotient for the segment  $j$  ( $i \neq j$ ) of the same value chain  $a$ . In the table, we report the value of the estimated  $\beta$  coefficients.

**Mapping of reliant regions and regional milieu.** The data used in the maps is the classification generated by a **Moran scatterplot**. This is a plot of  $Wz$  versus  $z$ , where  $W$  denotes a row-standardized spatial weights matrix and  $z$  is the standardized variable, which in our case is the location quotient of the region  $i$  for the value chain  $a$  and component  $b$ . Each map classifies the regions into four categories:

- regions with an above average regional intensity of employment (i.e. a  $LQ > 1$ ) and an above average intensity of employment in the milieu surrounding the given region (i.e. a relatively high spatial autocorrelation). This group is the core cluster of high reliant regions;
- regions above average on the former and below average on the latter;
- regions below average on the former and above average on the latter; and
- regions below average for both indicators. This group is the cluster of non-reliant regions.

The spatial measures of autocorrelation are computed using Stata modules for spatial analysis (Pisati 2001).

## **Why are natural resource sector value chains important?**

A “value chain” can be defined as “the full range of activities which are required to bring a product or service from conception, through the intermediary phases of production, delivery to final consumers and final disposal after use” (Kaplinsky 1999:121). These activities can include input and services to the primary producer, primary production, processing, handling, transportation, storage and retail, and service activities related to processing and marketing, including financial and insurance services, etc. (Porter 1985). In this analysis we consider only four aspects of the value chain – primary production, services to primary, wholesaling and first-stage processing (Box 2).

Natural resource sectors have long been exposed to globalization (falling price of transportation and communications) and fluctuations in world prices (Innis 1933, 1940, 1951). But the evolving global environment and emerging competitors in the world market poses continuous new challenges to traditional areas of production and processing.

Over the last decades, the economy of rural regions has become increasingly diversified and service-oriented. This transformation is largely associated with major changes in the predominantly rural and rural northern resource sectors (agriculture, forestry, fishing, mining and energy). There are two salient features of these changes which are relevant for rural development initiatives and which can be better articulated by looking at the components of the value chain. First, there has been a continuous shift of employment from primary production to processing and service activities; for instance, from farming to services to farmers and processing of agricultural products. Second, there has been a spatial reorganization of some of the activities in the value chains, between and within

predominantly rural and predominantly urban areas. For example, some of the services to farmers that were located in small villages have been relocated into larger towns or cities.

Both these processes of change are ongoing. New technologies keep reducing the amount of labour per unit of output in primary production (and increasingly also in the service sector). Similarly, the process of spatial reorganization has gone through rapid developments at the national and global level. Notably, after decades where processing activities became increasingly concentrated in core predominantly urban areas, many countries are now experiencing a reverse core-periphery pattern in which manufacturing activities are relocating into predominantly rural regions (Baldwin et al. 2001).

The analysis of value chains, from a regional perspective, requires defining and understanding of the ways in which specific economic activities of a region are linked to the rest of the national and global economy. The nature of these linkages can determine, to a large extent, the distributional outcomes along the chain and the capacity of a region to upgrade and sustain its economic base (Kaplinsky and Morris 2001). Part of the success of disadvantaged areas in generating employment from their primary products lies in the ability of these regions to access and take advantage of the benefit of specific value chains (UNCTAD 2000). In contrast, being cut off from a specific value chain may have severe consequences for a region. Therefore, an analysis of the structure and nature of predominantly rural value chains can help recognize persistent, and in some cases widening, regional inequalities (Kaplinsky and Morris 2001).

An analysis of predominantly rural value chains, even beyond the natural resource sectors, can provide better insights on how the rural economy often contributes to major value chains which are largely perceived as predominantly urban. Feser

and Isserman (2008) show, for the USA economy, that a significant proportion of employment in some national value chains that are generally perceived to be urban based are, in fact, rural based. They conclude: "rural counties play a significant role in numerous, diverse value chains. This statement holds true whether one focuses on the primary, distinguishing core industries of a value chain or its higher wage industries. It also holds true for rural counties whether they are within metropolitan areas or outside such integrated regional economies. Rural counties do not always play a secondary role in key US value chains, nor are they always the location of lower wage segments in key chains. Thus, understanding and supporting the competitiveness of US industry entails recognizing and supporting its rural-based component." (Feser and Isserman 2008: 107).

Finally, even though the rise of the knowledge-economy has overshadowed the role of the resource sector in the economy of many OECD countries, the growing global concerns on climate change, energy production and sustainability of food systems have focused the attention back on the role played by the resource sectors in

addressing these issues. The stewardship of natural and environmental resources will remain a distinguishing feature of predominantly rural areas. The use of these resources will continue to represent a unique asset upon which predominantly rural development initiatives can be built.

**Overall, there was employment growth for the forestry value chain but employment declined in primary production and processing in most resource sector value chains**

In 2001, total employment in all resource sector value chains amounted to 2 million workers, representing 13% of Canada's total employment (Table 1). Over the 1991 to 2001 period, resource sector value chain employment remained at about 2 million workers whereas total employment in all sectors increased 10% over this period, from 14.2 million to 15.6 million workers. As a consequence, the share of workers employed in resource sector value chains declined from 14% in 1991 to 13% in 2001.

**Table 1 Employment in natural resource sector value chains, Canada, 1991, 1996 and 2001**

Component of each value chain	1991	1996	2001	1991	1996	2001	1991 to 1996	1996 to 2001	1991 to 2001
	number employed			as percent of total employment			percent change		
<b>Agriculture</b>									
Primary production	489,420	442,765	409,505	3.4	3.1	2.6	-10	-8	-16
Service to primary	47,735	60,130	61,705	0.3	0.4	0.4	26	3	29
Wholesale	36,540	45,360	49,460	0.3	0.3	0.3	24	9	35
First-stage processing	226,770	217,670	217,975	1.6	1.5	1.4	-4	0	-4
Total value chain	800,465	765,925	738,645	5.6	5.3	4.7	-4	-4	-8
<b>Fisheries</b>									
Primary production	43,010	39,305	43,355	0.3	0.3	0.3	-9	10	1
Service to primary	4,130	4,480	4,985	0.0	0.0	0.0	8	11	21
Wholesale	...	...	...	...	...	...	...	...	...
First-stage processing	57,740	41,005	39,400	0.4	0.3	0.3	-29	-4	-32
Total value chain	104,880	84,790	87,740	0.7	0.6	0.6	-19	3	-16
<b>Forestry</b>									
Primary production	69,585	68,680	68,030	0.5	0.5	0.4	-1	-1	-2
Service to primary	36,690	33,705	29,670	0.3	0.2	0.2	-8	-12	-19
Wholesale	73,645	84,305	118,520	0.5	0.6	0.8	14	41	61
First-stage processing	256,900	266,120	277,615	1.8	1.9	1.8	4	4	8
Total value chain	436,820	452,810	493,835	3.1	3.2	3.2	4	9	13
<b>Mining</b>									
Primary production	81,780	65,880	57,350	0.6	0.5	0.4	-19	-13	-30
Service to primary	9,350	11,660	8,745	0.1	0.1	0.1	25	-25	-6
Wholesale	18,980	14,145	17,930	0.1	0.1	0.1	-25	27	-6
First-stage processing	333,275	317,655	341,980	2.3	2.2	2.2	-5	8	3
Total value chain	443,385	409,340	426,005	3.1	2.9	2.7	-8	4	-4
<b>Energy</b>									
Primary production	68,595	54,355	54,740	0.5	0.4	0.4	-21	1	-20
Service to primary	31,545	36,065	50,220	0.2	0.3	0.3	14	39	59
Wholesale	53,465	52,665	46,305	0.4	0.4	0.3	-1	-12	-13
First-stage processing	127,285	104,635	104,625	0.9	0.7	0.7	-18	0	-18
Total value chain	280,890	247,720	255,890	2.0	1.7	1.6	-12	3	-9
<b>All resource sector value chains</b>									
Primary production	752,390	670,985	632,980	5.3	4.7	4.1	-11	-6	-16
Service to primary	129,450	146,040	155,325	0.9	1.0	1.0	13	6	20
Wholesale	182,630	196,475	232,215	1.3	1.4	1.5	8	18	27
First-stage processing	1,001,970	947,085	981,595	7.0	6.6	6.3	-5	4	-2
Total value chain	2,066,440	1,960,585	2,002,115	14.5	13.7	12.9	-5	2	-3
<b>Total employed (all sectors)</b>	<b>14,220,080</b>	<b>14,317,540</b>	<b>15,576,460</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>1</b>	<b>9</b>	<b>10</b>

Note: See Appendix Table A.1 for SIC codes included in each value chain.

Source: Statistics Canada. Census of Population, 1991, 1996, and 2001.

Part of the transformation within resource sector value chains is reflected in the employment shifts between components of the value chains. The main trend recorded during the 1990s was a decline in primary production employment in most value chains and a decline in processing employment in most value chains. This general decline took place in the context of an increase in services and/or wholesaling employment in most value chains. In the case of forestry, this increase in services and wholesaling led to employment growth for the value chain as a whole.

Employment in the primary production component of resource sector value chains declined between 1991 and 2001, with an overall loss of about 120,000 employees. This trend is most evident in mining, energy and agriculture (Figure 1). In absolute terms, the decline was largest for agriculture (with a drop of almost 80,000 workers in primary production). But in terms of the rate of change, the contraction was more pronounced in mining (a decline of 30% or 24,000 employees) and in the energy sector (a decline of 20% or about 14,000 employees). For the fishing industry, primary production employment levels were essentially stable between the beginning and the end of the decade. Part of this trend may be the result of new developments in the aquaculture sector (Statistics Canada 2008).

Similar to primary production, employment in first-stage processing for all resource sectors combined was lower at the end of the 1990s, compared to the beginning of the 1990s. There was an overall loss of almost 20,000 employees. However, employment in forestry and mining processing was higher in 2001, compared to 1991. For these two sectors, however, the increase between 1991 and 2001 represented a partial recovery from a sharper decline in the late 1980s. First-stage processing in the fisheries and energy value chains recorded the largest decline both in absolute and percent terms, with job losses in the

order of 20,000 workers in each sector and a relative decline of 31% and 18%, respectively.

In contrast with the trends for the primary production and first-stage processing activities, employment in services to primary increased significantly from 1991 to 2001. For the five resource sectors combined, employment in the services to primary component of the value chain grew almost 26,000 workers. Changes were particularly large for the services component of the energy value chain (increasing 59% or about 19,000 employees) and for agriculture (with a 29% growth or 14,000 additional employees).

Similarly, employment in the wholesaling component for resource sector value chains as a whole was on the rise between 1991 and 2001. The wholesale component for all resource sectors value chains grew by almost 50,000 workers, but most of this was due to expansion in wholesaling in the forestry sector (almost 45,000 additional jobs) plus an employment increase of 13,000 in agriculture wholesaling. However, energy and mining wholesaling recorded an employment decline.

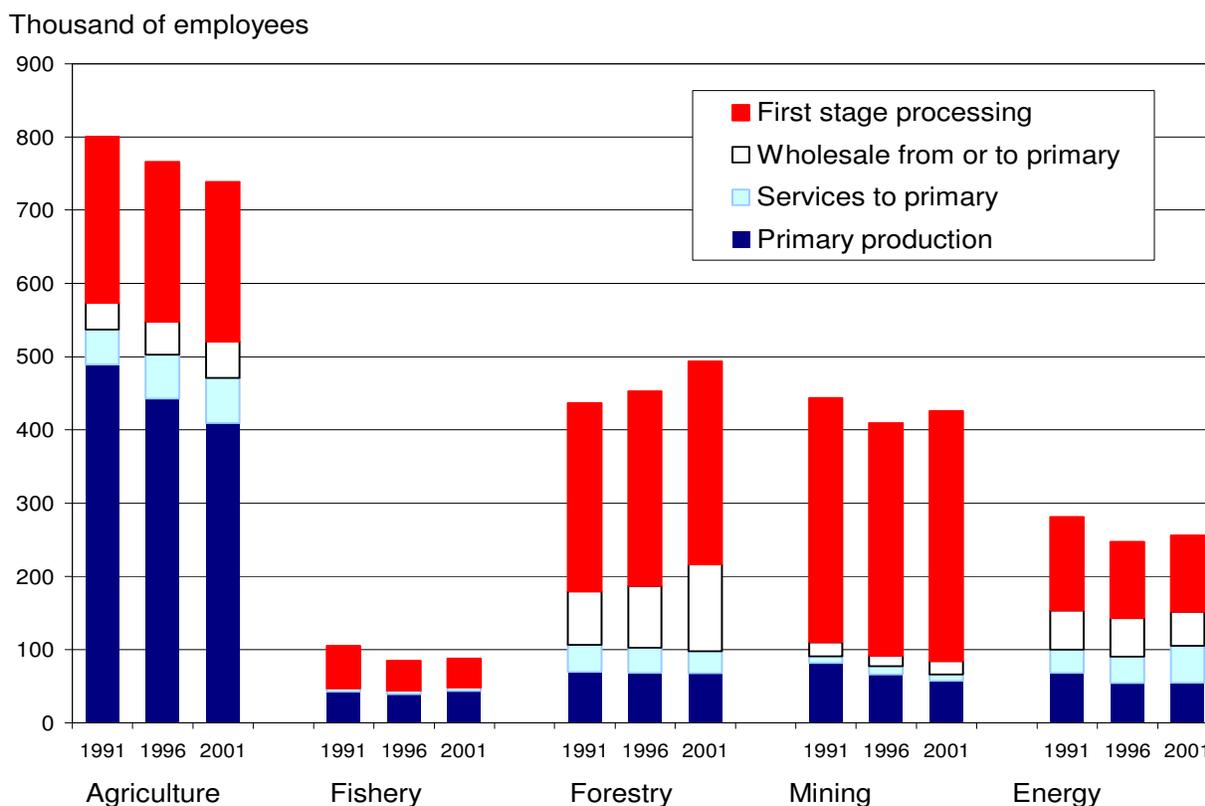
The net effect of these employment shifts was some growth from 1991 to 2001 in the forestry value chain, driven in particular by wholesale and processing expansion. For other value chains, the net effect of the changes over this period has been a declining employment trend, although the expansion in service and/or wholesaling has partially offset the decline in primary and processing employment.

The largest resource sector value chain, as defined in our study, is the agriculture value chain. The level of employment in 2001 was 739 thousand (Figure 1). This is equivalent to 5% of total employment (Table 1). This is followed by the forestry value chain with 494 thousand being employed (3.2% of total employment) and the mining value chain with 426 thousand being employed (2.7% of total employment). As noted

in Table 1, 13% of total employment in Canada was dedicated to a resource sector value chain in 2001. However, this share varies considerably by type of region. In 2001, employment in resource sector value chains represented 25% of total employment in rural non-metro-adjacent regions (Figure 2). This is a decline of 2 percentage points

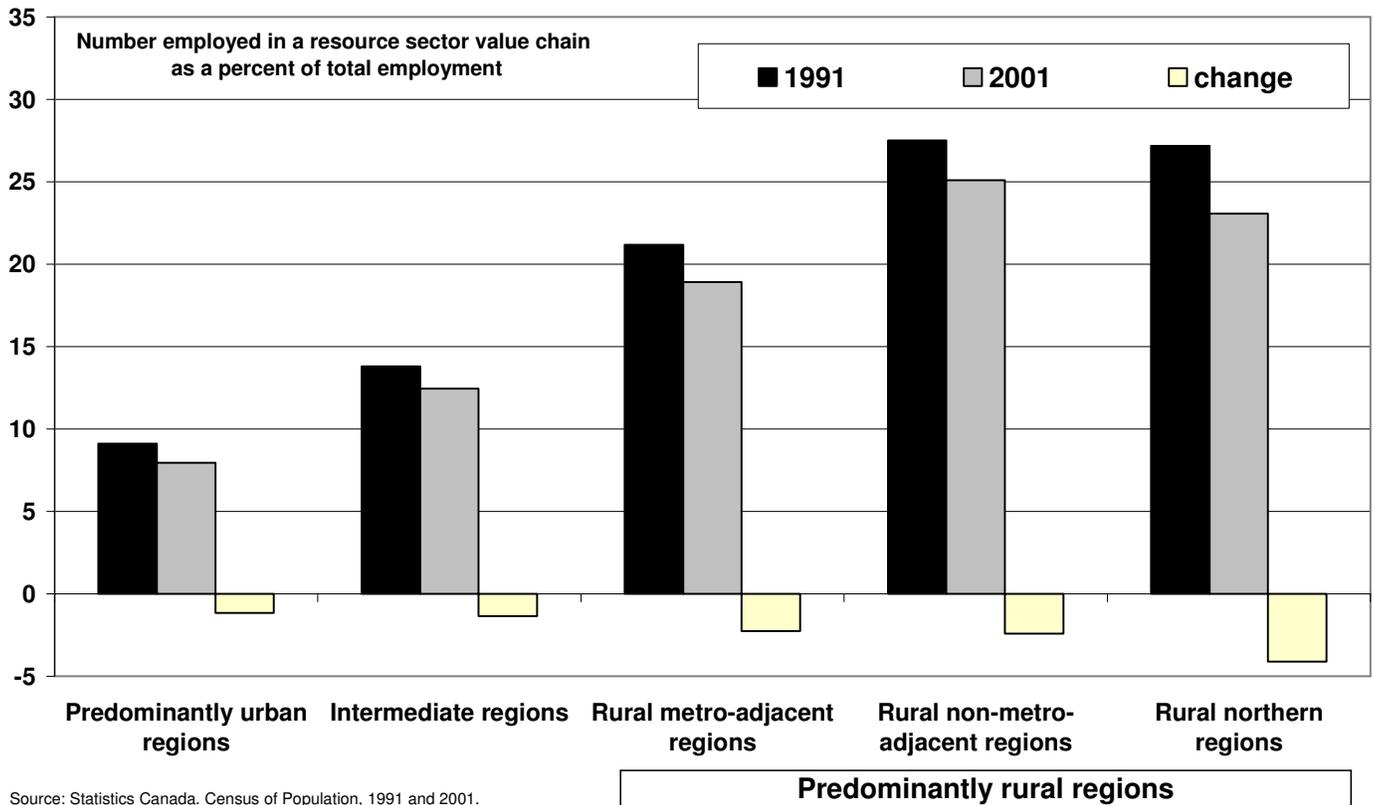
over the 1991 to 2001 period. This decline in share in rural non-metro-adjacent regions is due to the combination of a growth in total employment (up 4% from 1991 to 2001) and a decline in resource sector employment (down 5% from 1991 to 2001) (Appendix Table A.16).

**Figure 1 Total employment in natural resource value chains, Canada, 1991 to 2001**



Source: Statistics Canada. Census of Population, 1991, 1996 and 2001.

