

Indexing the Canadian North: Broadening the Definition

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Introduction—The Problem of Definition

In 1979, the Canadian geographer Louis-Edmond Hamelin wrote that the North is as much a concept as a place. He noted that because of this, the North was (and still is) the subject of a great deal of ignorance and misconception. People tend to define the North for themselves based on peculiar mental constructs that often bear little relation to the reality.¹ Thus, for most, “the North remains a stranger . . .”² It is “an unknown quantity. Even though [Canadians] experience its influence, they do not know what it is, how far it extends, how it may be subdivided, or what its future may be. . . .”³ This problem is not limited to the general public. At a 1989 conference that gathered experts from many Circumpolar countries to discuss the matter of Arctic security, the proceedings began with a debunking of ten of the most commonly-held misconceptions about the North.

Academics studying the North are as susceptible to creating a personal definition of the North as others. Furthermore, beyond a researcher’s individual predilections, each scholarly discipline has relied on its own criteria for defining the high-latitude cold regions of the northern hemisphere. Piecemeal definitions, applicable sometimes and in some disciplines, have proven to hinder far more than they have helped. There has been no common ground.

This paper highlights several methods that demonstrate the trend towards increasingly complex methods of constructing a geographical definition of the North, focusing primarily on Canada. Such a summary provides a basis for a brief discussion of whether a useful and comprehensive method of defining and delineating the Canadian North has been devised.

Single-Factor Definitions

Early scholars of the North, working with limited data and focusing on climate and biology, tended towards single-factor definitions of their areas of study. These took many forms, depending upon the

type and scale of research being done. These single-factor definitions were generally global or local, climatic or biological. A brief selection of such factors will illustrate this point.

The northern environment is a function of the tilt of the earth's axis and its orbit around the sun. Physical geographers divide the portions of the globe which are located above latitudes 55° North and South into three zones each: the subarctic and subantarctic zones (lat. 55° to 60° N and S), the arctic and antarctic zones (lat. 60° to 75° N and S), and the polar zones (lat. 75° to 90° N and S). On a global level, these divisions are accurate enough. They fail, though, to consider local differences that occur due to such factors as elevation, maritime location and other features.⁴

The mere presence or absence of trees has also been used as a defining characteristic. After the establishment of the extensive string of weather stations across the North, the data made it obvious that the tree line roughly follows the isotherm joining locations with a mean July temperature of 10°C. This isotherm is often thought of as the southern boundary of the tundra, or, interchangeably, the Arctic. While climatic factors might be satisfactory for delineating the North, one might ask, as Louis-Edmond Hamelin did: "In terms of demarcating an area, what is the relevance of a single aspect, during a single month of the year, expressed as a mean value?"⁵ The tree-line/isotherm definition is insufficient for two important reasons. First it does not recognize that the taiga-tundra division is not an actual line, but rather a broad band or ecotone 50-100 km wide, and second because it does not hold true for coastal areas.⁶

A third single-factor definition is more biological than climatic, though obviously related. The North is a region characterized by low levels of solar energy which supports few individual faunal species and only the hardier floral species. Deciduous trees, creepers and suckers cannot thrive beyond the southern limit of the taiga, or boreal forest. Again, this apparent boundary, accepted on biological grounds, as much a function of climate as of biology, is a convenient way of separating North from South. But this biological line, as with those created by lines on the globe or by climate, represents only a fragment of the whole North.

These kinds of definitions, global, climatic and biological, though narrow, continue to be used and accepted.⁷ They reflect those archetypal concepts about what constitutes the environment of the high-latitude cold regions which still influence much of northern studies. As Hamelin has stated, "A single physical factor, taken in isolation, cannot decree the limits of the North and hence be expressive of the entire region."⁸ Limited definitions of the North tend to

reinforce the romance of the North and do little to explain or demonstrate its complex nature.

