NOTE / NOTE

Forest dependence and community well-being in rural Canada: variation by forest sector and region

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Abstract: The forest products sector is a major employer in much of rural Canada, and it is often assumed by policy makers that increased timber harvest is a viable means of rural economic development. Despite burgeoning research in the United States, relatively little attention has focused on the relationship between forest dependence and well-being in rural Canada. Especially lacking are macrocomparisons of regions and of forest sectors. This note presents an overview of the relationship between forest dependence and well-being in Canada. Analysis of 1996 Statistics Canada data revealed a great deal of variation in the effect of forest dependence on indicators of well-being (e.g., human capital, unemployment, income): some sectors had fairly positive outcomes (e.g., pulp and paper); others had more negative outcomes (e.g., logging). These relationships, however, vary a great deal by region, suggesting the need for more mid-range explanatory models that incorporate the particulars of place and sector.

Résumé : L'industrie des produits forestiers est un employeur majeur dans la plupart des régions rurales du Canada. D'ailleurs, les décideurs politiques considèrent souvent que l'accroissement de la récolte forestière représente une approche viable pour le développement économique du milieu rural. En dépit de l'essor de la recherche sur ce thème aux États-Unis, on constate que relativement peu d'attention a été accordée à la relation qui existe entre la dépendance forestière et le bien-être des communautés rurales au Canada. Les études à l'échelle macro-sociale comparant les régions entre elles et les différents secteurs forestiers font particulièrement défaut. Cette étude présente un survol de la relation entre la dépendance forestière et le bien-être au Canada. L'analyse des données de Statistique Canada de 1996 révèle une variation importante quant à l'effet de la dépendance forestière sur les indicateurs de bien-être (p. ex. : capital humain, taux de chômage, revenu disponible). Quelques secteurs affichent des résultats assez positifs (p. ex. : pâtes et papiers). D'autres montrent des résultats plutôt négatifs (p. ex. : récolte forestière). Cependant, ces relations varient beaucoup selon les régions; d'où la nécessité d'élaborer des modèles interprétatifs de niveau intermédiaire qui intégreraient les particularités locales et sectorielles.

[Traduit par la Rédaction]

Introduction

The relationship between the forest industry and the well-being of people who depend on it for their livelihood is of strong interest in Canadian forest policy. Canada has approximately 418 million ha of forest, with 119 million ha managed primarily for timber production and another 249 million ha for potential forest harvesting (Canadian Council of Forest Ministers 1998). Canada is a world leader in the production of wood and paper; 1996 exports were valued at more than $32 billion (nearly equivalent to the value of exports from the energy, fishing, mining, and agriculture sectors combined). More than 825 000 Canadians work in forestry, and the sustainability of the human communities involved is an important goal of forest production (Canadian Council of Forest Ministers 1998). Although much work in the United States has examined the relationship between community dependence on forestry (and other resource industries) and well-being, work of this type is more recent in Canada (Beckley and Burkosky 1999; Parkins and Beckley 2001). These studies often focus at the community level, rather than making broad comparisons across communities or resource industries, but see Parkins et al. (2003) and Stedman et al. (2004) for several recent exceptions.

Empirical research in the United States has found negative outcomes of forest dependence on economic indicators of well-being, such as community stability (Kaufman and Kaufman 1946), poverty rates (Bliss et al. 1992; Cook 1995), and unemployment (e.g., Howze et al. 1993); and higher rates of social pathology, such as divorce (Drielsma 1984) and crime (Force et al. 1993). The negative relationship between resource dependence more generally and the well-

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being of rural communities has been theorized by the Rural Sociological Task Force on Rural Poverty as potentially based in problems of (1) human capital (residents of rural-resource-dependent places underinvest in their skills); (2) industrial structure (resource industries are "peripheral", in that associated jobs often offer low wages, part-time work, and few benefits); (3) power and natural resource bureaucracy (the industry may become captured by powerful interests); and (4) moral exclusion (popular sentiment may be against the extraction of resources). Humphrey et al. (1993) provided more detail on each of these theories.