**Figure 2 In 2001, 25% of employment in rural non-metro-adjacent regions was in a resource sector value chain**

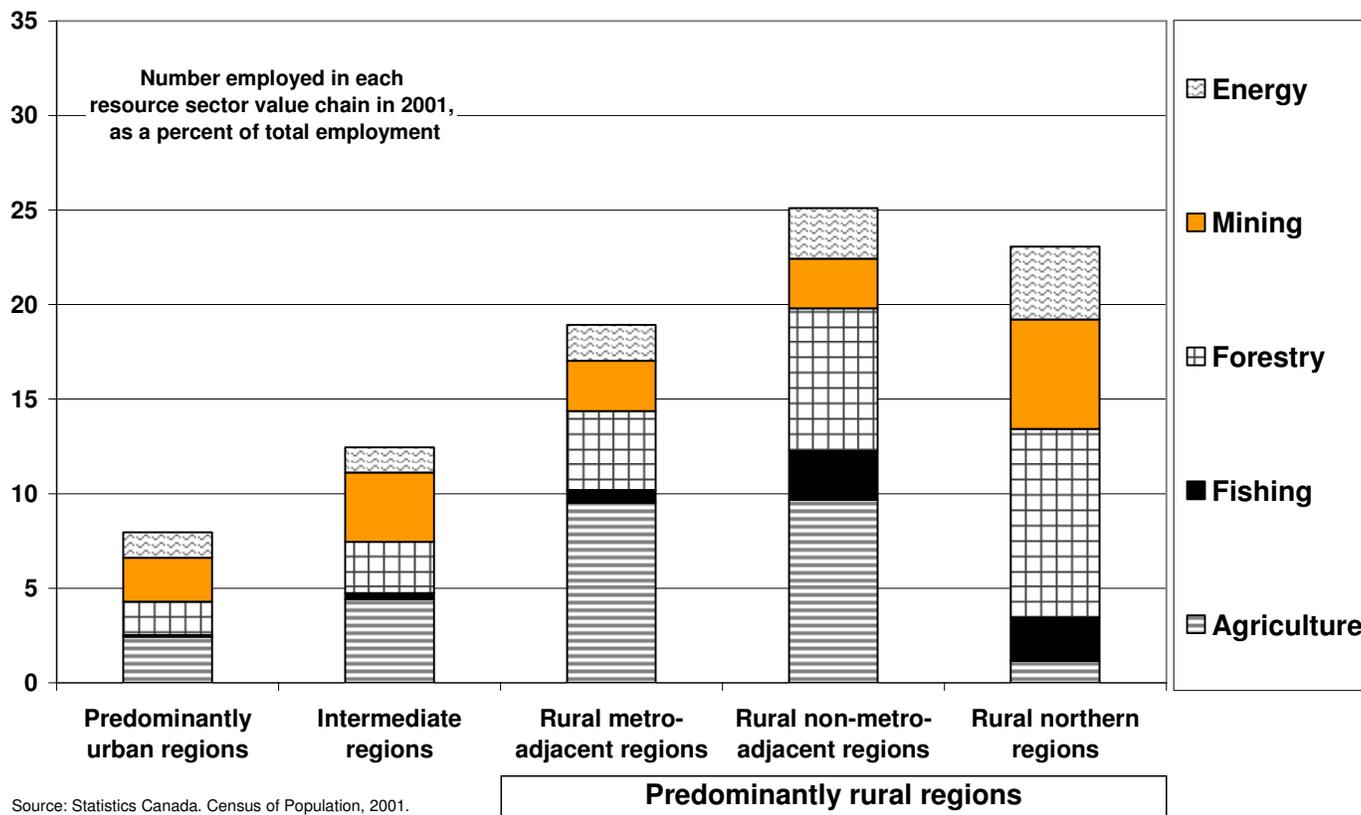


The resource sector employment share in rural northern regions recorded a larger decline in employment share – a decline of 4 percentage points between 1991 and 2001. This is again due to a growth in total employment and a decline in employment in resource sector value chains.

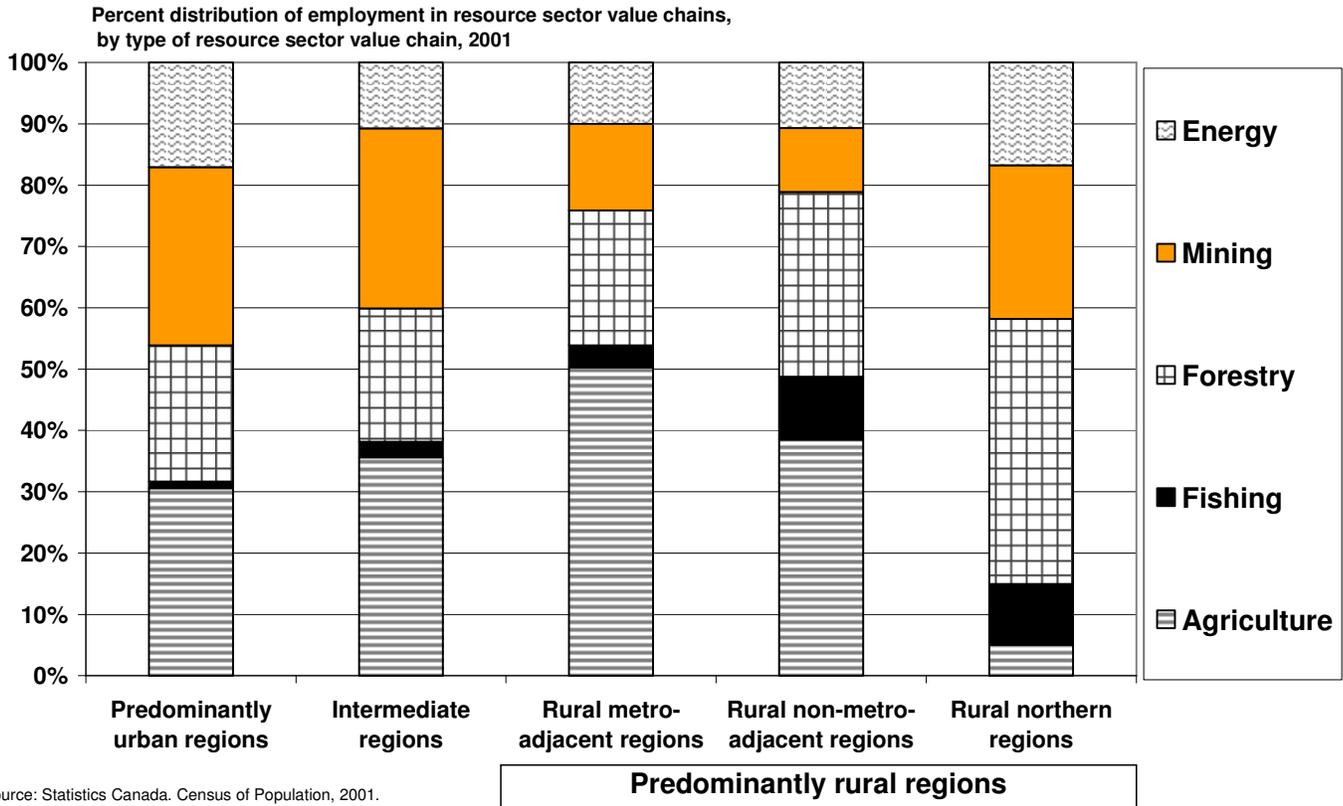
Not surprisingly, the share of employment in each resource sector value chain differs by type of region. In each of rural metro-adjacent regions and rural non-metro-adjacent regions in 2001, nearly 10% of total employment was in the agriculture sector value chain (Figure 3 and Appendix Table A.17)). Within rural northern regions, 10% of total employment was in the forestry sector value chain. When we just look at

the employment within resource sector value chains, we see that 43% of 2001 resource sector value chain employment in rural northern regions was in the forestry sector value chain (Figure 4 and Appendix Table A.17). Within the resource sector value chains, forestry is relatively more important in rural northern and rural non-metro-adjacent regions. Agriculture is relatively more important in rural metro-adjacent regions. Mining is relatively important within resource sector value chain employment in intermediate regions. Energy has as a relatively constant share of resource sector value chain employment in each type of region.

**Figure 3 In 2001, 10% of employment in rural northern regions was in the forestry sector value chain**



**Figure 4 In 2001, 43% of all resource sector employment in rural northern regions was in the forestry value chain**



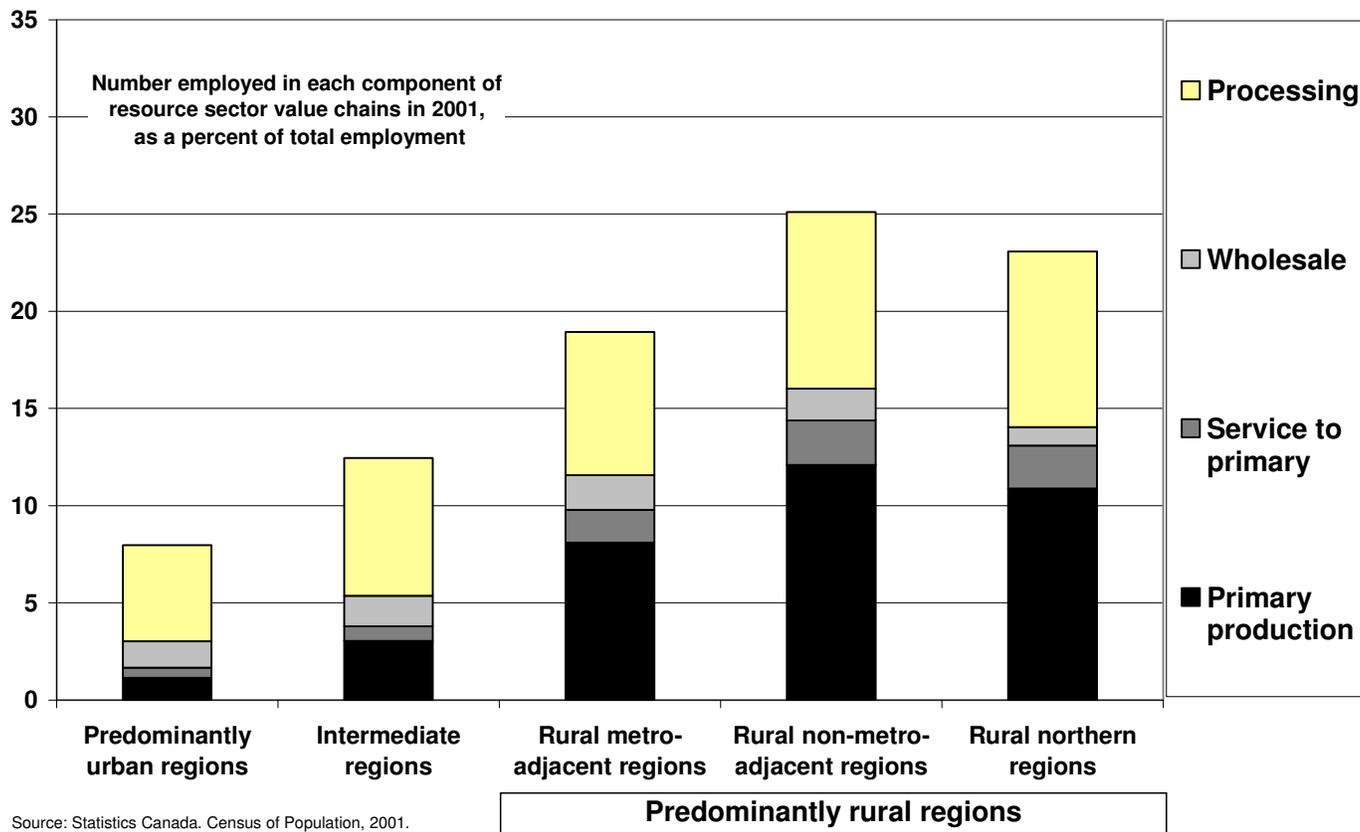
When we look at the contribution of each component of resource sector value chains to total employment, we see that in 2001, the processing component contributed 6.3% of total jobs in Canada followed by a contribution of 4.1% by primary production (Table 1).

Again, the size of this contribution differs by type of region. In rural non-metro-adjacent regions, 12% of total regional employment is employed in the primary production component of resource sector value chains (Figure 5 and Appendix Table A.17). Most of this employment is in primary agriculture (Table 1). In both rural non-metro-

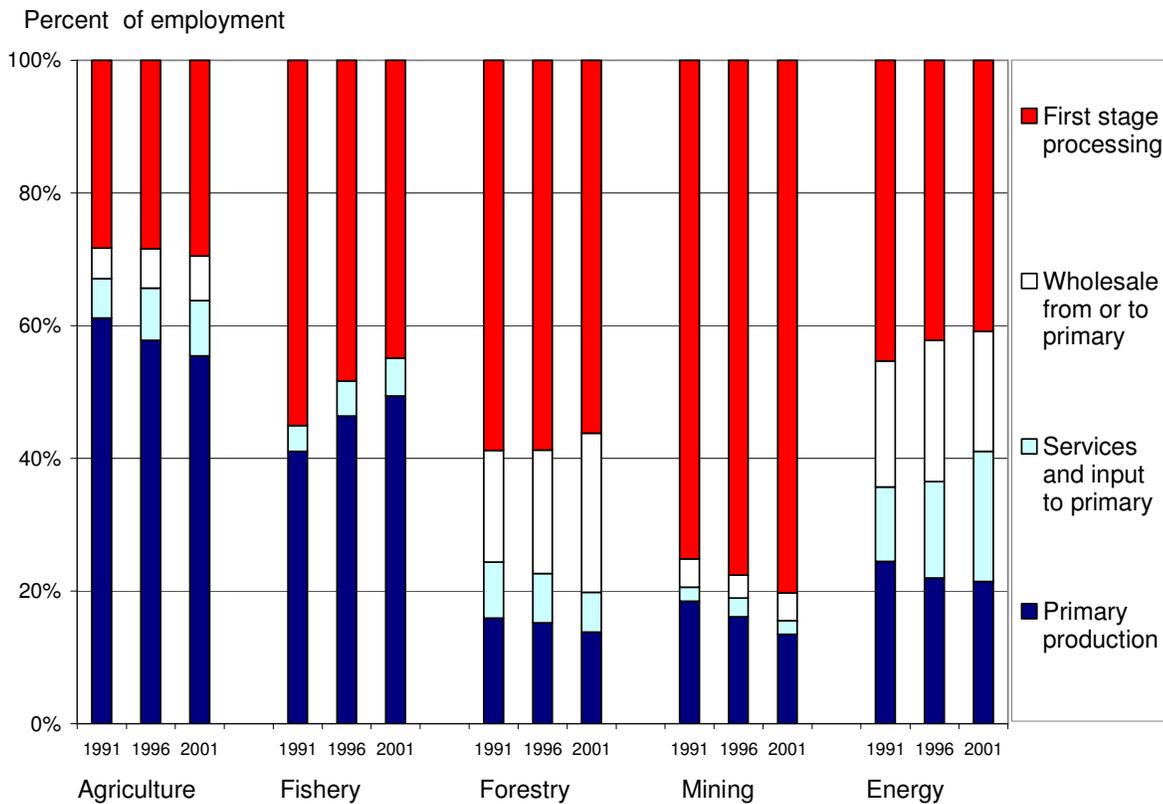
adjacent regions and rural northern regions, 9% of total employment is engaged in the processing component of resource sector value chains.

When we consider the contribution of each component within each value chain, the contributions differ by type of value chain. For example, within the agriculture value chain, employment in primary production represented 55% of employment in 2001 (Figure 6 and Appendix Table A.17). On the other hand, within the mining value chain, employment in first-stage processing represented 80% of total employment in the value chain.

**Figure 5 In 2001, 12% of employment in rural non-metro-adjacent regions was in the primary component of resource sector value chains**



**Figure 6 Employment shares in major components of natural resource value chains, Canada, 1991 to 2001**



Source: Statistics Canada. Census of Population, 1991, 1996 and 2001

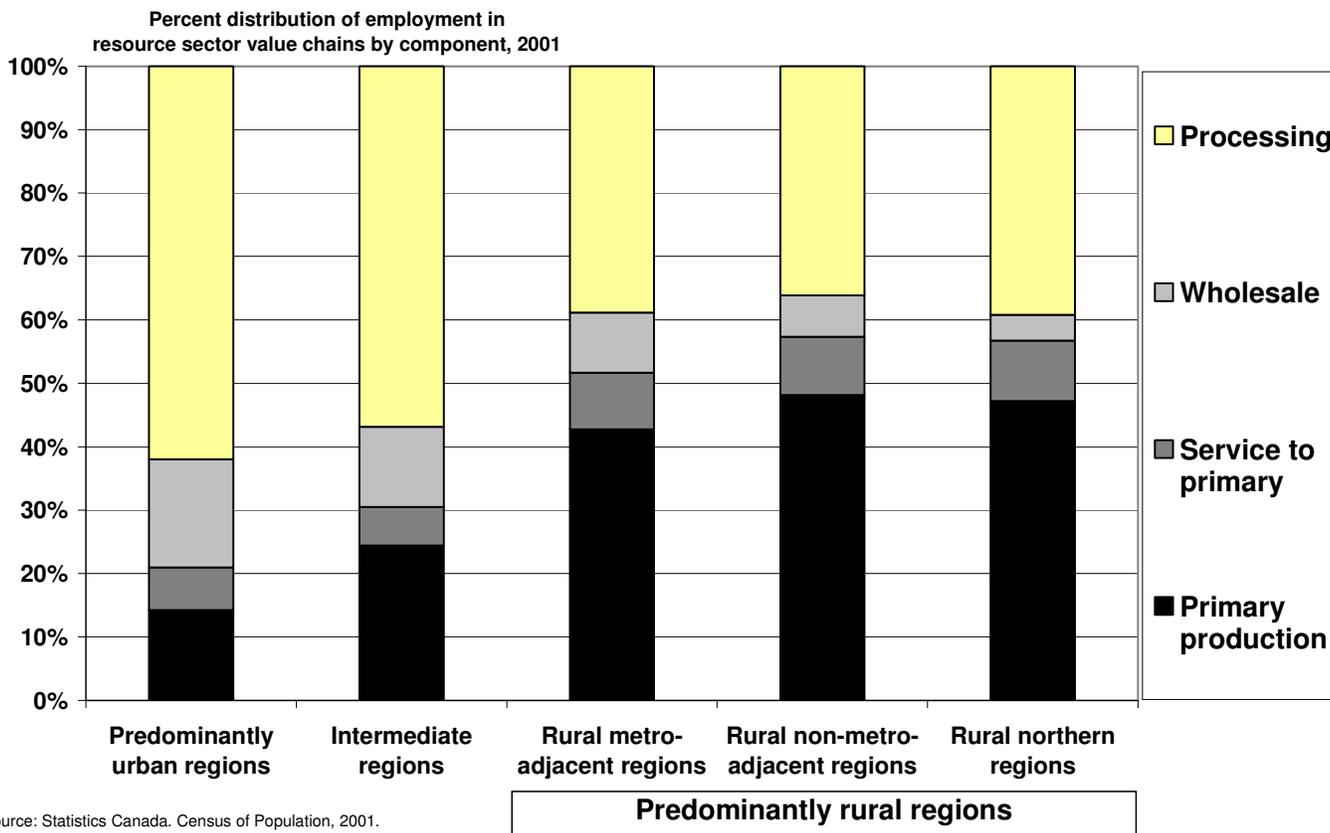
Again, these within-chain employment shares differ by type of region. In predominantly rural regions, over 40% of employment within resource sector value chains is involved in primary production (Figure 7 and Appendix Table A.17). Over 25% are employed in the processing component. However, among resource sector workers in predominantly urban regions, over 60% are employed in the processing component.