Multiple-Factor Definitions

In response to the limitations inherent in single-factor definitions, scholars began to examine the possibility of using multiple-factor definitions. Yet how could a coherent definition of an area be negotiated if there are a multitude of conflicting concepts about it? One answer has been to grade certain key elements according to *a priori* criteria, which, when variously scored and weighted, combined and totalled, would yield some kind of numerical value that expresses something about the whole: in short, an indexed definition. Nevertheless, the method is not simple. Armstrong, Rogers and Rowley, authors of a textbook on the Circumpolar North, summarized the problem succinctly:

the difficulty arises when one tries to find a definition to suit all subjects. . . . the most desirable solution is a flexible one: to think of the Arctic and sub-Arctic as a group of concepts and attributes, concerned with climate, vegetation, fauna, presence of ice and snow, sparseness of urban habitations, remoteness from industrial centres, and many other factors. . . .⁹

The idea of an index is a logical extension of the demand for detail and accuracy. An index is a very useful tool for it can be used to combine quantitative values reflecting both subjective and objective elements. Phenomena that are felt by a person or measured by a device can be treated equally. Another advantage is that an index can also be used to depict relative differences within the whole. The prime difficulty for the index-builders of this century, however, has been to decide which indicators should be included or excluded so the index expresses something meaningful. What follows is an investigation into the development of more complex northern indices.

In 1928, Soviet scholars proposed several single-factor definitions to define their North. One, L.L. Breyfus proposed the 10°C July isotherm as the southern boundary of the North. Another, B.P. Alisov suggested that the North could be defined as that area which was affected by arctic air masses throughout the year.¹⁰ However, neither of these definitions accurately reflected the seasonal extremes in which the Soviets were particularly interested. Accordingly, in the late 1950s, some attempted to devise a "definition of the boundaries of the North . . . based on the combined effect of physical-geographic (natural) and economic-geographic (human) factors. . . ."¹¹

In the Soviet search for a way to classify the northern environment and its effects on steel machinery, several multiple-factor definitions were developed. S.V. Slavin proposed a four-point definition which contained many aspects that would be included in the later Soviet indices. Regions were northern if they were

[1.] situated to the north of economically developed and settled regions of the country and [were] distant from the principal industrial centres; [2.] ... distinguished by sparse population and a low level of development of the basic mass-production sectors of the economy; [3.] ... [characterized by] high costs of construction compared with other regions of the country; and [4.] ... distinguished by a harsh physical environment making economic development more difficult.¹²

In 1967, an engineer, V.F. Burkhanov, established a geographic-engineering boundary for the Soviet North that used combined climatic data as a single indicator of climatic harshness. His index used "the distribution of minimum temperatures, wind speed, humidity and solar radiation (from March to October) and, in mountain areas, also barometric pressure,"¹³ the extent of permafrost and other, similar, geographical factors.

Burkhanov's index was somewhat restricted for it was designed principally to give particular results for engineering purposes. When the range of harshness values were mapped, four zones emerged: Arctic zone of maximum harshness, subarctic zone of high harshness, northern harsh zone, and an eastern moderately harsh zone.

Building on this early work, the Canadian geographer Louis-Edmond Hamelin pointed out the necessity of creating a concrete and universally acceptable definition of the Canadian North and a language with which to discuss it.¹⁴ Hamelin worked almost exclusively with Canadian data, but felt strongly that any index should be applicable to any circumpolar location. He saw the need for a system or method that would capture the essence of the North but would be flexible enough to express the differences encompassed within it. He first outlined his idea for a "polar index" in an address to the Canadian Association of Geographers in Vancouver, B.C. in June, 1965,¹⁵ and reiterated those ideas in a paper published in 1970-71.¹⁶ The problem, as Hamelin saw it, was whether such a flexible solution would, in fact, produce what he wanted, a scale of nordicity that would apply and accurately reflect all aspects of the global North.

Hamelin defined "nordicity" as "a state or level of 'northness,' real or perceived."¹⁷ He was convinced that his "nordic"¹⁸ index needed to establish the southern boundary of the North as well as other,

internal, boundaries which would divide the North into zones exhibiting similar nordicity. He felt, though, that those zonal boundaries could not be drawn "without identifying the fundamental elements that enter into the actual definition of high-latitude cold regions."¹⁹

Hamelin identified ten fundamental elements (latitude, summer heat, annual cold, types of ice, total precipitation, natural vegetation cover, accessibility by means other than air, air service, population, and degree of economic activity) as "the raw material for a specific index of nordicity."²⁰ Properly weighted and scaled, these elements permitted the presentation of the nature of the North as a whole, without regard for national boundaries²¹ and allowed "every intra-northern location to be quantified."²² The index was calculated by scoring the criteria out of a possible maximum of 100 and then summing the results to yield a total score which represented the nordicity of a particular place. This was the theoretical basis for Hamelin's Global Nordic Index.