Given the attention Canada puts on forest harvesting and wood processing as an economic development strategy, these theories and previous findings should raise concerns. A key question that has begun to receive attention is the degree to which the relationship between resource dependence and well-being varies between industries (e.g., Elo and Beale 1985) or forest sectors, such as between pulp and logging (Overdevest and Green 1995). Also of interest is the question of spatial variability in industry performance between different locales or regions (Elo and Beale 1985); Nord 1994; Fisher 2001). Randall and Ironside (1996) made the point that too much emphasis has been placed on looking at the similarities between resource-dependent places, with not enough focus on differences between sectors and between regions.

Research question and methods

Our research examines variation in the relationship between forest dependence and well-being by forest sector, region, and indicators chosen to represent community well-being. Following Parkins et al. (2003) and Overdevest and Green (1995), we examine the relationship between forest sector reliance and well-being primarily in the context of core–periphery relationships that characterize industrial structure. According to Averitt (1968), industries in the core, or center, are able to dominate markets for their products, whereas the periphery is characterized by firms with more limited resources that compete with each other to provide inputs to the center. This results in center industries having competitive advantage and being able to provide substantial benefits to employees, such as higher wages or job security. Disaggregating the forest industry into its four components — pulp, lumber, logging, and services — may reveal implications for well-being that are disguised by the general "forest dependence" label. Overdevest and Green (1995) identified the pulp sector as a core sector (with generally positive employment outcomes) and other forestry sectors as the periphery. Our question has several components: (1) Is forestry in Canada a peripheral industry overall, and does this vary by region? (2) Do core and peripheral forestry sectors vary by region? (3) Do these characterizations depend on the indicator chosen to represent well-being?

Measuring forest reliance and well-being

The data in this note are from the 1996 Census of Canada (Statistics Canada 1998). Canada has a total of 5260 census subdivisions (CSDs) in the provinces and territories. These data are collected every 5 years. Community dependence on natural resource industries (agriculture, forestry, fisheries, mining, and energy) can be measured in several ways, but to make comparisons with work in the United States this note measures dependence as the proportion of employment in forest industries (logging, sawmills, pulp and paper; and value-added services, such as reforestation and fire services).

Although much research in the United States defines well-being with poverty measures, other indicators of well-being are also important. Consistent with past research that suggests a broadened suite of indicators (e.g., Beckley and Burkosky 1999), this note utilizes Statistics Canada data on CSD-level rates of family poverty, individual unemployment (measured by whether the individual in question was employed on the day of the census), median family income, and educational attainment.

Results

How forest reliant is rural Canada?

First, we describe the degree of forest dependence in Canadian rural CSDs. Because most resource extraction takes place in rural areas, urban CSDs (n = 587) are excluded from the analysis. As well, there are 817 CSDs where data are suppressed. Generally, these involve First Nations reserves where there are concerns about data quality and CSDs with very small populations that raise issues of confidentiality. Once these are excluded, 3856 CSDs remain for national-level analysis.

Canada appears to be more forest dependent than the United States. In the United States, 20% employment has been used as the cutoff for high levels of dependence (e.g., Elo and Beale 1985). However, many studies use a 10% criterion because the 20% criterion results in few cases. In contrast, nationally, 6.5% of employment in rural Canadian CSDs is in the forestry industry. Of all rural CSDs in Canada, 23.8% (918 of 3853) have at least 10% of employment in forest-related industries, and 10.0% (386) have at least 20% of their employment in forest industries (Table 1). These figures vary by region: rural British Columbia is more dependent on the forest sector than any other region (16% of employment). Both Atlantic and central Canada also have a strong forest industry presence (more than 5% of employment).

Forest dependence and community well-being

Overall, forest dependence appears to be associated with negative outcomes for rural Canada: higher rates of forest dependence are associated with lower educational attainment and higher rates of family poverty and unemployment. Although each of these correlations is strongly significant ($p <$ 0.001 for all), the reader is cautioned to keep in mind that the large number of observations renders even modest correlations strongly significant. For example, the correlation between forest reliance and median family income is quite small, yet it is significant at $p < 0.01$ (Table 2).