As noted above (Table 1), the decline in share of total employment contributed by resource sector value chains was due to combination of:

- a. overall growth in employment; and
- b. overall decline in employment across all resource sector value chains.

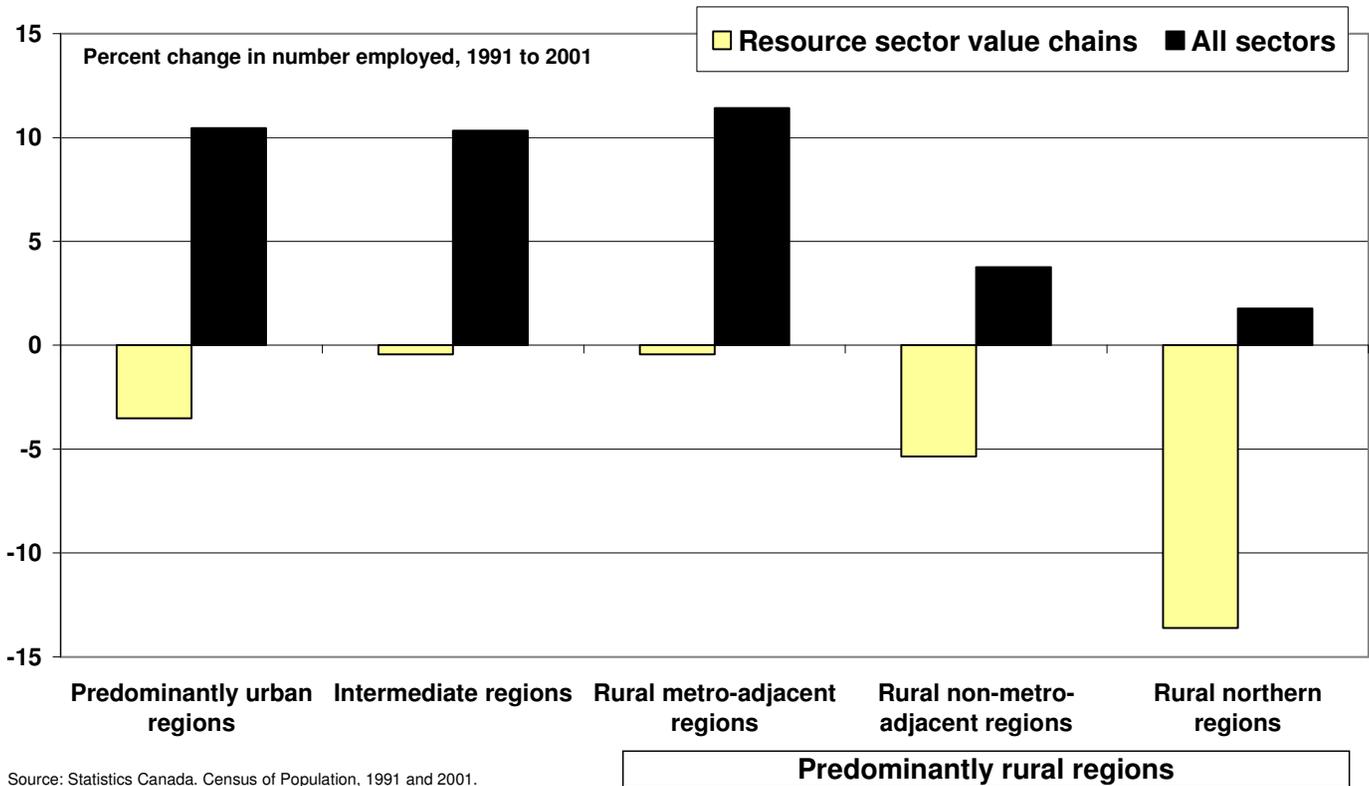
This pattern is evident in each type of region (Figure 8 and Appendix Table A.16).

**Figure 7 In 2001, in each type of region, processing contributes over 25% of overall employment in resource sector value chains**



Source: Statistics Canada. Census of Population, 2001.

Figure 8 Employment in resource sector value chains declined in each type of region, 1991 to 2001



### Employment in primary production and services and inputs became more geographically concentrated

Within Canadian resource sector value chains, employment in primary production and services to primary tended to become more spatially concentrated over the 1991 to 2001 period. In general, primary production employment declined relatively more in areas where it was less concentrated, while services and inputs employment grew relatively more in areas in which they were already more concentrated.

Not surprisingly, the primary production component of each value chain is highly geographically concentrated. In other words, relatively few jurisdictions account for most of

the employment in primary production in each resource value chain. Perhaps obviously, primary production is linked to the location of the resource. The locational Gini coefficient (Box 4), which is one of the widely-used measures of concentration, reflects this pattern. Values of the Gini coefficient close to 1 indicate a high degree of concentration of employment within a few census divisions, while values close to zero indicate a more even distribution across census divisions. The locational Gini coefficient for primary production is relatively high for fishing, mining, agriculture and forestry (Appendix Table A.2).

Employment in services to primary also showed a relatively higher level of geographic concentration – particularly for the fisheries, energy, mining and forestry with the Gini

coefficient ranging between 0.7 and 0.9. In most cases, the geographic concentration of services employment increased over the 1991 to 2001 period.

In contrast, processing and wholesale activities were more evenly distributed across space, with values of the locational Gini coefficient generally ranging from 0.15 to 0.58. The notable exception was employment in processing for fisheries which was as concentrated as primary production employment (Gini coefficient over 0.9).

Over the 1991 to 2001 period, the geographic concentration of employment in processing

activities increased for agriculture, fisheries and energy, while it declined for forestry and mining. These latter two sectors also had an expansion of processing employment in absolute terms over this period.

In this section we have presented the overall level of geographic concentration. The next question we want to address is: what is the relative employment concentration of various value chain activities across the predominantly rural to predominantly urban gradient, and how did this concentration change during the 1990s?

#### Box 4: Methodology: concentration and location

**Locational Gini coefficient.** The Gini coefficient is one of the most used measures of concentration. We apply the locational version as developed by Krugman (1993). To compute the locational Gini coefficient ( $LG$ ) for industry  $e$ , we calculate the region  $i$  share of employment in that industry ( $S_{e,i}$ ), relative to the national employment in that industry and relative to the regional share of employment of all industries ( $S_{tot,i}$ ). The locational Gini coefficient is then computed using the following specification:

$$LG_e = \sum_{i=1}^n s_{tot,i} (1 - r_{e,i}) \cdot \left( \frac{1}{2} s_{tot,i} + S_{i+1}^n \right)$$

where  $S_{i+1}^n = \sum_{k=i+1}^n s_{tot,k}$  and  $r_{e,i} = S_{e,i}/S_{tot,i}$  with  $r_{e,1} < r_{e,2} < \dots < r_{e,n}$ .

Hence, to compute the cumulative shares, the ranking of the regions is done according to the ratio  $r_{e,i} = S_{e,i}/S_{tot,i}$  where the region with the lowest ratio is assigned the rank number one. The value of this coefficient ranges from 1 to 0, with value 1 implying maximum concentration in one single location and 0 implying a perfectly even distribution across regions.

**Location Quotient.** The location quotient ( $LQ$ ) provides a measure of the intensity of employment in a given sector in a region relative to the level of employment in that sector at the national level. The LQ is presented as the ratio of the percent of the total regional employment in a sector to the percent of the total employment in that sector at the national level. A LQ is calculated for each component of the value chain. For example:

$$LQ_{e,i} = \frac{LF_{e,i} / LF_i}{LF_{e,N} / LF_N}$$

where  $LQ_{e,i}$  is the relative intensity of employment in sector “e” in region “i” and  $LF_{e,i}$  is the experienced labour force in sector “e” in region “i”.

The critical values of the LQ are as follows:  $LQ > 1$  indicates that the region has a higher intensity of employment relative to the nation.  $LQ = 1$  indicates that the region has the same intensity of employment relative to the nation.  $LQ < 1$  indicates that the region has a lower intensity of employment relative to the national level.

Thus, a region with an  $LQ > 1$  is relatively “specialized” or relatively “intensive”, relative to the national average.

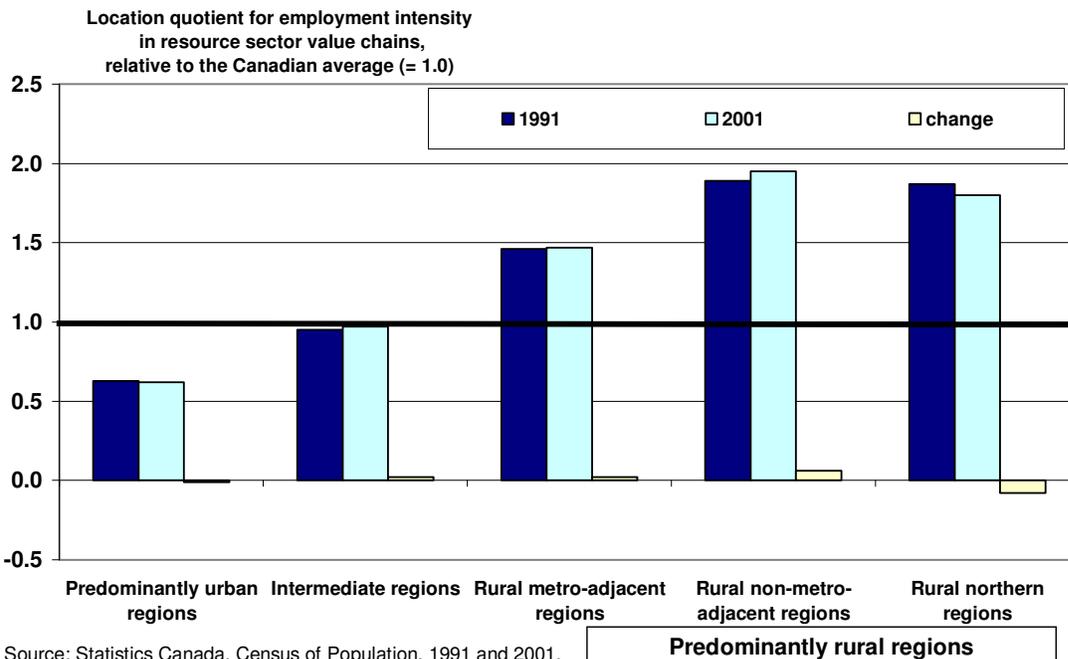
**Sector intensity: an increase in rural non-metro-adjacent regions, a decline in predominantly urban regions**

Recall that employment declined in most components of resource sector value chains in most types of regions from 1991 to 2001 (Appendix Table A.16). Here, we consider changes in relative intensity of employment, using a location quotient (Box 4) as our indicator. The benchmark value for calculating the location quotient is the national intensity (or the national employment share). Thus, if the employment share in a region declines more than the national average, the location quotient (or relative “intensity” or relative “specialization”) would fall. If employment share in a region declined less rapidly than the national average, then the location quotient for the given region would rise – indicating an increase in the relative intensity of employment in the given region, relative to the national average.

Between 1991 and 2001, the intensity of employment (i.e. the location quotient) for employment in resource sector value chains increased in predominantly rural regions (and particularly in rural non-metro-adjacent regions). This result for the change in the location quotient is due to a greater decline in the share of resource sector employment in predominantly urban regions compared to predominantly rural regions. Thus, at the end of the period, predominantly rural regions were slightly more intensive in resource sector employment, compared to Canada as a whole (Figure 9).

However, employment in resource sector value chains, as a percent of employment in each region, fell from 1991 to 2001 (Figure 2, above). Thus, from 1991 to 2001, the share of total employment contributed by the resource sectors declined in predominantly rural regions but it declined less than at the Canada level and hence the intensity relative to the national level went up (i.e. the LQ increased).

**Figure 9 Relative to the Canadian average, the intensity of employment in resource sector value chains increased marginally in rural non-metro-adjacent regions from 1991 to 2001**



With respect to the services component of the resource sector value chains as a whole, the location quotient showed an increase in rural metro-adjacent and rural non metro-adjacent areas (Appendix Table A.3). During the 1990s, the rural northern regions and the predominantly urban regions recorded a declining value of the location quotient in the services component for resource sectors as a whole. The relative measure of localization for intermediate regions remained more stable.

In the agriculture value chain, rural non-metro-adjacent regions had a relatively higher specialization (relative to the Canadian average) in all components of the value chain (Appendix Table A.4). Moreover, all components within rural non-metro-adjacent regions registered an increase in their location quotient from 1991 to 2001. During the 1990s, employment in agricultural services activities increased approximately 40% in rural metro-adjacent and rural non-metro-adjacent regions (approaching the level of 15,000 and 10,000 employees in 2001, for the two types of regions respectively) (Appendix Table A.16). A change of similar magnitude occurred in intermediate regions (where growth of 36% resulted in about 15,000 additional employees in agricultural services by 2001).

In contrast, rural northern and predominantly urban regions further de-specialized from agriculture. For example, from 1991 to 2001, employment in agricultural processing was reduced by half in rural northern regions (from approximately 1,000 employees to about 500).

In the fisheries value chain, rural metro-adjacent and rural non-metro-adjacent regions saw an overall increase in their location quotient from 1991 to 2001 (Appendix Table A.5). The location quotients in rural non-metro-adjacent regions increased for all components of the value chain, particularly employment in primary production and services. The rural northern regions maintained a relatively higher specialization (i.e.

higher location quotient) in fishing activities although they saw a decrease in the location quotient, except in services activities. Predominantly urban and intermediate regions saw a decrease in their relative intensity of employment in the fishing sector (i.e. a declining location quotient).

The location quotient for employment in forestry's primary production increased in each type of predominantly rural region (Appendix Table A.6). In contrast, the relative intensity of forestry wholesale employment decreased in each type of predominantly rural region. This was due to a large increase of forestry wholesaling in intermediate and predominantly urban regions (75% and 66%, respectively, corresponding to an additional 11,000 and 25,000 employees, respectively) (Appendix Table A.16). Rural metro-adjacent regions also experienced an employment growth of 53% (corresponding to about 6,000 additional employees in wholesaling of forestry products). However, this growth in employment in the wholesale component of the forestry value chain was less than the growth for Canada as a whole which resulted in a decline in employment intensity (i.e. a decline in the location quotient) in rural metro-adjacent regions.

In the mining sector, each type of predominantly rural region saw increases in location quotients in the primary production component. Rural northern regions are relatively more intensive in employment providing services to the mining sector – and this relative intensity increased during the decade. Rural metro-adjacent regions also saw an overall increase in their location quotient in the mining sector (due to an increase in primary and in processing), while the rural northern regions showed a decrease (due to a decrease in processing).

Finally, each type of predominantly rural region reported an overall increase in intensity of employment (a higher location quotient) in the energy value chain. The only decline in a

component was in the services to energy in rural northern regions (Appendix Table A.9).

### **Services to primary and wholesaling were increasingly clustered or located in core production regions**

Most of the research on resource-reliant communities has focused on the concept of local reliance on the sector (Natural Resources Canada 2001; White and Watson 2001, Stedman *et al.* 2007). We extend this concept in two directions; first, by looking at regional reliance in the context of its *regional milieu*; and second, by looking at the relationship of the region and the milieu of the region for different components of the same value chain.

We do this by considering jointly the indicators of intensity (location quotient) for a given region and the corresponding spatially lagged values for this region. A spatially lagged location quotient is simply the average value of the location quotient in surrounding regions. We use the Moran's I statistic and bivariate regressions between the location quotient for a given region and the average location quotient of surrounding regions (i.e. the spatially lagged location quotient) to investigate these patterns (Box 3). The location quotient for a particular region does not tell us about the milieu in which the region is located. In this sense, the location quotient for a particular region provides only a partial picture of the spatial intensity of employment along resource sector value chains. Thus, the information for any given region does not indicate the distribution of these units across space.

In simple terms, we address the following types of questions: Are the areas with a high intensity of employment in a given sector clustered together? Or are they randomly spread over space? Are the localities with high intensity of processing activities in a regional milieu characterized by a high intensity of primary production? The

Appendix Tables A.9 to A.13 summarize the results of this analysis.

In the agriculture value chain, regions (census divisions) with a higher intensity of employment in primary agriculture tend to be clustered together (coefficients of 0.53 in 1991 and 0.49 in 2001, Appendix Table A.9); in other words, these regions tend to be situated in a primary agriculture milieu. In these spatial clusters, there is also a higher intensity of employment in services and wholesaling. In particular, services to agriculture appear to be strongly connected to a primary agriculture milieu (coefficients of 0.91 in 1991 and 1.03 in 2001). In the case of the agriculture value chain, the wholesaling activities included in this analysis relate to the wholesaling of inputs for purchase by farmers (Appendix Table A.1). Thus, it is not surprising that regions that have a higher intensity of agricultural wholesaling employment tend to be surrounded by regions with a higher intensity of primary agricultural employment (coefficients of 0.86 in 1991 and 0.67 in 2001).

For agricultural primary production, services, and wholesaling, the same type of spatial association runs in the other direction, although the magnitude of the coefficients varies. For instance, regions with a higher intensity of primary agriculture employment are surrounded by regions with a higher intensity of agriculture wholesaling employment (coefficients of 0.32 in 1991 and 0.40 in 2001). Similarly, agricultural service and wholesaling employment tend to be spatially clustered; for instance, the regression coefficient of intensity of regional agricultural services and the agricultural wholesaling milieu is 0.62 in 1991 and 0.89 in 2001.

In contrast, there is limited spatial association between first-stage processing of agricultural products and agricultural primary production, services and wholesaling; thus agriculture shows a rather clear level of spatial disjuncture at this stage of the value chain. Employment in food processing is not in the milieu of production,

services to production or wholesaling (coefficients are small or not statistically significantly different from zero). This is due, in part, to the fact that there are only a few (relatively large) food processing facilities and often these facilities are located in a (more) urban location.

Regarding the fisheries value chain, primary production, service to primary production and fish processing all tend to be in a primary production milieu (coefficients for 1991 and 2001 range from 0.29 to 0.39, Appendix Table A.10) – although the relationships are not as strong as for agriculture. The indication that emerges from the coefficients of spatial association is that of geographic clusters of regions in which primary production, services and processing are located.

For the forestry value chain, the greatest degree of spatial association is found between primary production and services to primary. Regions with a higher intensity of primary forestry employment tend to be clustered in primary forestry milieus (coefficients of 0.38 in 1991 and 0.35 in 2001, Appendix Table A.11) and services to primary have a stronger connection to a primary forestry milieu (coefficients of 0.54 in 1991 and 0.42 in 2001). Furthermore, regions with a higher employment intensity in forest processing tend to be surrounded by regions with a higher intensity of primary forestry employment (coefficients of 0.55 in 1991 and 0.44 in 2001), although this degree of spatial association is not as strong in the opposite direction.