For each element or criterion, he outlined a set of possible values that reflected the situation in northern latitudes. Each specific attribute was graded on the scale of 0-100 where 100 reflected extreme nordicity, and zero, a total lack of nordicity. The actual number of points awarded to each criterion quantified the characteristics of the given area or community. Thus, nordicity scores (which Hamelin called *valeurs polaires*, or VAPO) were expressed as a score out of a possible 1000, theoretically reached at the North Pole. Hamelin further suggested that a line drawn through all places having a nordicity value of 200 VAPO—an isonord—would constitute the southern edge of the North or conversely, the northern edge of the ecumene or Base Canada. Using latitude as an example, any place south of 45°N scored 0 VAPO, so a community lying at 60.14°N would score 55 VAPO. In the case of summer heat, a place where the average summer temperature does not exceed 5.6°C would score the maximum 100 VAPO. A community with an average of more than 150 days above 5.6°C, a temperature that represents the lower threshold for plant growth, would score the minimum of 0 VAPO. The totals for each of the ten individual criteria were summed to give a number out of 1000 VAPO, the maximum total.²³

Hamelin then used the scores to establish internal regions within the North. VAPO scores were easily mapped. He used certain maximum VAPO scores to define the zonal boundaries. The isonords he drew provided those zones geographers and others had long sought. The furthest southern extent of the North and of the North's

divisions into Extreme North, Far North, Middle North and Near North had been defined. The advantage of using the isonord approach was that it allowed the zone borders to be independent of political boundaries. They "have the advantage of reflecting an all-embracing reality."²⁴

The Extreme North (to use Hamelin's terminology) included all places that scored between 800 and 1000 VAPO, the Far North between 500 and 799 VAPO and the Middle North between 200 and 499 VAPO. Some places in the Middle North include Fort Simpson, NWT (377), Watson Lake, Y.T. (379) and Fort Nelson, B.C. (282). The boundary of the ecumene, or Base Canada was drawn at VAPO 199. So generally applicable was Hamelin's index, that to exclude certain places that might score points in many categories because of remoteness, cold, small populations or limited economic activity but are not northern, he used 45°N as a cutoff.

Aside from being able to map the results, there was another advantage to Hamelin's method. By not concentrating entirely on criteria which related solely to populated areas, the Global Nordic Index allowed the calculation of the nordicity of uninhabited, coastal or maritime regions by including alternate guidelines in some categories. The types-of-ice category had secondary charts for ground ice, sea ice and ice sheets. The population category was subdivided so that either density or aggregate population could be used to calculate the score.

After 1972, Hamelin continued to refine his index. He wanted it to reflect the degree to which physical and emotional factors actually combine to produce that quality he termed "nordicity." The changes he made essentially constituted an elaboration and a broadening of the point scores and guideline choices possible to better exhibit degrees of economic activity, population by number of inhabitants, air service and accessibility, vegetation, types of ice and latitude.²⁵ His book, *Canadian Nordicity: It's Your North, Too* was published in 1978. It included a presentation of the Global Nordic Index and its theoretical background. What is crucial is that Hamelin's method, like that of the Soviets Burkhanov and Slavin, recognized that the North cannot be identified, understood, or quantified on the basis of a single criterion. Hamelin stated his case clearly: "... a purely climatic or botanical delimitation of an area does not appear to be adequate to a scientist who is concerned with the whole."²⁶

Other Indices

Geographers and engineers were not the only people with an interest in locating the boundaries of the North. Governments and other major employers in the North also had a keen interest in the issue, for they desperately required an equitable method of determining levels of benefits for northern-based employees. In this section, a variety of approaches relating to the payment of scaled or tax benefits will be examined in light of the problem of defining and delineating the North.