How do these figures vary by region? Table 2 demonstrates much regional and indicator-based variation in the relationship between forest dependence and well-being. Forest dependence appears to be especially associated with decreased well-being in central Canada. This is true regardless of the indicator chosen to represent well-being. In Atlantic Canada and British Columbia, in contrast, forest dependence is asso-

Table 1. CSD-level forestry employment.

	Atlantic[a] (n = 700)	Central[b] (n = 1818)	Prairie[c] (n = 1063)	B.C.[d] (n = 215)	North[e] (n = 60)	Canada (n = 3856)
Forest employment (%)	6.1	8.2	2.2	15.5	2.5	6.5

Note: Provinces were aggregated into regions on the basis of spatial proximity and similarity in resource dependence. By the latter criterion, British Columbia constitutes its own region, because of its dissimilarity in forest dependence to any other province. CSD, census subdivision.
[a]Newfoundland, Prince Edward Island, Nova Scotia, New Brunswick.
[b]Quebec, Ontario.
[c]Manitoba, Saskatchewan, Alberta.
[d]British Columbia.
[e]Yukon, Northwest Territories.

Table 2. Regional variation in forest reliance and well-being.

	Atlantic[a] (n = 700)	Central[b] (n = 1818)	Prairie[c] (n = 1063)	B.C.[d] (n = 215)	North[e] (n = 60)	Canada (n = 3856)
University degree	–0.135**	–0.297***	–0.050	–0.128	–0.148	–0.163***
Family poverty	–0.086*	0.244***	0.176***	–0.084	—	0.160***
Unemployment	0.073	0.354***	0.295***	0.102	0.326*	0.228***
Median family income	0.080*	–0.152***	–0.136***	0.178***	–0.133	–0.056**

Note: *, $p < 0.05$; **, $p < 0.01$; ***, $p < 0.001$.
[a]Newfoundland, Prince Edward Island, Nova Scotia, New Brunswick.
[b]Quebec, Ontario.
[c]Manitoba, Saskatchewan, Alberta.
[d]British Columbia.
[e]Yukon, Northwest Territories.

ciated with more positive outcomes for rural communities: forest dependence is associated with slightly decreased poverty for Atlantic Canada and British Columbia; it is linked to increased poverty for rural Canada as a whole. As well, there is no relationship between forest dependence and unemployment in these regions, in contrast to the fairly strong relationship at the national level.

What drives this regional variation in performance of the forest industry? One explanation may lie in economic segmentation theory and regional variation in the sectors that constitute the forest industry (i.e., some regions may be represented more by peripheral sectors). The first step in examining this question is to look at the national-level relationship between forest sector dependence and well-being (Table 3).

Consistent with previous work examining core–periphery theories, pulp is clearly advantageous relative to other forest sectors: it is the only sector not associated with lower educational attainment or higher unemployment (pulp-dependent CSDs do not differ from the Canadian rural CSD average for any of these variables). As well, pulp employment is positively related to median family income, whereas this relationship for all of the other forest sectors is significantly negative. As such, pulp dependence presents itself in contrast to the other forestry sectors, which are all similar: consistent with core–periphery theories, logging, services, and lumber are associated with lower educational attainment, higher poverty and unemployment, and lower income.

The remainder of this note explores whether the relationship between forest sector dependence and well-being varies by region. We have already seen that nationally, outcomes such as employment, income, and human capital differ, both by type of forest dependence observed and by region. Table 4 provides insights into the regional differences and the factors underlying them: Do regional differences exist because the forest industry differs regionally in the performance of its component sectors (e.g., does the pulp industry "perform" better in one region than another)? Or is it primarily a matter of regional differences in the makeup of the industry (e.g., is there proportionately more pulp dependence in British Columbia, which, as a higher wage sector, is related to more positive overall effects)?

Table 4 illustrates regional variation in forest sector employment. Nationally, the greatest share of forestry employment is in lumber (42%) and logging (30%). Pulp (16%) and forest services (12%) represent much smaller shares of employment. Compared with Canada as a whole, the Atlantic provinces are less dependent on lumber (32%); the central region is more dependent on lumber (48%); the Prairie region and the north are more reliant on forest services (25% and 74%, respectively); and British Columbia is less pulp dependent (10%).