In the forestry value chain, the wholesale activities included in this report relate to the wholesaling of wood and paper products to consumers. Thus, wholesaling to consumers show a relatively modest degree of spatial clustering (coefficients 0.13 in 1991 and 0.24 in 2001), and more interestingly is negatively associated with the primary forestry milieu as forestry products are wholesaled to an urban market and forestry production is a hinterland activity.

A review of the mining value chain indicates that mines and their associated services and processing generally show a modest degree of spatial association, suggesting that these activities exist within the same census division (i.e. within the given region), as opposed to a cluster of CDs. There is no apparent “milieu” or group of census divisions that are relatively intensive in mining. More interestingly, there is a negative spatial association of processing with production, meaning that regions with higher intensity of employment in primary production tend to be surrounded by regions with lower intensity of employment in processing (coefficients of -0.34 in 1991 and -0.36 in 2001, Appendix Table A.12), and vice versa. This is another way of saying that minerals are processed where they are mined.

Finally, regarding the energy value chain, regions with a higher intensity of primary production employment show some degree of spatial clustering among themselves (coefficients of 0.23 in 1991 and 0.28 in 2001, Appendix Table A.13). Services to primary production have a stronger spatial association with a milieu of primary production (coefficients of 0.42 in 1991 and 0.48 in 2001); even more so, wholesaling of primary production, which in the energy value chain includes pipeline transportation industries (Appendix Table A.1) is strongly associated with primary production (coefficients of 1.39 in 1991 and 1.17 in 2001). In contrast, processing employment shows very little evidence of spatial clustering with any other segment of the energy value chain or with other processing intensive CDs (coefficients are, in most cases, not statistically significantly different from zero).

### **Value chain distribution across regions and regional milieu: spatial patterns**

As a final step of this analysis, we use the relationship between the location quotient for a specific area and the location quotient of the regional milieu (spatial lag) to identify;

1. areas that are relatively directly reliant on a resource value chain; and to identify
2. areas with an economy that is not directly related to a resource sector value chain but which is located within the milieu of a resource value chain and thus may be affected by the resource sector's economic trends due to geographic proximity.

The analysis focuses on the data for 2001; we show a set of maps for the components of the value chains that appear to be spatially correlated, as determined from the results presented in Appendix Tables A.9 to A.13. For instance, based on the indications emerging from Appendix Table A.9, we break the agriculture value chain into a group composed of primary, services and wholesaling, on the one hand, and processing, on the other hand. Hence, for the purpose of mapping, we recomputed the location quotients and their spatial lag for these re-defined components of each value chain.

The methods used for this purpose are presented in Box 3. In brief, each census division is assigned to one of four groups, depending on the combination of regional reliance (the location quotient of the census division) and the regional milieu reliance (spatial lag value of the same location quotient). The resulting groups are:

- a. higher regional and higher regional milieu values (dark blue on the maps);
- b. higher regional and lower regional milieu values (light blue);
- c. lower regional and higher regional milieu values (light red); and
- d. lower regional and lower regional milieu values (dark red).

The first group (dark blue) can be considered to be the “core reliant regions”; this identifies the census divisions with a relatively higher intensity of employment in that natural resource value chain and that are also located in a regional milieu with a relatively higher share of employment in that value chain. At the opposite end, the “non-

reliant regions” are those regions that have lower than average employment in that value chain and are located in a regional milieu which also has lower than average employment in that value chain (dark red on the map).

The distribution of all regions (census divisions) across this classification is shown in Appendix Table A.14 while the distribution of only predominantly rural regions is shown in Appendix Table A.15. As noted, the maps were generated from groupings of selected components of some value chains in cases where the geographic pattern of the components was highly correlated.

The maps and the tables in the appendix illustrate two relevant aspects of the spatial distribution of resource value chain employment. First, the maps delineate the regional clusters that have a relatively stronger association with the value chain of natural resources. In particular, the dark blue areas are the core reliant regions, i.e. regions with relatively higher value of the location quotient surrounded by other regions with relatively higher value of the location quotient.

The appendix tables indicate that the percent of regions that fall into the core reliance group has increased from 1991 to 2001 for all natural resource sectors except the fishing industry. Employment growth in Canada has generally been in the non-resource sectors. Thus, at the Canada level, the share of employment in resource sectors has been declining. The increase in the number of regions with “relatively” higher employment in the resources sectors is due, at least in part, to the lower share of natural resource employment at the Canada level – which is the benchmark for calculating the location quotients in this study.

Second, these maps show that, although many regions are not directly reliant on natural resource value chains, their economy might be strongly affected by the performance of these value chains.<sup>1</sup> The most intuitive example is that of a census division that is not reliant on agricultural

related employment but that is located in a milieu of agricultural regions. The use of indicators for regions and for the regional milieu (i.e. the neighbouring regions) allows us to assess the potential relevance that core economic activities may have when the regional milieu is considered.

In 2001, almost 20% of all regions were classified as agriculture core reliant regions (Appendix Table A.14). Another 12% of the census divisions were highly reliant on agriculture but were located in a regional milieu with low dependence on this industry. In contrast, in 11% of the regions, their economy was not directly dependent on agriculture but they were located in a regional milieu with a higher degree of reliance on agriculture. Although the identification of these regions is strictly based on a criterion of geographic proximity, their economic performance might be significantly affected by initiatives targeted to the agriculture value chain as their economy may be more closely linked to that of core reliant regions as compared to the remaining 57% of census divisions which have a lower reliance on agriculture and are located in a milieu that has a lower reliance on agriculture.

Map 1 shows the geographic pattern of regions by intensity of employment in agriculture primary production, services and wholesaling, while Map 2 shows the distribution of regions by employment intensity of processing activities within the agriculture value chain. Not surprisingly, employment in processing activities is more intensive in more urbanized areas, like southern Ontario and southern Quebec.

For the fishing industry in 2001, almost 15% of Canadian regions were core fishery reliant regions (dark blue), while another 9% of the regions were surrounded by a regional milieu with an above average reliance on the fishing industries' value chain (light red). Not surprisingly, the regions

with a core reliance on the fishing value chain are limited to coastal locations in the Atlantic Provinces and British Columbia (Map 3).

Maps 4, 5 and 6 show the spatial pattern for the intensity of employment in the forestry value chain. Map 4 combines primary production and services, while the other two maps show wholesaling (Map 5) and processing employment (Map 6) (See also Appendix Table A.11). About one-quarter of Canadian census divisions (Appendix Table A.14) have a relatively higher intensity of employment in forestry and related services and they are located in a milieu of similarly intensive census divisions (dark blue in Map 4). In addition, approximately 15% of Canadian census divisions exist in a regional milieu with a relatively high intensity of forestry employment in the primary and services components (light red in map 4) (Appendix Table A.14).

Map 5 shows where wholesaling of forest products to consumers is relatively intensive. Most intensive regions are regions with cities and/or growing populations. These regions operate in a different spatial context than the forestry workers.

Map 6 shows where the location of a higher employment intensity in the processing of wood (e.g. sawmills and pulp and paper mills). These regions are essentially the same regions as where the forestry workers are located (Map 4). As indicated in Appendix Table A.11, first-stage forestry processing tends to be located in the regional milieu of primary production.

Employment intensity in the mining value chain is mapped in two main parts. Map 7 shows the spatial distribution of census divisions according to their employment intensity in primary production and services. Map 8 shows the spatial pattern of intensity of employment in wholesaling and processing. The maps show the highly specific nature of this type of production; only

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1. It should be emphasized that the criteria for interaction is geographic proximity.

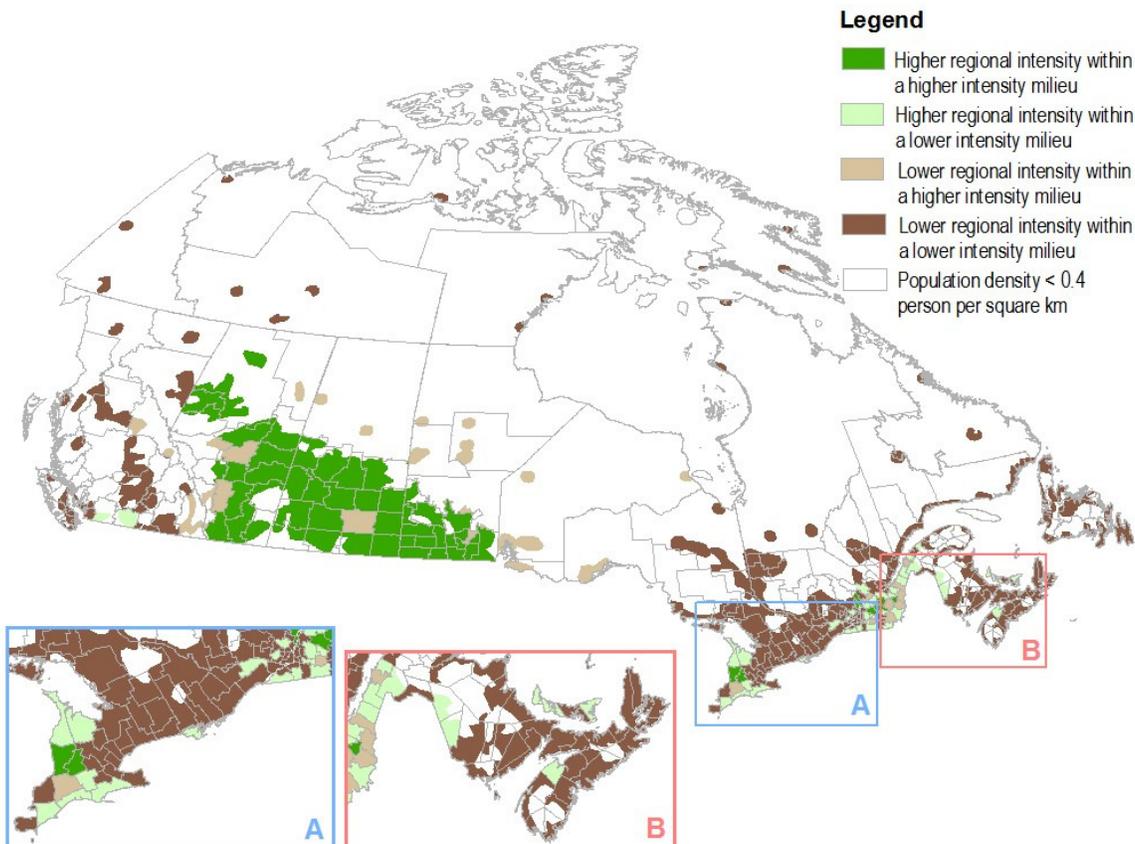
about 10% of regions are core reliant regions (Appendix Table A.15). Northern Ontario and some regions in Saskatchewan and Manitoba account for most of them. In contrast, wholesaling and processing are largely concentrated in southern Ontario and southern Quebec (Map 8).

Finally, Map 9 and Map 10 display the spatial distribution of the components of the energy value chain. Map 9 shows the distribution of regions for the combined value chain components of primary production, services and wholesaling employment. Two major regional clusters are evident in Alberta and part of Saskatchewan. Similar to employment in mining, only about 10%

of regions are in core reliant regions for production and services, and even less (about 2%) are high reliant regions located in a non-reliant regional milieu (Appendix Table A.14).

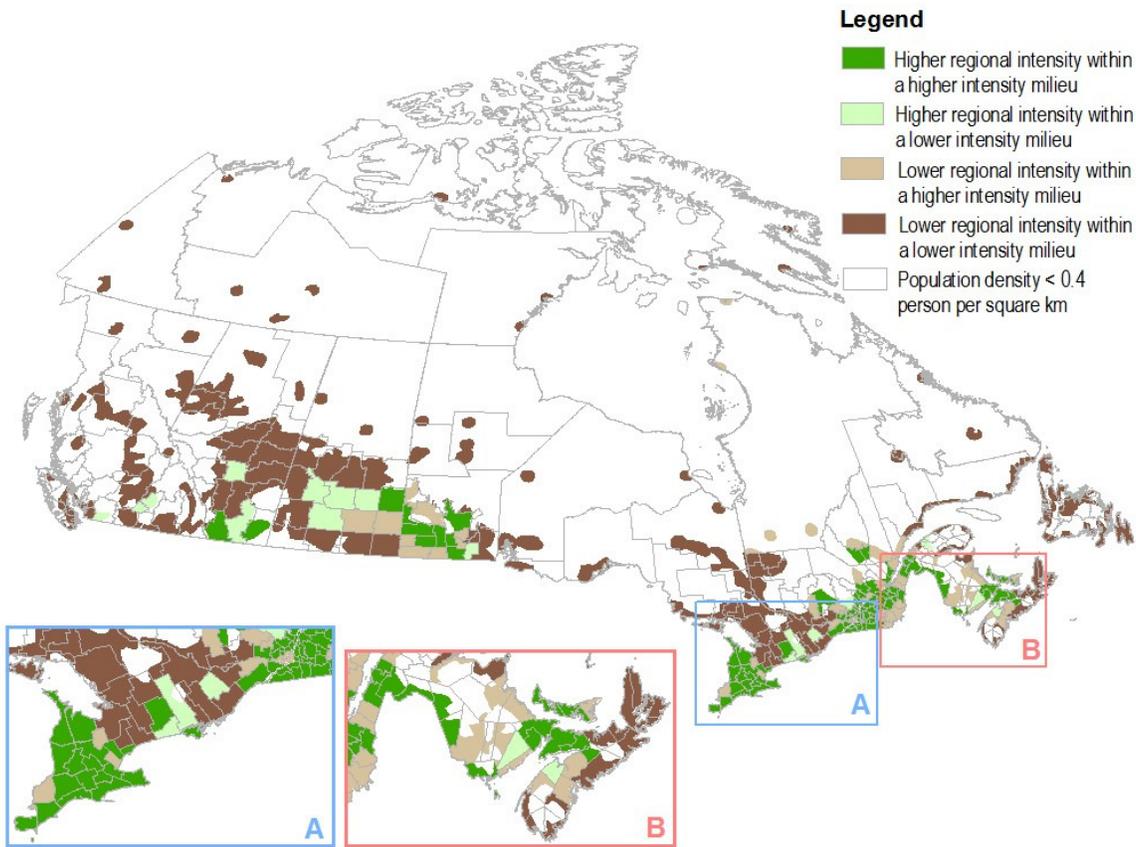
The spatial distribution of processing employment in the energy value chain (refined petroleum products, other petroleum and coal industries, and electric power system industries) is shown on Map 10. About 20% of the regions are core reliant regions, which appear relatively evenly distributed across Canada. Part of the spatial pattern is due to the dispersed nature of electricity generation via hydro, coal or gas fired generation plants and nuclear generation plants.

**Map 1 Employment in primary production, services and wholesaling within the agriculture value chain: pattern of regional intensity and intensity within the regional milieu, 2001**



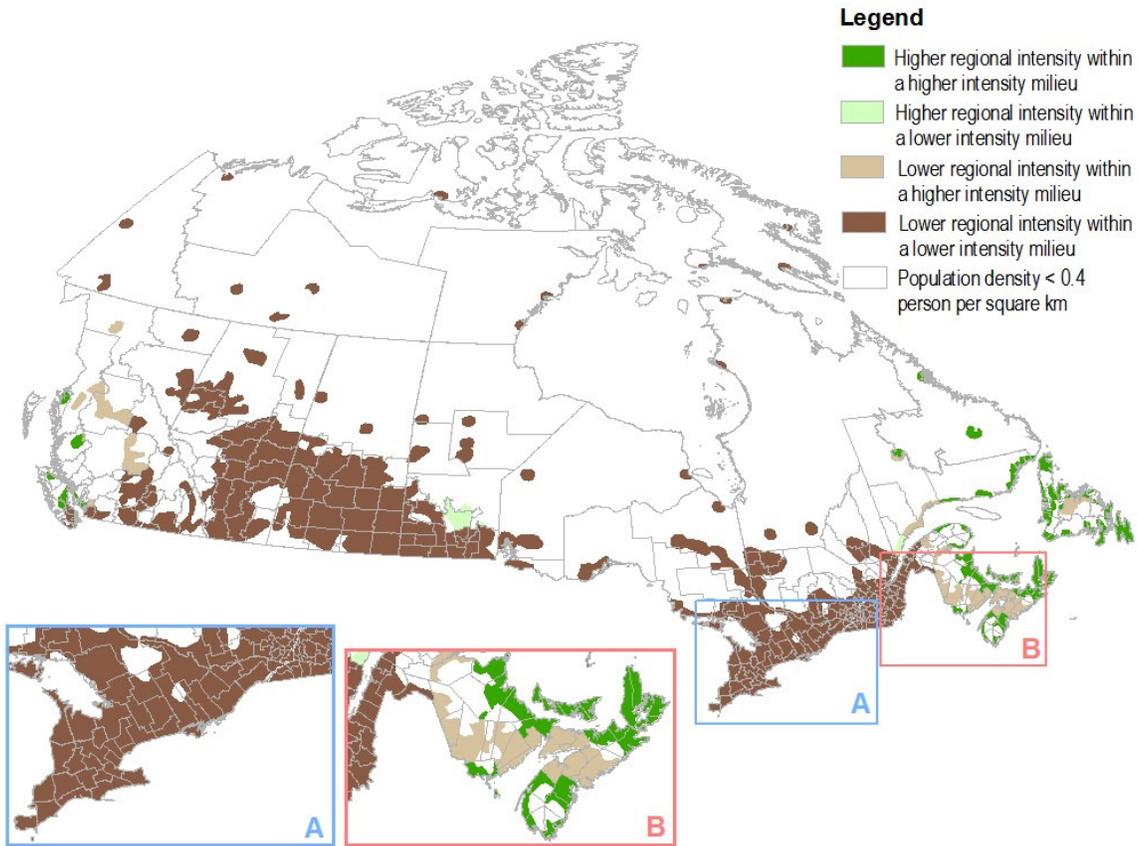
Source: Authors' computation based on Census of Population 2001 data.