In the 1950s, with the burgeoning of the federal government's involvement in the North and later with its "Northern Vision," public and private sector employers found it difficult to attract the kinds of skilled workers needed to provide services and expertise to government, mining, and development projects in the North.²⁷ Native employees were often not suitable, partly because of lack of skills and partly because many were still relying on a seasonal subsistence lifestyle which conflicted with the time demands of the wage economy. Further, government policy and public opinion often led to misunderstanding and misconceptions about the capability of Natives to participate in the wage economy. In that decade, the Indian Act still firmly controlled the lives of status Natives across the country, and strongly affected non-native attitudes and perceptions.

Mobility of non-natives also created problems for many companies and government departments.²⁸ People would accept employment and, for various reasons, remain in the positions for only a short time. For some, it was a case of earn-and-run. The North provided a chance to earn a considerable amount of money in a fairly short period of time. For others, such as the RCMP and some federal government employees, working in the northern communities constituted a necessary and expected stage in a relatively fixed career path which often ended in the South.

Thus, encouraging manpower to relocate to and incentive to remain in the North was the fundamental goal of most northern bonuses and allowances. As Hamelin noted in "A Zonal System of Allowances for Northern Workers," the scales of these early incentives were often confused and the amounts paid generally inadequate:

In Northern Canada, payment of allowances is not universal. Where allowances do exist, they are not paid on the basis of a rigorously established scale. ... The absence of an overall plan leads to a large number of special solutions. Moreover, the different scales—where there are scales—are not properly adjusted to nordicity. ... allowances are

independently established by a host of employers ... which assign allowances at their own discretion. In short, northern allowances represent an anarchically complex situation. ...²⁹

After 1958, the federal government provided incentive payments, usually increasing with the degree of discomfort or hardship experienced, to encourage its employees to accept positions in "fringe" areas. A primitive form of indexing was used to determine how much to pay and for what hardships and even to ascertain what those hardships were. The allowance was a lump sum paid in three separate categories to offset the higher costs of living and fuel, and to compensate for the distance and lack of access to the nearest town with a substantial population. This allowance system was limited and strictly speaking not purely a northern allowance. All remote areas, from Sable Island, Nova Scotia, to Vancouver Island, British Columbia were included.³⁰

There were problems, too. The allowance was paid unevenly. Federal workers in some northern communities were paid for one or two of the categories but not all three.³¹ In response, in late 1969, the federal government announced further changes to its allowance system which from then on would incorporate the work of Louis-Edmond Hamelin and would "take the natural situation more into account. ..."³²

By the late 1960s, the advantages of indices were becoming obvious, and the idea was catching on. In 1969, the Meteorological Branch of the Department of Transport in Toronto published a climate map based on four criteria: hours of sunlight, precipitation, and annual cold and heat.³³ Others soon published more and more comprehensive indices.³⁴

In 1978, B.M. Burns, F.A. Richardson, and C.N.H. Hall presented their index which attempted to remove some of the subjectivity from Hamelin's index. The trio disagreed with Hamelin's seemingly "subjective evaluation of a multitude of parameters."³⁵ They proposed an improved northern index that could be "objectively calculated for any community for which all the data are available."³⁶ The Burns, Richardson and Hall index was generated using calculation formulae derived by weighting eleven numerical parameters: latitude, mean annual number of heating degree-days, mean annual number of growing degree-days, mean annual number of freezing degree-days, mean length of the ice season, mean length of the snow ground cover, mean annual precipitation, the number of major roads, railways and aircraft movements in 1971, and estimated 1971 population.³⁷

It is obvious, though, that this index was somewhat confined. It relied on a subjective appraisal of the weight applied to the criteria

and it could not present a calculation for nordicity for maritime or uninhabited locations. It made diachronic comparison of nordicity nearly impossible because of its reliance on 1971 data. For communities, though, it did allow calculation of a nordicity value which would be the same for any researcher using the same data. The authors' assessment was that the "project to formulate an objective approach to the determination of a nordicity index appears to be successful."³⁸ Hamelin noted their results with a certain smugness. He wrote that "recent studies based on methods comparable to my own . . . produce very similar zonations of the polar world."³⁹