It appears there is a great deal of regional variation in the relationship between sector dependence and well-being. Logging dependence (which is proportionally higher in Atlantic Canada) is linked to especially negative outcomes in central Canada, which has the strongest ties to low educational attainment, family poverty, incidence of low family income, and unemployment of any region. In contrast, logging dependence is not associated with any negative outcomes in British Columbia, and other regions fall between these two extremes.

Forest services are also negatively related to educational attainment and median family income in central Canada. The relationship to unemployment is strongest in the Prairie region and central Canada but negligible in Atlantic Canada. Forest service employment is especially linked to family

Table 3. Well-being and forest reliance, by sector.

	University degree	Family poverty	Unemployment	Median family income
All forestry	–0.163***	0.160***	0.228***	–0.056**
Logging	–0.156***	0.160***	0.291***	–0.116***
Services	–0.078***	0.152***	0.221***	–0.153***
Lumber	–0.150***	0.113***	0.082***	–0.049**
Pulp	0.030	–0.014	0.012	0.167***

Note: **, $p < 0.01$; ***, $p < 0.001$.

Table 4. Well-being and forest reliance, by forest sector and region.

	Atlantic[a] (n = 700)	Central[b] (n = 1818)	Prairie[c] (n = 1063)	B.C.[d] (n = 215)	North[e] (n = 60)	Canada (n = 3856)
All forestry (% reliant)	(100)	(100)	(100)	(100)	(100)	(100)
University degree	–0.135**	–0.297***	–0.050	–0.128	–0.148	–0.163***
Family poverty	0.073	0.244***	0.176***	–0.084	—	0.160***
Median family income	–0.015	–0.097***	–0.002	0.180***	–0.154	0.046**
Unemployment	0.080*	0.354***	0.295***	0.108	0.326*	0.228***
Logging (% reliant)	36.5	27.8	29.1	33.9	13.4	30.1
University degree	–0.188***	–0.251***	–0.071*	–0.061	0.217	–0.156***
Family poverty	0.143***	0.202***	0.173***	–0.075	—	0.160***
Median family income	–0.159***	–0.199***	–0.087**	0.148*	0.004	–0.067***
Unemployment	0.230***	0.403***	0.263***	0.067	–0.132	0.291***
Services (% reliant)	12.0	8.1	24.5	16.8	73.9	11.8
University degree	–0.040	–0.140***	–0.077*	–0.076	–0.240	–0.078***
Family poverty	–0.032	0.183***	0.338***	0.155*	—	0.152***
Median family income	–0.038	–0.188***	–0.160***	–0.259***	–0.224	–0.114***
Unemployment	0.021	0.301***	0.397***	0.258***	0.408**	0.221***
Lumber (% reliant)	31.5	47.5	34.5	39.0	11.5	42.2
University degree	–0.106**	–0.263***	–0.020	–0.111	–0.025	–0.150***
Family poverty	–0.007	0.210***	0.071*	0.051	—	0.113***
Median family income	–0.016	–0.123***	0.105**	0.048	0.023	0.031
Unemployment	–0.054	0.190***	0.038	0.070	0.119	0.082***
Pulp (% reliant)	20.0	16.5	11.8	10.3	1.2	15.8
University degree	0.058	0.012	0.071	–0.023	0.033	0.030
Family poverty	0.021	–0.022	–0.055	–0.207***	—	–0.014
Median family income	0.230***	0.275***	0.142***	0.374***	0.254	0.238***
Unemployment	–0.053	–0.023	–0.045	–0.121	–0.194	0.012

Note: *, $p < 0.05$; **, $p < 0.01$; ***, $p < 0.001$.
[a]Newfoundland, Prince Edward Island, Nova Scotia, New Brunswick.
[b]Quebec, Ontario.
[c]Manitoba, Saskatchewan, Alberta.
[d]British Columbia.
[e]Yukon, Northwest Territories.

poverty in the Prairie provinces. In sum, forest services are associated with the most negative outcomes in central Canada and (relatively speaking) with more positive outcomes in Atlantic Canada. As well, the positive relationship between logging and well-being in rural British Columbia apparently does not extend to forest services.