**Map 2 Employment in food processing within the agriculture value chain: pattern of regional intensity and intensity within the regional milieu, 2001**



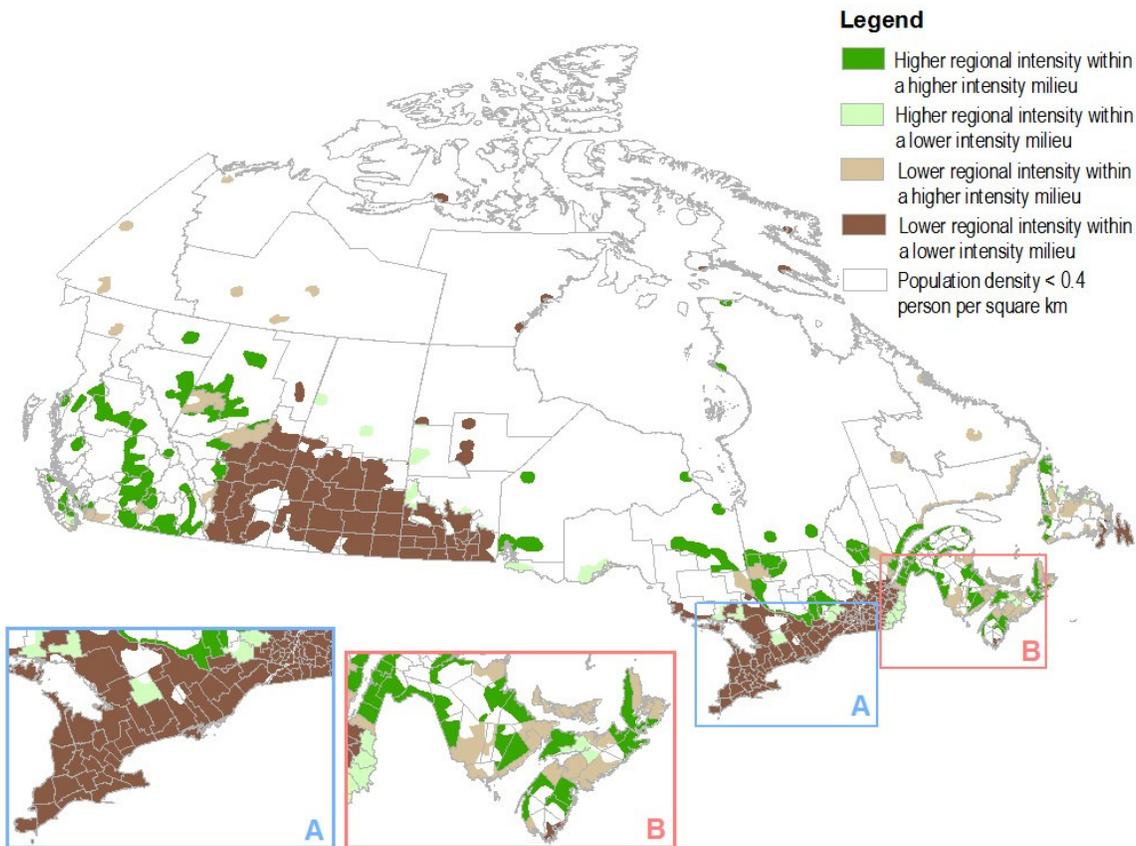
Source: Authors' computation based on Census of Population 2001 data.

**Map 3 Employment within the fishing value chain: pattern of regional intensity and intensity within the regional milieu, 2001**



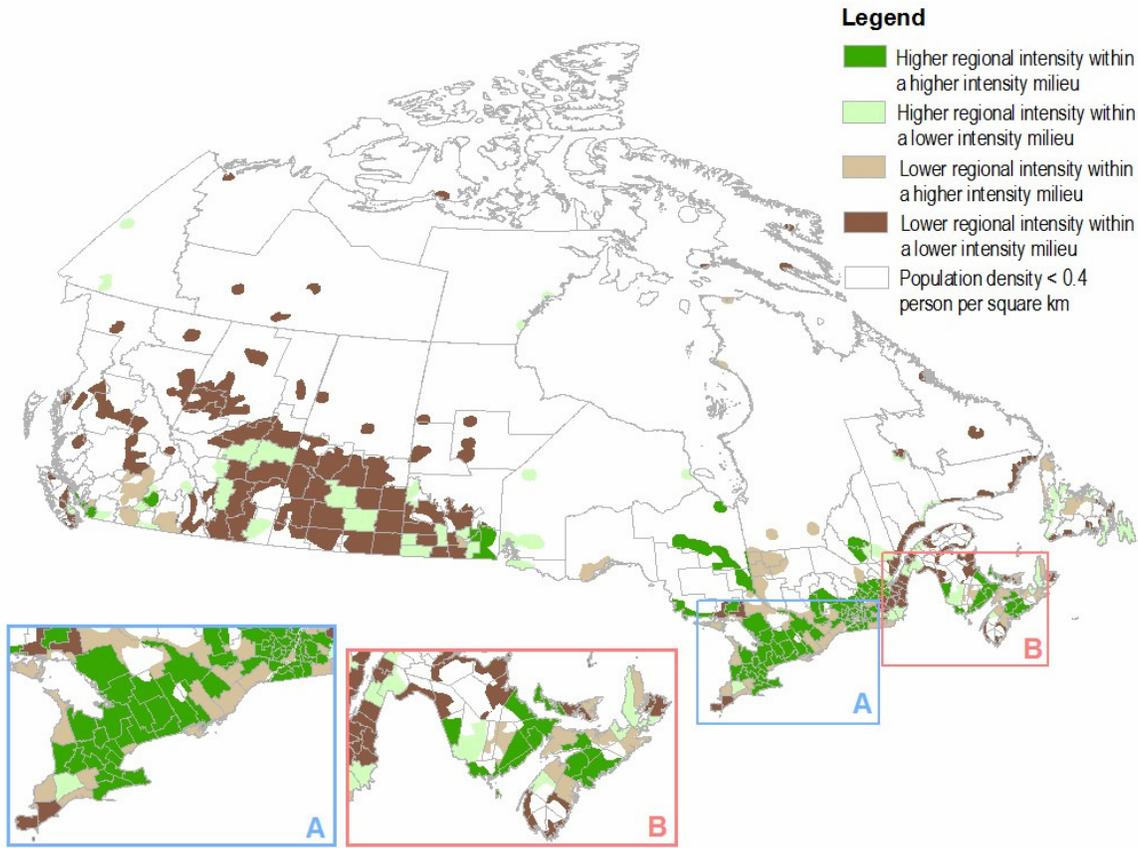
Source: Authors' computation based on Census of Population 2001 data.

**Map 4 Employment in primary production and services within the forestry value chain: pattern of regional intensity and intensity within the regional milieu, 2001**



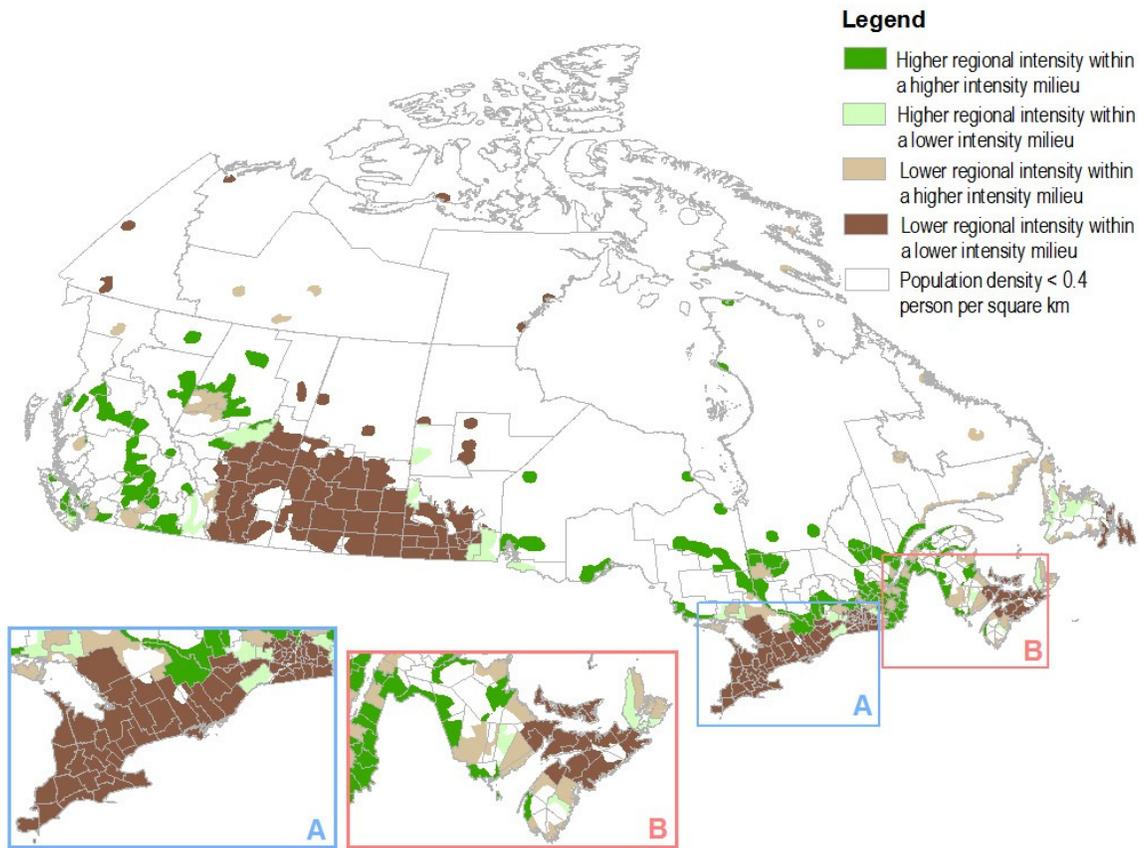
Source: Authors' computation based on Census of Population 2001 data.

**Map 5 Employment in wholesaling within the forestry value chain: pattern of regional intensity and intensity within the regional milieu, 2001**



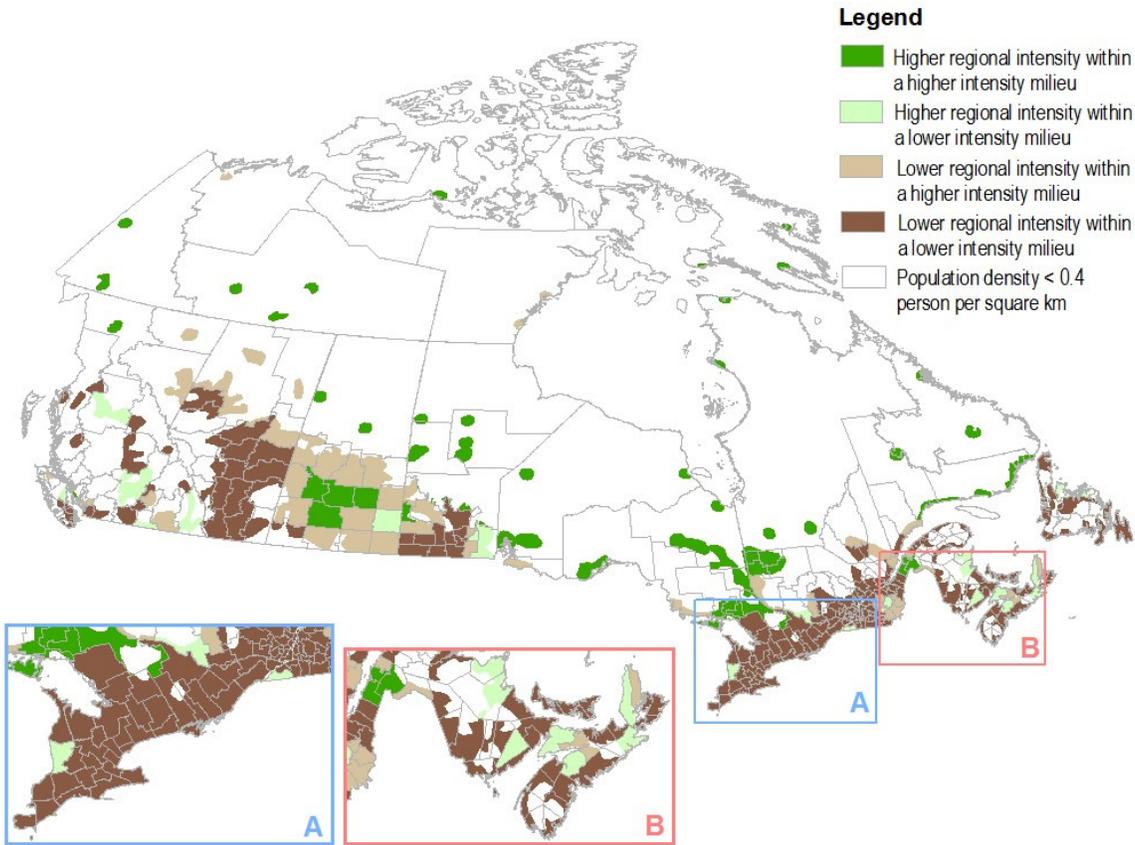
Source: Authors' computation based on Census of Population 2001 data.

**Map 6 Employment in wood processing within the forestry value chain: pattern of regional intensity and intensity within the regional milieu, 2001**



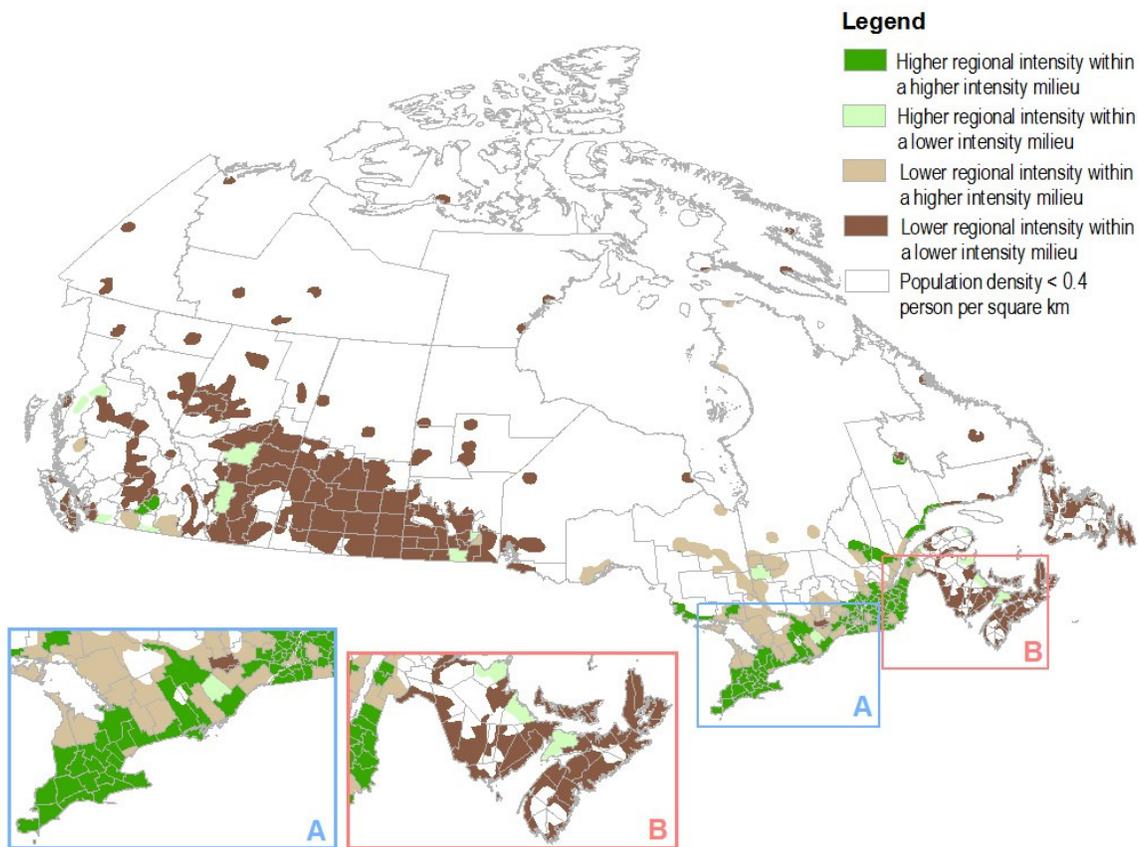
Source: Authors' computation based on Census of Population 2001 data.

**Map 7 Employment in primary production and services within the mining value chain: pattern of regional intensity and intensity within the regional milieu, 2001**



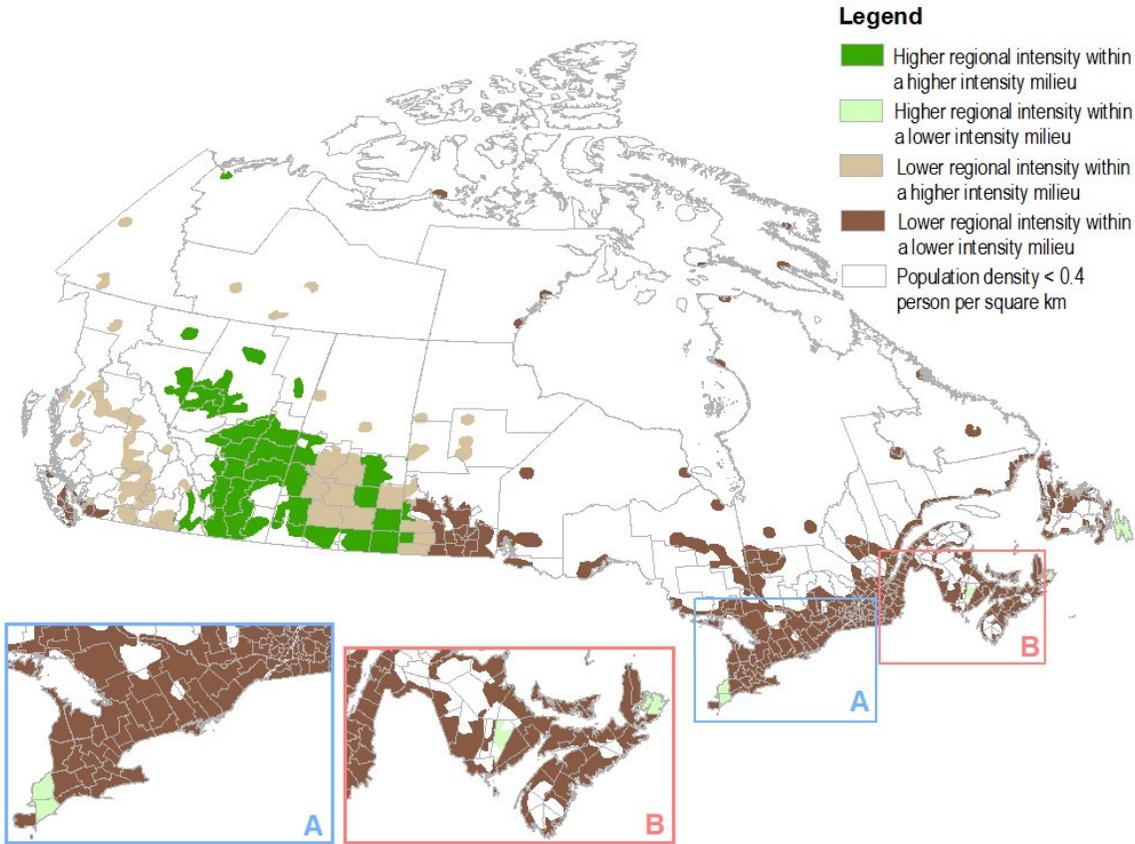
Source: Authors' computation based on Census of Population 2001 data.