Another group to examine the issue and produce a northern index was a federal government task force. Changes to the *Income Tax Act* became necessary after a Revenue Canada audit in the late 1970s revealed that many northern Canadians were not reporting taxable benefits, such as travel and housing. To allow time for review, a remission order passed in 1980 temporarily declared those benefits tax-free though they clearly constituted a taxable benefit under paragraph 6(1)(a) of the *Income Tax Act*. Discussion of the problem of taxable benefits continued for several years.⁴⁰

Meetings were held with the public in 1985 in which the major theme was northern development. Employers again stressed the difficulty of attracting and keeping skilled employees. Other intervenors pointed out that progressive tax rates were inherently unfair, as higher northern wages were paid to offset the higher cost of living and did not relate to an effectively larger income. Thus northerners bore a greater tax burden. In 1986, in response to the public concerns, the Minister of Finance outlined further changes to the benefit scheme which would allow all qualifying residents to claim a residency deduction. All residents north of 60°N were automatically eligible. Those living north of 55°N were eligible on a temporary basis.

People in the temporarily qualifying areas, were extremely worried. They foresaw the loss of their taxation benefits. The government, however, needed a way to determine eligibility that was firm and sensible, yet easy to reassess and alter should conditions change. As a result, the Finance Minister, Mr. Michael Wilson, in a speech on given in December 1987, "expressed concern with the issue of non-qualifying communities situated near ones that were prescribed. He also announced his intention to establish a Task Force to study the appropriateness of the eligibility criteria for determining northern and isolated areas."⁴¹

The Finance Minister's Federal Task Force on Tax Benefits for Northern and Isolated Areas was established on 29 April, 1989 with a mandate to

review the impact of the existing criteria on communities in northern and isolated regions of Canada; to develop and recommend revised criteria to reduce anomalies and inequities; and to recommend an on-going mechanism for periodic review of anomalies.⁴²

Ignoring the North beyond the 60th parallel, whose residents would automatically receive the benefits, the Task Force was directed to examine the possibility of using some system "of graduated levels of benefits for communities south of 60°N."⁴³ To this purpose, it examined the federal system then in use for determining eligibility, a system based on the Treasury Board's Isolated Post Allowance scheme for federal employees.⁴⁴

The Treasury Board's system was, and remains, a mature version of the federal system introduced in 1969-70 and outlined above. In it, the criteria for determining benefit levels were divided into three separate categories: environment allowance, living cost differential, and fuel and utilities differential. The environment allowance level was calculated using a simplified point-scoring scheme based on Hamelin's work. It took into account only such factors as population, climate, vegetation, and access.⁴⁵ The living cost differential was a an allowance paid "when the price of goods and services reache[d] an index level of 115 or higher in relation to an index of 100 at the major source of supply to the isolated post."⁴⁶ The fuel and utilities differential was paid on a rebate basis when the employee paid for those commodities directly. It was calculated on the difference between "the National Composite Billing cost for fuel and utilities plus 20%, and the calculated fuel and utilities cost at the isolated post."⁴⁷

In cases where housing was subsidized, this differential was not paid.

The Task Force decided that this method was not suitable for determining eligibility of a taxpayer, though it worked well for federal employees. The main drawback to the Treasury Board's method was that it necessarily assumed that all beneficiaries were residents of identifiable communities. Border cases, problems with rural inhabitants, and misinterpretation of the criteria were common complaints heard by the Task Force in 1989 when it conducted its public hearings in the affected areas. It became patently obvious that some other system had to be used.