Lumber dependence appears to be yet another example of sector-specific underperformance in central Canada: it is associated with lower educational attainment, lower income, higher poverty, and higher unemployment than is the case nationally. In contrast, lumber dependence appears to be tied to slightly better than average outcomes (higher educational attainment and median family income) in the Prairie region. The relationship between lumber dependence and well-being in British Columbia closely parallels the national average.

Finally, consistent with core–periphery theories, pulp dependence has the most positive relationship to well-being of any of the forest sectors. More than the other forest sectors, this appears to be a general, rather than regional, effect, with the exception of British Columbia, where it is more strongly linked to positive outcomes. In contrast with other forest sectors, there is essentially no relationship between pulp dependence and outcomes such as educational attainment, family poverty, and unemployment. In short, CSDs with higher levels of pulp dependence are neither significantly better nor significantly worse off than other rural CSDs. Several excep-

tions exist: first, higher levels of pulp dependence are associated with higher levels of family income in every region. Second, in British Columbia, poverty rates are far lower in pulp-dependent CSDs.

Summary and conclusions

Despite the importance of the forest industry to rural life and to an economic development strategy with widespread political support, little research has been conducted on the relationship between forest dependence and human well-being in Canada. Rather, the de facto policy assumption has been that an increase in forest harvest and processing is a viable strategy for rural economic development. These findings suggest, however, that in many parts of rural Canada, dependence on forest harvest is associated with negative economic and social outcomes. These outcomes appear to be less prevalent in places with higher levels of dependence on pulp. Such conclusions generally support previous research on forest dependence and core–periphery theories of economic development. Dependence on peripheral forest industries, such as logging, generally does not lead to positive outcomes for communities; the extraction and supplying of inputs for others to process does not result in economic development.

Forest dependence is associated with decreased income in the central region and increased income in British Columbia, and in other regions there is no significant positive or negative effect. This regional variation is partly a function of regional differences in the presence of core–peripheral sectors (e.g., regions that are better off economically might have a higher proportion of their forest-based employment in pulp). However, what appears to be more important is the regional variation in the performance of these sectors. For example, although forest dependence overall is associated with increased well-being in British Columbia, this province is one of the least pulp-dependent regions. As well, logging is associated with lower income in central Canada and higher income in British Columbia.

This research was intended primarily to illustrate the differences in the relationship between forest dependence and measures of well-being by sector and by region, as a starting point for more detailed enquiries about the causes of particular relationships. Some explanations may be reasonably forthcoming: that core-like economic outcomes appear even in peripheral sectors (logging and lumber) in British Columbia may be attributed to the higher value of British Columbia's round wood products, high levels of unionization, and specialized capital skills for logging on steep slopes (see Parkins et al. 2003). But why, for example, are the relationships between well-being and forest dependence consistently more negative for every forest sector in central Canada? A host of other questions raised by these basic findings (including questions of causation) deserve detailed scrutiny.

The reader is urged to recall that we emphasize an expanded conception of well-being of forest-dependent communities. In our research, we take small steps toward this end by assessing multiple indicators, rather than simply focusing (as many others have done) on poverty. It appears that the indicator used to represent well-being also affects assessments of the relationship. Overall, median family income paints the rosiest picture of forest-dependent CSDs. Although forestry jobs are tied to unemployment (some of it seasonal) and are associated with lower educational attainment, they do pay well.

We have not gone far enough in thinking creatively about how to measure well-being in analyses of this type: many measures of well-being are not readily captured by measures readily obtained from Statistics Canada. For example, some note that seasonal unemployment is part and parcel of the woods worker way of life and that the capacity to maintain one's identity as such may supersede economic concerns (Carroll 1995). To this end, Stedman (1999) suggested that sense of place, or meanings of and attachments to one's community, also be considered as indicators of well-being. Beckley et al. (2002) followed this lead, expanding the discussion of the progression of indicators of forest-dependent community sustainability from static economic measures to process indicators, such as sense of place, community capacity, and social capital. However, well-being, even with the fairly straightforward measures we use in this note, bears a complex and variegated relationship to forest dependence.

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