**Map 8 Employment in metal processing and wholesaling within the mining value chain: pattern of regional intensity and intensity within the regional milieu, 2001**



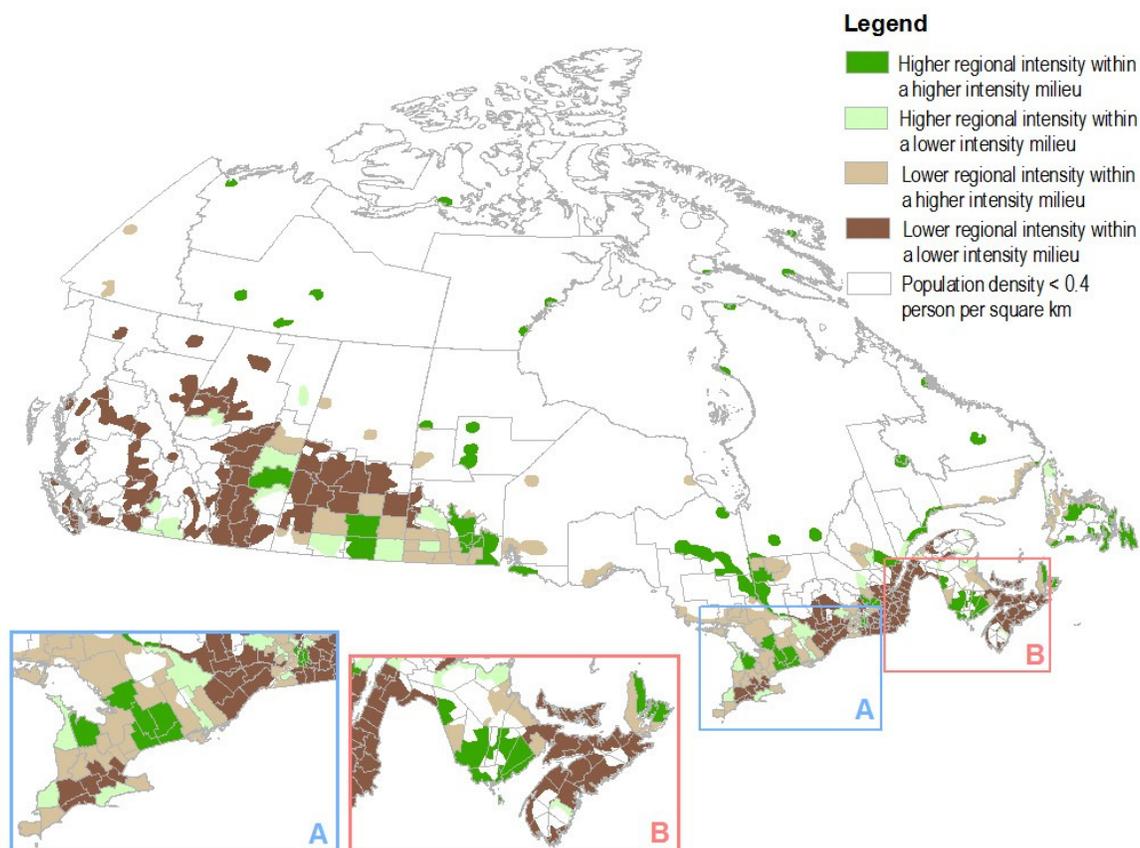
Source: Authors' computation based on Census of Population 2001 data.

**Map 9 Employment in primary production, services and wholesaling within the energy value chain: pattern of regional intensity and intensity within the regional milieu, 2001**



Source: Authors' computation based on Census of Population 2001 data.

**Map 10 Employment in processing within the energy value chain: pattern of regional intensity and intensity within the regional milieu, 2001**



Source: Authors' computation based on Census of Population 2001 data.

## Conclusions

A value chain perspective can substantially enhance our understanding of the rural economy and the challenges faced by rural regions. A value chain analysis focuses on the way in which economic actors are linked to the broader economic context. The nature of these linkages will determine, to a large extent, the distributional outcomes of changes occurring in increasingly global production systems. Almost all products from Canada's resource sectors are priced in international markets and/or are sold into international markets. An analysis of the value chains that link rural economies to the rest of the

national and international economy is of major importance to rural development initiatives.

In this bulletin we have outlined a definition of natural resource sector value chains by classifying relevant industrial sectors to each value chain. The analysis extends only to 2001 because the 2006 data were not coded to the same Standard Industrial Classification used in earlier census periods. The North American Industry Classification System was used in 2006 and it only extends back to 2001. We limit our focus to employment statistics and look at each component of each resource sector value chain to portray the relative intensity of employment in each region. Furthermore, we focus on the relationship

between a region and its regional milieu. It should be emphasized that this analysis remains a first exploration of predominantly rural value chains which has focused on a single indicator, namely employment data. It should also be recognized that any standard industry classification system does not always fully capture and overlap with the concept of a value chain.

Our analysis shows that the relative intensity of employment in resource sector value chains increased slightly during the 1990s in the rural economy, relative to the nation as a whole. Although the rural economy is diversifying, the intermediate and predominantly urban regions are doing so at a faster pace.

The findings of this research show that the resource sector value chains are upgrading, as

measured by a shift of employment from primary production to processing and services activities, and this shift has been more intense in rural metro-adjacent regions. Rural northern regions have experienced a relative decline in the intensity of their employment in the processing and services activities in resource sector value chains. This trend may increase their exposure to global competition in raw commodity production.

The analysis of the characteristics of a given region and a consideration of the milieu in which the region is located identifies also those regions that, although not directly reliant on a natural resource value chain, could be strongly affected by the economic performance of these value chains because the region is situated in a natural resource milieu.

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**Appendix Table A.1 Composition of major resource sector value chains: Standard Industrial Classification codes**

Agriculture	Fishing	Forestry	Mining	Energy
<b>Primary production</b>				
<b>MAJOR GROUP 01 - Agricultural Industries</b> 011 - Livestock Farms (except Animal Specialties) 012 - Other Animal Specialty Farms 013 - Field Crop Farms 014 - Field Crop Combination Farms 015 - Fruit and Other Vegetable Farms 016 - Horticultural Specialties 017 - Livestock, Field Crop and Horticultural Combination Farms	<b>MAJOR GROUP 03 - Fishing and Trapping Industries</b> 031 - Fishing Industries	<b>MAJOR GROUP 04 – Logging Industry</b> 041 – Logging Industry	<b>MAJOR GROUP 06 – Mining Industries</b> 061 – Metal Mines 062 – Non-Metal Mines (except Coal) <b>MAJOR GROUP 08 - Quarry and Sand Pit Industries</b> 081 – Stone Quarries 082 – Sand and Gravel Pits	<b>MAJOR GROUP 07 - Crude Petroleum and Natural Gas Industries</b> 071 - Crude Petroleum and Natural Gas Industries <b>MAJOR GROUP 06 – Mining Industries</b> 063 – Coal Mines
<b>Services to primary</b>				
<b>MAJOR GROUP 02 - Service Industries Incidental to Agriculture</b> 021 - Services Incidental to Livestock and Animal Specialties 022 - Services Incidental to Agricultural Crops 023 - Other Services Incidental to Agriculture <b>MAJOR GROUP 31 - Machinery Industries (except Electrical Machinery)</b> 311 - Agricultural Implement Industry <b>MAJOR GROUP 37 – Chemical and Chemical Products Industries</b> 372 - Agricultural Chemical Industries	<b>MAJOR GROUP 03 - Fishing and Trapping Industries</b> 032 - Services Incidental to Fishing	<b>MAJOR GROUP 05 – Forestry Services Industry</b> 051 – Forestry Services Industry	<b>MAJOR GROUP 09 - Service Industries Incidental to Mineral Extraction</b> 092 - Service Industries Incidental to Mining	<b>MAJOR GROUP 09 - Service Industries Incidental to Mineral Extraction</b> 091 - Service Industries Incidental to Crude Petroleum and Natural Gas
<b>Wholesaling to or from primary and to or from processing</b>				
<b>MAJOR GROUP 50 - Farm Products Industries, Wholesale</b> 501 - Farm Products, Wholesale <b>MAJOR GROUP 57 - Machinery, Equipment and Supplies Industries, Wholesale</b> 571 - Farm Machinery, Equipment and Supplies, Wholesale <b>MAJOR GROUP 59 - Other Products Industries, Wholesale</b> 593 - Agricultural Supplies, Wholesale		<b>MAJOR GROUP 56 - METALS, HARDWARE, PLUMBING, HEATING AND BUILDING</b> 563 - Lumber and Building Materials, Wholesale <b>MAJOR GROUP 59 - OTHER PRODUCTS INDUSTRIES, WHOLESAL</b> 592 - Paper and Paper Products, Wholesale	<b>MAJOR GROUP 56 - METALS, HARDWARE, PLUMBING, HEATING AND BUILDING</b> 561 - Metal and Metal Products, Wholesale	<b>MAJOR GROUP 46 - PIPELINE TRANSPORT INDUSTRIES</b> 461 - Pipeline Transport Industries <b>MAJOR GROUP 49 – OTHER UTILITIES</b> 492 - Gas Distribution Systems Industry <b>MAJOR GROUP 51 - PETROLEUM PRODUCTS INDUSTRIES, WHOLESAL</b> 511 - Petroleum Products, Wholesale

Appendix Table A.1 (continued)

Agriculture	Fishing	Forestry	Mining	Energy
<b>First stage processing</b>				
<p><b>MAJOR GROUP 10 – Food Industries</b>                      101 - Meat and Poultry Products Industries                      103 - Fruit and Vegetable Industries                      104 - Dairy Products Industries                      105 - Flour, Prepared Cereal Food and Feed Industries                      106 - Vegetable Oil Mills (except Corn Oil)                      107 - Bakery Products Industries                      108 - Sugar and Sugar Confectionery Industries                      109 - Other Food Products Industries  <b>MAJOR GROUP 11 – Food Industries</b>                      111 - Soft Drink Industry                      112 - Distillery Products Industry                      113 - Brewery Products Industry                      114 - Wine Industry  <b>MAJOR GROUP 17 - Leather and Allied Products Industries</b>                      171 - Leather and Allied Products Industries  <b>MAJOR GROUP 12 – Tobacco Products Industries</b>                      121 - Leaf Tobacco Industry                      122 - Tobacco Products Industry</p>	<p><b>MAJOR GROUP 10 – Food Industries</b>                      102 - Fish Products Industry</p>	<p><b>MAJOR GROUP 25 – Wood Industries</b>                      251 - Sawmill, Planing Mill and Shingle Mill Products Industries                      252 - Veneer and Plywood Industries                      254 - Sash, Door and Other Millwork Industries                      256 - Wooden Box and Pallet Industry                      258 - Coffin and Casket Industry                      259 - Other Wood Industries    <b>MAJOR GROUP 27 - Paper and Allied Products Industries</b>                      271 - Pulp and Paper Industries                      272 - Asphalt Roofing Industry                      273 - Paper Box and Bag Industries                      279 - Other Converted Paper Products Industries</p>	<p><b>MAJOR GROUP 29 - Primary Metal Industries</b>                      291 - Primary Steel Industries                      292 - Steel Pipe and Tube Industry                      294 - Iron Foundries                      295 - Non-Ferrous Metal Smelting and Refining Industries                      296 - Aluminum Rolling, Casting and Extruding Industry                      297 - Copper and Copper Alloy Rolling, Casting and Extruding Industry                      299 - Other Rolled, Cast and Extruded Non-Ferrous Metal Products Industries  <b>MAJOR GROUP 30 - Fabricated Metal Products Industries (except Machinery and Transportation Equipment Industries)</b>                      301 - Power Boiler and Heat Exchanger Industry                      302 - Fabricated Structural Metal Products Industries                      303 - Ornamental and Architectural Metal Products Industries                      304 - Stamped, Pressed and Coated Metal Products Industries                      305 - Wire and Wire Products Industries                      306 - Hardware, Tool and Cutlery Industries                      307 - Heating Equipment Industry                      308 - Machine Shop Industry                      309 - Other Metal Fabricating Industries  <b>MAJOR GROUP 35 - Non-metallic Mineral Products Industries</b>                      351 - Clay Products Industries                      352 - Hydraulic Cement Industry                      354 - Concrete Products Industries                      355 - Ready-Mix Concrete Industry                      356 - Glass and Glass Products Industries                      357 - Abrasives Industry                      358 - Lime Industry                      359 - Other Non-Metallic Mineral Product Industries</p>	<p><b>MAJOR GROUP 36 - Refined Petroleum and Coal Products Industries</b>                      361 - Refined Petroleum Products Industries                      369 - Other Petroleum and Coal Products Industries  <b>MAJOR GROUP 49 – OTHER UTILITIES</b>  <b>491 - Electric Power Systems Industry</b></p>

Source: Statistics Canada. (1980) **Standard Industrial Classification, 1980** (Ottawa: Statistics Canada, Catalogue no. 12-501). Online document available at: [http://www.statcan.gc.ca/subjects-sujets/standard-norme/sic-cti/sice-ctie80\\_menu-eng.htm](http://www.statcan.gc.ca/subjects-sujets/standard-norme/sic-cti/sice-ctie80_menu-eng.htm). Last accessed December 2008.

Note that Census of Population data are coded only to the 3-digit level and thus some relevant 4-digit groups (such as 5215 – Fish and Seafood, Wholesale) could not be tabulated with the Census of Population data.

**Appendix Table A.2 Locational Gini Coefficients**

	Locational Gini coefficient, 1991	Locational Gini coefficient, 2001
<b>Agriculture</b>	<b>0.476</b>	<b>0.487</b>
Primary production	0.663	0.669
Service to primary	0.385	0.410
Wholesale	0.515	0.580
First-stage processing	0.311	0.362
<b>Fisheries</b>	<b>0.906</b>	<b>0.913</b>
Primary production	0.916	0.934
Service to primary	0.718	0.842
Wholesale	...	...
First-stage processing	0.937	0.926
<b>Forestry</b>	<b>0.499</b>	<b>0.452</b>
Primary production	0.822	0.830
Service to primary	0.651	0.724
Wholesale	0.185	0.159
First-stage processing	0.552	0.531
<b>Mining</b>	<b>0.387</b>	<b>0.368</b>
Primary production	0.775	0.766
Service to primary	0.778	0.768
Wholesale	0.403	0.495
First-stage processing	0.391	0.381
<b>Energy</b>	<b>0.492</b>	<b>0.510</b>
Primary production	0.888	0.891
Service to primary	0.874	0.892
Wholesale	0.342	0.377
First-stage processing	0.344	0.371

Note: See Appendix Table A.1 for SIC codes included in each value chain and Box 4 for a definition of the locational Gini coefficient

Source: Authors' computation based on Statistics Canada, Census of Population, 1991 and 2001.

**Appendix Table A.3 Location quotients for all resource sector value chains, Canada, 1991 and 2001**

All natural resource sectors	Predominantly urban regions	Intermediate regions	Predominantly rural regions				All regions
			All predominantly rural regions	Rural metro-adjacent regions	Rural non-metro-adjacent regions	Rural northern regions	
location quotient							
<b>Primary</b>							
1991	0.31	0.75	2.36	2.01	2.72	2.62	1.00
2001	0.28	0.75	2.45	1.99	2.97	2.68	1.00
change	-0.03	-0.01	0.09	-0.01	0.25	0.06	0.00
<b>Service to primary</b>							
1991	0.61	0.74	1.84	1.59	2.04	2.39	1.00
2001	0.54	0.76	1.99	1.70	2.31	2.21	1.00
change	-0.08	0.02	0.15	0.11	0.27	-0.18	0.00
<b>Wholesale</b>							
1991	0.94	1.00	1.10	1.19	1.05	0.73	1.00
2001	0.91	1.06	1.12	1.20	1.10	0.63	1.00
change	-0.03	0.06	0.02	0.01	0.05	-0.09	0.00
<b>Processing</b>							
1991	0.81	1.11	1.25	1.08	1.40	1.45	1.00
2001	0.78	1.12	1.30	1.17	1.44	1.43	1.00
change	-0.03	0.01	0.05	0.09	0.04	-0.02	0.00
<b>Total value chain</b>							
1991	0.63	0.95	1.67	1.46	1.89	1.87	1.00
2001	0.62	0.97	1.69	1.47	1.95	1.80	1.00
change	-0.01	0.02	0.02	0.02	0.06	-0.08	0.00

Note: See Appendix Table A.1 for SIC codes included in each value chain and Box 4 for a definition of the location quotient.

Source: Authors' computation based on Statistics Canada, Census of Population, 1991 and 2001.

**Appendix Table A.4 Location quotients for the agriculture value chain, Canada, 1991 and 2001**

Agriculture value chain	Predominantly urban regions	Intermediate regions	Predominantly rural regions				All regions	
			All predominantly rural regions	Rural metro-adjacent regions	Rural non-metro-adjacent regions	Rural northern regions		
location quotient								
<b>Primary</b>								
1991	0.26	0.82	2.39	2.52	2.57	0.31	1.00	
2001	0.25	0.83	2.44	2.47	2.74	0.31	1.00	
change	-0.01	0.01	0.05	-0.05	0.17	0.00	0.00	
<b>Service to primary</b>								
1991	0.73	1.18	1.34	1.58	1.22	0.36	1.00	
2001	0.63	1.24	1.49	1.70	1.40	0.37	1.00	
change	-0.10	0.06	0.15	0.12	0.19	0.02	0.00	
<b>Wholesale</b>								
1991	0.61	1.06	1.63	1.84	1.60	0.26	1.00	
2001	0.53	0.99	1.85	2.01	1.91	0.13	1.00	
change	-0.09	-0.07	0.22	0.17	0.31	-0.13	0.00	
<b>Processing</b>								
1991	1.03	1.00	0.95	1.10	0.89	0.20	1.00	
2001	0.97	1.03	1.03	1.22	0.94	0.11	1.00	
change	-0.06	0.03	0.09	0.12	0.05	-0.09	0.00	
<b>Total value chain</b>								
1991	0.52	0.90	1.88	2.03	1.97	0.28	1.00	
2001	0.51	0.93	1.91	2.01	2.04	0.24	1.00	
change	-0.01	0.03	0.02	-0.02	0.07	-0.04	0.00	

Note: See Appendix Table A.1 for SIC codes included in each value chain and Box 4 for a definition of the location quotient.

Source: Authors' computation based on Statistics Canada, Census of Population, 1991 and 2001.

Appendix Table A.5 Location quotients for the fisheries value chain, Canada, 1991 and 2001

Fisheries value chain	Predominantly urban regions	Intermediate regions	Predominantly rural regions				All regions	
			All predominantly rural regions	Rural metro-adjacent regions	Rural non-metro-adjacent regions	Rural northern regions		
location quotient								
<b>Primary</b>								
1991	0.18	0.49	2.75	1.16	4.22	4.97	1.00	
2001	0.10	0.55	2.89	1.11	4.90	4.17	1.00	
change	-0.08	0.06	0.15	-0.05	0.68	-0.80	0.00	
<b>Service to primary</b>								
1991	0.37	0.90	2.14	1.54	2.63	3.43	1.00	
2001	0.20		2.55	1.62	3.37	4.63	1.00	
change	-0.18	-0.09	0.40	0.07	0.74	1.21	0.00	
<b>Wholesale</b>								
1991	...	...	...	...	...	...	...	
2001	...	...	...	...	...	...	...	
change	...	...	...	...	...	...	...	
<b>Processing</b>								
1991	0.16	0.68	2.65	1.11	4.22	4.03	1.00	
2001	0.21	0.56	2.69	1.23	4.33	3.87	1.00	
change	0.05	-0.12	0.04	0.12	0.11	-0.16	0.00	
<b>Total value chain</b>								
1991	0.18	0.61	2.67	1.15	4.16	4.39	1.00	
2001	0.16	0.57	2.78	1.19	4.56	4.06	1.00	
change	-0.02	-0.04	0.11	0.05	0.40	-0.33	0.00	

Note: See Appendix Table A.1 for SIC codes included in each value chain and Box 4 for a definition of the location quotient.

Source: Authors' computation based on Statistics Canada, Census of Population, 1991 and 2001.

Appendix Table A.6 Location quotients for the forestry value chain, Canada, 1991 and 2001

Forestry value chain	Predominantly urban regions	Intermediate regions	Predominantly rural regions				All regions	
			All predominantly rural regions	Rural metro-adjacent regions	Rural non-metro-adjacent regions	Rural northern regions		
location quotient								
<b>Primary</b>								
1991	0.13	0.47	2.85	1.40	4.14	5.26	1.00	
2001	0.09	0.47	2.96	1.46	4.37	5.88	1.00	
change	-0.03	0.00	0.11	0.05	0.23	0.61	0.00	
<b>Service to primary</b>								
1991	0.40	0.60	2.30	1.47	2.92	4.40	1.00	
2001	0.27	0.62	2.56	1.38	3.50	5.87	1.00	
change	-0.13	0.02	0.26	-0.09	0.58	1.47	0.00	
<b>Wholesale</b>								
1991	1.01	0.98	0.99	1.05	0.96	0.76	1.00	
2001	1.03	1.06	0.90	0.98	0.84	0.66	1.00	
change	0.02	0.08	-0.09	-0.07	-0.12	-0.10	0.00	
<b>Processing</b>								
1991	0.52	0.88	1.91	1.36	2.35	3.17	1.00	
2001	0.50	0.89	1.96	1.41	2.44	3.25	1.00	
change	-0.02	0.01	0.05	0.06	0.09	0.08	0.00	
<b>Total value chain</b>								
1991	0.53	0.81	1.94	1.32	2.45	3.20	1.00	
2001	0.56	0.85	1.88	1.31	2.38	3.15	1.00	
change	0.03	0.05	-0.06	-0.01	-0.07	-0.05	0.00	

Note: See Appendix Table A.1 for SIC codes included in each value chain and Box 4 for a definition of the location quotient.

Source: Authors' computation based on Statistics Canada, Census of Population, 1991 and 2001.

Appendix Table A.7 Location quotients for the mining value chain, Canada, 1991 and 2001

Mining value chain	Predominantly urban regions	Intermediate regions	Predominantly rural regions				All regions	
			All predominantly rural regions	Rural metro-adjacent regions	Rural non-metro-adjacent regions	Rural northern regions		
location quotient								
<b>Primary</b>								
1991	0.18	1.24	2.26	0.81	2.56	10.76	1.00	
2001	0.19	1.20	2.30	0.87	2.66	11.34	1.00	
change	0.01	-0.03	0.04	0.06	0.09	0.58	0.00	
<b>Service to primary</b>								
1991	0.46	0.76	2.08	0.87	2.49	8.30	1.00	
2001	0.47	0.78	2.09	0.85	2.57	8.83	1.00	
change	0.01	0.02	0.00	-0.02	0.07	0.53	0.00	
<b>Wholesale</b>								
1991	1.24	1.08	0.53	0.75	0.34	0.13	1.00	
2001	1.15	1.26	0.55	0.66	0.45	0.34	1.00	
change	-0.09	0.17	0.02	-0.09	0.11	0.21	0.00	
<b>Processing</b>								
1991	1.00	1.37	0.75	0.92	0.59	0.59	1.00	
2001	0.95	1.38	0.83	1.01	0.66	0.49	1.00	
change	-0.05	0.01	0.08	0.09	0.07	-0.11	0.00	
<b>Total value chain</b>								
1991	0.85	1.32	1.05	0.89	0.98	2.61	1.00	
2001	0.85	1.34	1.04	0.97	0.96	2.11	1.00	
change	0.00	0.01	-0.01	0.08	-0.03	-0.50	0.00	

Note: See Appendix Table A.1 for SIC codes included in each value chain and Box 4 for a definition of the location quotient.

Source: Authors' computation based on Statistics Canada, Census of Population, 1991 and 2001.

Appendix Table A.8 Location quotients for the energy value chain, Canada, 1991 and 2001

Energy value chain	Predominantly urban regions	Intermediate regions	Predominantly rural regions				All regions	
			All predominantly rural regions	Rural metro-adjacent regions	Rural non-metro-adjacent regions	Rural northern regions		
location quotient								
<b>Primary</b>								
1991	1.03	0.17	1.50	0.88	1.62	5.20	1.00	
2001	0.97	0.16	1.62	0.90	1.80	6.19	1.00	
change	-0.06	-0.01	0.13	0.02	0.19	0.99	0.00	
<b>Service to primary</b>								
1991	0.75	0.21	1.95	1.95	2.06	1.24	1.00	
2001	0.62	0.24	2.19	2.04	2.57	0.91	1.00	
change	-0.13	0.03	0.24	0.08	0.51	-0.33	0.00	
<b>Wholesale</b>								
1991	0.96	0.95	1.09	1.10	1.06	1.21	1.00	
2001	0.91	1.03	1.13	1.11	1.16	1.22	1.00	
change	-0.05	0.08	0.04	0.00	0.10	0.01	0.00	
<b>Processing</b>								
1991	0.83	1.31	1.08	0.89	1.27	1.29	1.00	
2001	0.81	1.34	1.11	0.89	1.31	1.55	1.00	
change	-0.02	0.02	0.03	0.00	0.04	0.26	0.00	
<b>Total value chain</b>								
1991	0.90	0.84	1.28	1.05	1.40	2.22	1.00	
2001	0.83	0.81	1.43	1.16	1.64	2.36	1.00	
change	-0.07	-0.03	0.15	0.11	0.23	0.13	0.00	

Note: See Appendix Table A.1 for SIC codes included in each value chain and Box 4 for a definition of the location quotient.

Source: Authors' computation based on Statistics Canada, Census of Population, 1991 and 2001.

**Appendix Table A.9 The agriculture value chain: spatial association between the intensity of employment in a given region and the intensity of employment in the region's milieu, Canada, 1991 and 2001**

Region	Regional milieu				
	Primary production	Service to primary	Wholesale	First-stage processing	
	coefficients				
<b>Primary production</b>					
	1991	<b>0.53</b>	<b>0.13</b>	<b>0.32</b>	-0.02
	2001	<b>0.49</b>	<b>0.18</b>	<b>0.40</b>	<b>0.03</b>
<b>Service to primary</b>					
	1991	<b>0.91</b>	<b>0.37</b>	<b>0.62</b>	0.05
	2001	<b>1.03</b>	<b>0.44</b>	<b>0.89</b>	<b>0.10</b>
<b>Wholesale</b>					
	1991	<b>0.86</b>	<b>0.23</b>	<b>0.53</b>	-0.01
	2001	<b>0.67</b>	<b>0.26</b>	<b>0.58</b>	<b>0.04</b>
<b>First stage processing</b>					
	1991	-0.19	0.03	-0.07	<b>0.28</b>
	2001	0.13	0.11	0.14	<b>0.25</b>

Note: The coefficients along the main diagonal correspond to Moran's "I" (see Box 3). The coefficients off the main diagonal are slope coefficients of a regression between the regional value of the location quotient (row) and the regional milieu values of the location quotient (column). See Box 3 for details. Figures in bold are statistically significant at the 1% level.

Source: Authors' computations based on Census of Population, 1991 and 2001.

**Appendix Table A.10 The fisheries value chain: spatial association between the intensity of employment in a given region and the intensity of employment in the region's milieu, Canada, 1991 and 2001**

Region	Regional milieu				
	Primary production	Service to primary	Wholesale	First-stage processing	
	coefficients				
<b>Primary production</b>					
	1991	<b>0.33</b>	<b>0.09</b>	...	<b>0.35</b>
	2001	<b>0.36</b>	<b>0.15</b>	...	<b>0.32</b>
<b>Service to primary</b>					
	1991	<b>0.31</b>	<b>0.15</b>	...	<b>0.29</b>
	2001	<b>0.39</b>	<b>0.28</b>	...	<b>0.34</b>
<b>Wholesale</b>					
	1991	...	...	...	...
	2001	...	...	...	...
<b>First stage processing</b>					
	1991	<b>0.29</b>	<b>0.07</b>	...	<b>0.32</b>
	2001	<b>0.36</b>	<b>0.15</b>	...	<b>0.32</b>

Note: The coefficients along the main diagonal correspond to Moran's "I" (see Box 3). The coefficients off the main diagonal are slope coefficients of a regression between the regional value of the location quotient (row) and the regional milieu values of the location quotient (column). See Box 3 for details. Figures in bold are statistically significant at the 1% level.

Source: Authors' computations based on Census of Population, 1991 and 2001.

**Appendix Table A.11 The forestry value chain: spatial association between the intensity of employment in a given region and the intensity of employment in the region's milieu, Canada, 1991 and 2001**

Region	Regional milieu				
	Primary production	Service to primary	Wholesale	First-stage processing	
coefficients					
<b>Primary production</b>					
	1991	<b>0.38</b>	<b>0.21</b>	0.00	<b>0.16</b>
	2001	<b>0.35</b>	<b>0.26</b>	<b>-0.01</b>	<b>0.12</b>
<b>Service to primary</b>					
	1991	<b>0.54</b>	<b>0.37</b>	-0.01	<b>0.21</b>
	2001	<b>0.42</b>	<b>0.34</b>	<b>-0.02</b>	<b>0.14</b>
<b>Wholesale</b>					
	1991	-0.33	-0.39	<b>0.13</b>	-0.08
	2001	<b>-1.32</b>	<b>-1.28</b>	<b>0.24</b>	-0.35
<b>First stage processing</b>					
	1991	<b>0.55</b>	<b>0.28</b>	0.00	<b>0.26</b>
	2001	<b>0.44</b>	<b>0.31</b>	0.00	<b>0.23</b>

Note: The coefficients along the main diagonal correspond to Moran's "I" (see Box 3). The coefficients off the main diagonal are slope coefficients of a regression between the regional value of the location quotient (row) and the regional milieu values of the location quotient (column). See Box 3 for details. Figures in bold are statistically significant at the 1% level.  
 Source: Authors' computations based on Census of Population, 1991 and 2001.

**Appendix Table A.12 The mining value chain: spatial association between the intensity of employment in a given region and the intensity of employment in the region's milieu, Canada, 1991 and 2001**

Region	Regional milieu				
	Primary production	Service to primary	Wholesale	First-stage processing	
coefficients					
<b>Primary production</b>					
	1991	<b>0.11</b>	<b>0.11</b>	-0.01	-0.01
	2001	<b>0.13</b>	<b>0.12</b>	0.00	-0.01
<b>Service to primary</b>					
	1991	<b>0.14</b>	<b>0.20</b>	-0.01	-0.01
	2001	<b>0.11</b>	<b>0.18</b>	0.00	-0.01
<b>Wholesale</b>					
	1991	<b>-0.45</b>	<b>-0.41</b>	<b>0.29</b>	<b>0.25</b>
	2001	-0.06	-0.10	<b>0.10</b>	<b>0.08</b>
<b>First stage processing</b>					
	1991	<b>-0.34</b>	-0.27	<b>0.23</b>	<b>0.24</b>
	2001	<b>-0.36</b>	<b>-0.40</b>	<b>0.19</b>	<b>0.28</b>

Note: The coefficients along the main diagonal correspond to Moran's "I" (see Box 3). The coefficients off the main diagonal are slope coefficients of a regression between the regional value of the location quotient (row) and the regional milieu values of the location quotient (column). See Box 3 for details. Figures in bold are statistically significant at the 1% level.  
 Source: Authors' computations based on Census of Population, 1991 and 2001.

**Appendix Table A.13 The energy value chain: spatial association between the intensity of employment in a given region and the intensity of employment in the region's milieu, Canada, 1991 and 2001**

Region	Regional milieu				
	Primary production	Service to primary	Wholesale	First-stage processing	
	coefficients				
<b>Primary production</b>	1991	<b>0.23</b>	<b>0.24</b>	<b>0.04</b>	0.00
	2001	<b>0.28</b>	<b>0.34</b>	<b>0.05</b>	-0.01
<b>Service to primary</b>	1991	<b>0.42</b>	<b>0.43</b>	<b>0.09</b>	-0.01
	2001	<b>0.48</b>	<b>0.47</b>	<b>0.08</b>	0.00
<b>Wholesale</b>	1991	<b>1.39</b>	<b>1.61</b>	<b>0.35</b>	0.02
	2001	<b>1.17</b>	<b>1.36</b>	<b>0.27</b>	0.02
<b>First stage processing</b>	1991	-0.03	-0.05	0.01	0.04
	2001	-0.07	-0.04	0.01	<b>0.05</b>

Note: The coefficients along the main diagonal correspond to Moran's "I" (see Box 3). The coefficients off the main diagonal are slope coefficients of a regression between the regional value of the location quotient (row) and the regional milieu values of the location quotient (column). See Box 3 for details. Figures in bold are statistically significant at the 1% level.

Source: Authors' computations based on Census of Population, 1991 and 2001.

**Appendix Table A.14 Distribution of all census divisions by regional and regional milieu intensity of the resource value chain, Canada 1991 and 2001**

Value chain Component	Census 1991				Census 2001			
	High (region and milieu)	High region - low milieu	Low region - high milieu	Low (region and milieu)	High (region and milieu)	High region - low milieu	Low region - high milieu	Low (region and milieu)
percent distribution of census divisions								
<b>Agriculture</b>	<b>18.8</b>	<b>12.8</b>	<b>10.8</b>	<b>57.6</b>	<b>19.8</b>	<b>12.2</b>	<b>10.8</b>	<b>57.3</b>
Primary production	17.0	14.6	8.7	59.7	18.1	13.9	9.0	59.0
Service to primary	24.3	13.2	11.1	51.4	19.8	14.6	9.4	56.3
Wholesale	19.8	11.8	8.3	60.1	17.0	11.8	8.0	63.2
First-stage processing	30.9	7.6	20.1	41.3	31.6	6.3	17.4	44.8
<b>Fisheries</b>	<b>16.0</b>	<b>0.3</b>	<b>8.3</b>	<b>75.3</b>	<b>14.9</b>	<b>1.0</b>	<b>8.7</b>	<b>75.3</b>
Primary production	16.0	1.7	9.7	72.6	14.9	1.7	8.3	75.0
Service to primary	20.8	7.6	17.4	54.2	18.4	4.9	10.4	66.3
Wholesale	...	...	...	...	...	...	...	...
First-stage processing	12.5	1.0	9.7	76.7	12.8	1.7	9.4	76.0
<b>Forestry</b>	<b>27.1</b>	<b>6.3</b>	<b>16.3</b>	<b>50.3</b>	<b>29.2</b>	<b>6.6</b>	<b>16.3</b>	<b>47.9</b>
Primary production	26.4	5.6	13.9	54.2	27.4	5.9	14.2	52.4
Service to primary	26.0	8.0	15.6	50.3	24.7	6.6	15.3	53.5
Wholesale	33.0	14.2	18.4	34.4	32.3	16.0	15.6	36.1
First-stage processing	25.7	6.3	17.7	50.3	27.4	7.3	18.1	47.2
<b>Mining</b>	<b>20.8</b>	<b>8.3</b>	<b>21.5</b>	<b>49.3</b>	<b>27.8</b>	<b>5.6</b>	<b>20.8</b>	<b>45.8</b>
Primary production	11.1	7.3	17.7	63.9	11.8	8.0	17.7	62.5
Service to primary	13.9	6.6	18.1	61.5	11.5	9.0	13.5	66.0
Wholesale	31.6	8.3	17.4	42.7	21.2	9.7	21.5	47.6
First-stage processing	30.6	5.2	16.7	47.6	30.2	5.2	18.1	46.5
<b>Energy</b>	<b>12.8</b>	<b>7.6</b>	<b>10.8</b>	<b>68.8</b>	<b>13.5</b>	<b>8.3</b>	<b>11.1</b>	<b>67.0</b>
Primary production	11.1	1.4	11.1	76.4	11.1	2.1	11.8	75.0
Service to primary	12.2	1.4	11.8	74.7	11.8	0.7	11.8	75.7
Wholesale	19.4	13.2	9.0	58.3	20.5	13.9	16.7	49.0
First-stage processing	21.9	12.5	21.2	44.4	18.8	11.5	23.6	46.2

Note: "High (region and milieu)" indicates higher values of employment intensity (relative to the Canadian average) in the region and in the regional milieu. "High region - low milieu" indicates higher regional values and lower values in the regional milieu. "Low region - high milieu" indicates lower regional values and higher values in the regional milieu; "Low (region and milieu)" indicates a lower value of employment intensity both in the region and in the regional milieu.

Source: Authors' computations based on Census of Population, 1991 and 2001.

**Appendix Table A.15 Distribution of predominantly rural census divisions by regional and regional milieu intensity of the resource value chain, Canada 1991 and 2001**

Value chain Component	Census 1991				Census 2001			
	High (region and milieu)	High region - low milieu	Low region - high milieu	Low (region and milieu)	High (region and milieu)	High region - low milieu	Low region - high milieu	Low (region and milieu)
percent distribution of census divisions								
<b>Agriculture</b>	<b>23.5</b>	<b>15.5</b>	<b>6.6</b>	<b>54.4</b>	<b>23.9</b>	<b>14.6</b>	<b>7.1</b>	<b>54.4</b>
Primary production	21.7	17.7	6.6	54.0	22.6	16.8	6.6	54.0
Service to primary	24.3	15.9	8.8	50.9	21.7	16.4	6.6	55.3
Wholesale	21.2	13.7	7.5	57.5	20.4	12.8	6.6	60.2
First-stage processing	24.3	8.4	19.9	47.3	26.1	7.5	15.9	50.4
<b>Fisheries</b>	<b>19.9</b>	<b>0.4</b>	<b>8.8</b>	<b>70.8</b>	<b>18.6</b>	<b>1.3</b>	<b>9.7</b>	<b>70.4</b>
Primary production	19.9	2.2	10.2	67.7	18.6	2.2	9.3	69.9
Service to primary	24.8	9.7	18.6	46.9	22.1	6.2	11.5	60.2
Wholesale	...	...	...	...	...	...	...	...
First-stage processing	15.5	1.3	11.1	72.1	15.9	2.2	10.2	71.7
<b>Forestry</b>	<b>32.3</b>	<b>6.6</b>	<b>17.3</b>	<b>43.8</b>	<b>34.1</b>	<b>8.4</b>	<b>16.8</b>	<b>40.7</b>
Primary production	32.7	6.6	13.7	46.9	34.5	6.6	14.2	44.7
Service to primary	31.4	9.7	17.3	41.6	30.1	7.1	17.3	45.6
Wholesale	28.8	15.5	16.4	39.4	23.9	15.5	17.3	43.4
First-stage processing	29.6	8.0	18.6	43.8	31.4	8.8	18.6	41.2
<b>Mining</b>	<b>17.3</b>	<b>10.2</b>	<b>19.5</b>	<b>53.1</b>	<b>22.6</b>	<b>6.6</b>	<b>18.1</b>	<b>52.7</b>
Primary production	12.8	8.4	20.8	58	13.3	10.2	19.9	56.6
Service to primary	16.8	7.5	20.8	54.9	13.7	11.1	15.9	59.3
Wholesale	21.2	7.5	19.5	51.8	13.7	8.8	23.0	54.4
First-stage processing	21.7	6.2	17.3	54.9	21.2	6.2	18.1	54.4
<b>Energy</b>	<b>14.6</b>	<b>6.2</b>	<b>12.8</b>	<b>66.4</b>	<b>15.9</b>	<b>7.5</b>	<b>13.3</b>	<b>63.3</b>
Primary production	13.3	1.3	13.3	72.1	13.3	2.2	14.2	70.4
Service to primary	14.6	1.8	14.2	69.5	14.2	0.4	14.2	71.2
Wholesale	22.1	12.8	9.7	55.3	22.6	15.0	19.0	43.4
First-stage processing	20.4	12.4	19.9	47.3	17.7	11.5	23.5	47.3

Note: "High (region and milieu)" indicates higher values of employment intensity (relative to the Canadian average) in the region and in the regional milieu. "High region - low milieu" indicates higher regional values and lower values in the regional milieu. "Low region - high milieu" indicates lower regional values and higher values in the regional milieu; "Low (region and milieu)" indicates a lower value of employment intensity both in the region and in the regional milieu.

Source: Authors' computations based on Census of Population, 1991 and 2001.

Appendix Table A.16 Number employed in each natural resource value chain by type of region, Canada, 1991 and 2001

	Predominantly urban regions	Intermediate regions	Predominantly rural regions				All regions
			All predominantly rural regions	Rural metro-adjacent regions	Rural non-metro-adjacent regions	Rural northern regions	
number employed							
<b>Agriculture: primary</b>							
1991	65,210	78,370	345,840	182,140	160,575	3,125	489,420
2001	52,450	67,095	289,960	152,115	135,445	2,400	409,505
percent change	-20	-14	-16	-16	-16	-23	-16
<b>Agriculture: service to primary</b>							
1991	17,840	11,025	18,870	11,115	7,405	350	47,735
2001	20,025	15,025	26,655	15,750	10,465	440	61,705
percent change	12	36	41	42	41	26	29
<b>Agriculture: wholesale</b>							
1991	11,365	7,585	17,590	9,925	7,470	195	36,540
2001	13,325	9,665	26,470	14,920	11,425	125	49,460
percent change	17	27	50	50	53	-36	35
<b>Agriculture: processing</b>							
1991	118,885	44,515	63,370	36,700	25,735	935	226,770
2001	108,520	44,325	65,130	39,955	24,700	475	217,975
percent change	-9	0	3	9	-4	-49	-4
<b>Agriculture: total value chain</b>							
1991	213,300	141,495	445,670	239,880	201,185	4,605	800,465
2001	194,320	136,110	408,215	222,740	182,035	3,440	738,645
percent change	-9	-4	-8	-7	-10	-25	-8
<b>Fishing: primary</b>							
1991	3,985	4,100	34,925	7,365	23,175	4,385	43,010
2001	2,290	4,675	36,390	7,255	25,690	3,445	43,355
percent change	-43	14	4	-1	11	-21	1
<b>Fishing: service to primary</b>							
1991	785	730	2,615	940	1,385	290	4,130
2001	505	800	3,680	1,210	2,030	440	4,985
percent change	-36	10	41	29	47	52	21
<b>Fishing: wholesale</b>							
1991	...	...	...	...	...	...	...
2001	...	...	...	...	...	...	...
percent change	...	...	...	...	...	...	...
<b>Fishing: processing</b>							
1991	4,765	7,685	45,290	9,440	31,080	4,770	57,740
2001	4,305	4,330	30,765	7,265	20,595	2,905	39,400
percent change	-10	-44	-32	-23	-34	-39	-32
<b>Fishing: total value chain</b>							
1991	9,535	12,515	82,830	17,745	55,640	9,445	104,880
2001	7,100	9,805	70,835	15,730	48,315	6,790	87,740
percent change	-26	-22	-14	-11	-13	-28	-16

Appendix Table A.16 Continued

	Predominantly urban regions	Intermediate regions	Predominantly rural regions				All regions
			All predominantly rural regions	Rural metro-adjacent regions	Rural non-metro-adjacent regions	Rural northern regions	
number employed							
<b>Forestry: primary</b>							
1991	4,505	6,395	58,685	14,415	36,760	7,510	69,585
2001	3,305	6,290	58,435	14,880	35,940	7,615	68,030
percent change	-27	-2	0	3	-2	1	-2
<b>Forestry: service to primary</b>							
1991	7,435	4,320	24,935	7,940	13,685	3,310	36,690
2001	4,035	3,620	22,015	6,140	12,560	3,315	29,670
percent change	-46	-16	-12	-23	-8	0	-19
<b>Forestry: wholesale</b>							
1991	37,895	14,170	21,580	11,405	9,030	1,145	73,645
2001	62,740	24,830	30,950	17,460	12,010	1,480	118,520
percent change	66	75	43	53	33	29	61
<b>Forestry: processing</b>							
1991	67,405	44,270	145,225	51,485	77,055	16,685	256,900
2001	71,250	48,460	157,905	58,970	81,735	17,200	277,615
percent change	6	9	9	15	6	3	8
<b>Forestry: total value chain</b>							
1991	117,240	69,155	250,425	85,245	136,530	28,650	436,820
2001	141,330	83,200	269,305	97,450	142,245	29,610	493,835
percent change	21	20	8	14	4	3	13
<b>Mining: primary</b>							
1991	7,410	19,805	54,565	9,800	26,725	18,040	81,780
2001	5,480	13,595	38,275	7,485	18,405	12,385	57,350
percent change	-26	-31	-30	-24	-31	-31	-30
<b>Mining: service to primary</b>							
1991	2,190	1,400	5,760	1,195	2,975	1,590	9,350
2001	2,110	1,345	5,290	1,110	2,710	1,470	8,745
percent change	-4	-4	-8	-7	-9	-8	-6
<b>Mining: wholesale</b>							
1991	11,955	4,030	2,995	2,110	835	50	18,980
2001	10,595	4,450	2,885	1,790	980	115	17,930
percent change	-11	10	-4	-15	17	130	-6
<b>Mining: processing</b>							
1991	169,550	89,505	74,220	45,120	25,050	4,050	333,275
2001	166,830	92,885	82,265	51,925	27,180	3,160	341,980
percent change	-2	4	11	15	9	-22	3
<b>Mining: total value chain</b>							
1991	191,105	114,740	137,540	58,225	55,585	23,730	443,385
2001	185,015	112,275	128,715	62,310	49,275	17,130	426,005
percent change	-3	-2	-6	7	-11	-28	-4

Appendix Table A.16 Continued

	Predominantly urban regions	Intermediate regions	Predominantly rural regions				All regions
			All predominantly rural regions	Rural metro-adjacent regions	Rural non-metro-adjacent regions	Rural northern regions	
number employed							
<b>Energy: primary</b>							
1991	35,890	2,325	30,380	8,940	14,130	7,310	68,595
2001	27,185	1,765	25,790	7,430	11,910	6,450	54,740
percent change	-24	-24	-15	-17	-16	-12	-20
<b>Energy: service to primary</b>							
1991	12,070	1,290	18,185	9,095	8,290	800	31,545
2001	16,025	2,370	31,825	15,350	15,605	870	50,220
percent change	33	84	75	69	88	9	59
<b>Energy: wholesale</b>							
1991	26,240	9,965	17,260	8,710	7,225	1,325	53,465
2001	21,685	9,390	15,230	7,685	6,470	1,075	46,305
percent change	-17	-6	-12	-12	-10	-19	-13
<b>Energy: processing</b>							
1991	53,910	32,695	40,680	16,735	20,575	3,370	127,285
2001	43,455	27,560	33,610	13,960	16,565	3,085	104,625
percent change	-19	-16	-17	-17	-19	-8	-18
<b>Energy: total value chain</b>							
1991	128,110	46,275	106,505	43,480	50,220	12,805	280,890
2001	108,350	41,085	106,455	44,425	50,550	11,480	255,890
percent change	-15	-11	0	2	1	-10	-9
<b>All natural resource sectors: primary</b>							
1991	117,000	110,995	524,395	222,660	261,365	40,370	752,390
2001	90,710	93,420	448,850	189,165	227,390	32,295	632,980
percent change	-22	-16	-14	-15	-13	-20	-16
<b>All natural resource sectors: service to primary</b>							
1991	40,320	18,765	70,365	30,285	33,740	6,340	129,450
2001	42,700	23,160	89,465	39,560	43,370	6,535	155,325
percent change	6	23	27	31	29	3	20
<b>All natural resource sectors: wholesale</b>							
1991	87,455	35,750	59,425	32,150	24,560	2,715	182,630
2001	108,345	48,335	75,535	41,855	30,885	2,795	232,215
percent change	24	35	27	30	26	3	27
<b>All natural resource sectors: processing</b>							
1991	414,515	218,670	368,785	159,480	179,495	29,810	1,001,970
2001	394,360	217,560	369,675	172,075	170,775	26,825	981,595
percent change	-5	-1	0	8	-5	-10	-2
<b>All natural resource sectors: total value chain</b>							
1991	659,290	384,180	1,022,970	444,575	499,160	79,235	2,066,440
2001	636,115	382,475	983,525	442,655	472,420	68,450	2,002,115
percent change	-4	0	-4	0	-5	-14	-3
<b>All sectors: total employment</b>							
1991	7,232,695	2,783,555	4,203,830	2,098,725	1,813,595	291,510	14,220,080
2001	7,988,585	3,070,990	4,516,885	2,338,435	1,881,790	296,660	15,576,460
percent change	10	10	7	11	4	2	10

Source: Statistics Canada. Census of Population, 1991 and 2001.

Appendix Table A.17 Percent distribution of employment with each type of region, Canada, 1991 and 2001

	Predominantly urban regions	Intermediate regions	Predominantly rural regions				All regions
			All predominantly rural regions	Rural metro-adjacent regions	Rural non-metro-adjacent regions	Rural northern regions	
percent distribution within each geographic group (column percent)							
<b>Agriculture: primary</b>							
1991	0.9	2.8	8.2	8.7	8.9	1.1	3.4
2001	0.7	2.2	6.4	6.5	7.2	0.8	2.6
percentage point change in share	-0.2	-0.6	-1.8	-2.2	-1.7	-0.3	-0.8
<b>Agriculture: service to primary</b>							
1991	0.2	0.4	0.4	0.5	0.4	0.1	0.3
2001	0.3	0.5	0.6	0.7	0.6	0.1	0.4
percentage point change in share	0.0	0.1	0.1	0.1	0.1	0.0	0.1
<b>Agriculture: wholesale</b>							
1991	0.2	0.3	0.4	0.5	0.4	0.1	0.3
2001	0.2	0.3	0.6	0.6	0.6	0.0	0.3
percentage point change in share	0.0	0.0	0.2	0.2	0.2	0.0	0.1
<b>Agriculture: processing</b>							
1991	1.6	1.6	1.5	1.7	1.4	0.3	1.6
2001	1.4	1.4	1.4	1.7	1.3	0.2	1.4
percentage point change in share	-0.3	-0.2	-0.1	0.0	-0.1	-0.2	-0.2
<b>Agriculture: total value chain</b>							
1991	2.9	5.1	10.6	11.4	11.1	1.6	5.6
2001	2.4	4.4	9.0	9.5	9.7	1.2	4.7
percentage point change in share	-0.5	-0.7	-1.6	-1.9	-1.4	-0.4	-0.9
<b>Fishing: primary</b>							
1991	0.1	0.1	0.8	0.4	1.3	1.5	0.3
2001	0.0	0.2	0.8	0.3	1.4	1.2	0.3
percentage point change in share	0.0	0.0	0.0	0.0	0.1	-0.3	0.0
<b>Fishing: service to primary</b>							
1991	0.0	0.0	0.1	0.0	0.1	0.1	0.0
2001	0.0	0.0	0.1	0.1	0.1	0.1	0.0
percentage point change in share	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Fishing: wholesale</b>							
1991	...	...	...	...	...	...	...
2001	...	...	...	...	...	...	...
percentage point change in share	...	...	...	...	...	...	...
<b>Fishing: processing</b>							
1991	0.1	0.3	1.1	0.4	1.7	1.6	0.4
2001	0.1	0.1	0.7	0.3	1.1	1.0	0.3
percentage point change in share	0.0	-0.1	-0.4	-0.1	-0.6	-0.7	-0.2
<b>Fishing: total value chain</b>							
1991	0.1	0.4	2.0	0.8	3.1	3.2	0.7
2001	0.1	0.3	1.6	0.7	2.6	2.3	0.6
percentage point change in share	0.0	-0.1	-0.4	-0.2	-0.5	-1.0	-0.2

Appendix Table A.17 Continued

	Predominantly urban regions	Intermediate regions	Predominantly rural regions				All regions
			All predominantly rural regions	Rural metro-adjacent regions	Rural non-metro-adjacent regions	Rural northern regions	
percent distribution within each geographic group (column percent)							
<b>Forestry: primary</b>							
1991	0.1	0.2	1.4	0.7	2.0	2.6	0.5
2001	0.0	0.2	1.3	0.6	1.9	2.6	0.4
percentage point change in share	0.0	0.0	-0.1	-0.1	-0.1	0.0	-0.1
<b>Forestry: service to primary</b>							
1991	0.1	0.2	0.6	0.4	0.8	1.1	0.3
2001	0.1	0.1	0.5	0.3	0.7	1.1	0.2
percentage point change in share	-0.1	0.0	-0.1	-0.1	-0.1	0.0	-0.1
<b>Forestry: wholesale</b>							
1991	0.5	0.5	0.5	0.5	0.5	0.4	0.5
2001	0.8	0.8	0.7	0.7	0.6	0.5	0.8
percentage point change in share	0.3	0.3	0.2	0.2	0.1	0.1	0.2
<b>Forestry: processing</b>							
1991	0.9	1.6	3.5	2.5	4.2	5.7	1.8
2001	0.9	1.6	3.5	2.5	4.3	5.8	1.8
percentage point change in share	0.0	0.0	0.0	0.1	0.1	0.1	0.0
<b>Forestry: total value chain</b>							
1991	1.6	2.5	6.0	4.1	7.5	9.8	3.1
2001	1.8	2.7	6.0	4.2	7.6	10.0	3.2
percentage point change in share	0.1	0.2	0.0	0.1	0.0	0.2	0.1
<b>Mining: primary</b>							
1991	0.1	0.7	1.3	0.5	1.5	6.2	0.6
2001	0.1	0.4	0.8	0.3	1.0	4.2	0.4
percentage point change in share	0.0	-0.3	-0.5	-0.1	-0.5	-2.0	-0.2
<b>Mining: service to primary</b>							
1991	0.0	0.1	0.1	0.1	0.2	0.5	0.1
2001	0.0	0.0	0.1	0.0	0.1	0.5	0.1
percentage point change in share	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Mining: wholesale</b>							
1991	0.2	0.1	0.1	0.1	0.0	0.0	0.1
2001	0.1	0.1	0.1	0.1	0.1	0.0	0.1
percentage point change in share	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Mining: processing</b>							
1991	2.3	3.2	1.8	2.1	1.4	1.4	2.3
2001	2.1	3.0	1.8	2.2	1.4	1.1	2.2
percentage point change in share	-0.3	-0.2	0.1	0.1	0.1	-0.3	-0.1
<b>Mining: total value chain</b>							
1991	2.6	4.1	3.3	2.8	3.1	8.1	3.1
2001	2.3	3.7	2.8	2.7	2.6	5.8	2.7
percentage point change in share	-0.3	-0.5	-0.4	-0.1	-0.4	-2.4	-0.4

Appendix Table A.17 Continued

	Predominantly urban regions	Intermediate regions	Predominantly rural regions				All regions
			All predominantly rural regions	Rural metro-adjacent regions	Rural non-metro-adjacent regions	Rural northern regions	
percent distribution within each geographic group (column percent)							
<b>Energy: primary</b>							
1991	0.5	0.1	0.7	0.4	0.8	2.5	0.5
2001	0.3	0.1	0.6	0.3	0.6	2.2	0.4
percentage point change in share	-0.2	0.0	-0.2	-0.1	-0.1	-0.3	-0.1
<b>Energy: service to primary</b>							
1991	0.2	0.0	0.4	0.4	0.5	0.3	0.2
2001	0.2	0.1	0.7	0.7	0.8	0.3	0.3
percentage point change in share	0.0	0.0	0.3	0.2	0.4	0.0	0.1
<b>Energy: wholesale</b>							
1991	0.4	0.4	0.4	0.4	0.4	0.5	0.4
2001	0.3	0.3	0.3	0.3	0.3	0.4	0.3
percentage point change in share	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
<b>Energy: processing</b>							
1991	0.7	1.2	1.0	0.8	1.1	1.2	0.9
2001	0.5	0.9	0.7	0.6	0.9	1.0	0.7
percentage point change in share	-0.2	-0.3	-0.2	-0.2	-0.3	-0.1	-0.2
<b>Energy: total value chain</b>							
1991	1.8	1.7	2.5	2.1	2.8	4.4	2.0
2001	1.4	1.3	2.4	1.9	2.7	3.9	1.6
percentage point change in share	-0.4	-0.3	-0.2	-0.2	-0.1	-0.5	-0.3
<b>All natural resource sectors: primary</b>							
1991	1.6	4.0	12.5	10.6	14.4	13.8	5.3
2001	1.1	3.0	9.9	8.1	12.1	10.9	4.1
percentage point change in share	-0.5	-0.9	-2.5	-2.5	-2.3	-3.0	-1.2
<b>All natural resource sectors: service to primary</b>							
1991	0.6	0.7	1.7	1.4	1.9	2.2	0.9
2001	0.5	0.8	2.0	1.7	2.3	2.2	1.0
percentage point change in share	0.0	0.1	0.3	0.2	0.4	0.0	0.1
<b>All natural resource sectors: wholesale</b>							
1991	1.2	1.3	1.4	1.5	1.4	0.9	1.3
2001	1.4	1.6	1.7	1.8	1.6	0.9	1.5
percentage point change in share	0.1	0.3	0.3	0.3	0.3	0.0	0.2
<b>All natural resource sectors: processing</b>							
1991	5.7	7.9	8.8	7.6	9.9	10.2	7.0
2001	4.9	7.1	8.2	7.4	9.1	9.0	6.3
percentage point change in share	-0.8	-0.8	-0.6	-0.2	-0.8	-1.2	-0.7
<b>All natural resource sectors: total value chain</b>							
1991	9.1	13.8	24.3	21.2	27.5	27.2	14.5
2001	8.0	12.5	21.8	18.9	25.1	23.1	12.9
percentage point change in share	-1.2	-1.3	-2.6	-2.3	-2.4	-4.1	-1.7
<b>All sectors: total employment</b>							
1991	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2001	100.0	100.0	100.0	100.0	100.0	100.0	100.0
percentage point change in share	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Statistics Canada. Census of Population, 1991 and 2001.

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