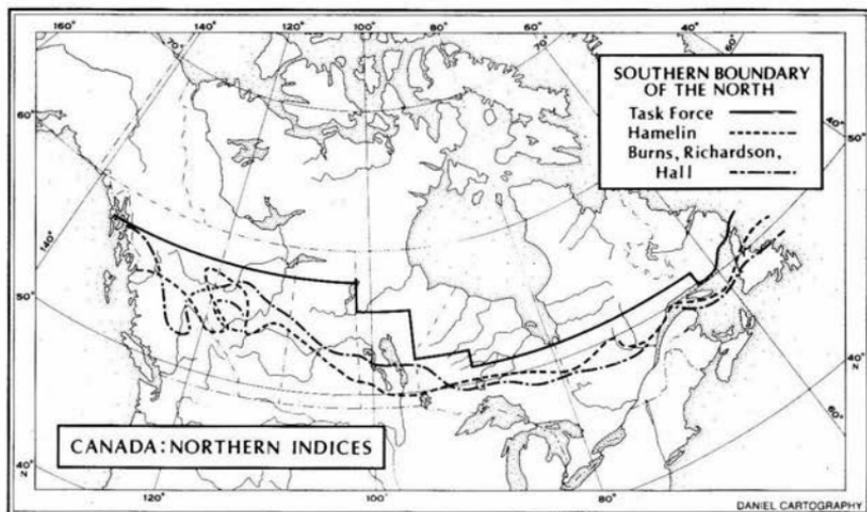


FIGURE 1

Canada: Comparison of the southern boundary of three northern indices. Sources: L.-E. Hamelin, *Canadian Nordicity: It's Your North, Too*, 1979; R.M. Burns, F.A. Richardson, and C.N.H. Hall, "A Nordicity Index," *the musk ox*, No. 17, 1975; R. Brunelle, M. McGillivray, and E.P. Poole, *The Report of the Task Force on Tax Benefits for Northern and Isolated Areas*, 1989.

The Task Force therefore proposed the creation of a single “northern zone” in which all residents would be eligible. This would prevent problems that were sure to arise under a graduated scale of benefits. And in determining the location of the North in Canada, the Task Force may have succeeded better than earlier attempts because it was able to take the work of scholars such as Hamelin, Burkhanov and Burns *et al* into account when building their own system. In one area in particular, the Task Force noted difficulties with Hamelin’s criteria.

The Task Force felt that the major problems associated with Hamelin’s index were the subjective nature of some of the criteria and the relatively small number of community VAPO scores with which he constructed his zone map. Echoing Burns, Richardson and Hall, but using a different approach, the Task Force tried to substitute and refine the index criteria so “only those which could be objectively utilized were included.”⁴⁸ To avoid using a subjective criterion like economic activity, the Task Force instead used population figures as indicators of the level of services, which, in turn, implied a certain level of economic activity and could be conveniently measured. To ensure that the premise was correct, the Task Force mailed a survey to the 4,699 northern communities listed in Statistics Canada’s *Place Name Master File*. The responses showed there was a positive correlation between population and the level of services and other economic activity.⁴⁹

The Task Force used two separate methods to establish the boundary of the Canadian “northern zone” to cross-check its results. The working group first designed a Northern Ranking System (NRS) similar to Hamelin’s but altered to avoid using the subjectively-valued criteria like economic activity. The Task Force’s NRS produced an index figure based on points scored for twenty-eight criteria,⁵⁰ twenty of which were already compiled into three indices. The second was the Isolation Ranking System (IRS). It combined and indexed factors affecting the isolation of a community by awarding points for climate, population and distance from larger centres. The results of the IRS corroborated those of the NRS.

Both systems had their drawbacks. The Task Force found that the IRS led to a community-by-community approach that, while working well with government employees and urban residents, performed miserably with those living outside organized communities.⁵¹ With the NRS, Task Force members had difficulty creating an indexing system that left little to subjective judgement. They soon recognized, as had Hamelin and Burns, Richardson and Hall before them, that:

development of criteria [required] an element of subjective judgment because their measurement and relative weight [were] arbitrary. Consequently, it [was] difficult, if not impossible, to structure totally objective criteria.⁵²

A single “northern zone” was the answer the Task Force submitted to the Minister of Revenue in its report of October, 1989.⁵³ The southern boundary was determined by combining the results of the IRS and the NRS. It also concluded that within this zone, there was little point, for tax purposes, in further subdividing it into even smaller zones. For the purposes of eligibility, all Canadians living in this zone would qualify for northern benefits. In some places, the Task Force’s boundary is similar to Hamelin’s southern boundary. Where Hamelin included a portion of the Rocky Mountains, the Task Force did not. For the most part, though, the results are fairly similar (see Figure 1).

The main difference between Hamelin’s 200 VAPO isonord and the southern boundary of the Task Force’s “northern zone” is one of point of view. The latter was much less flexible. In matters of taxation, accuracy and consistency are important. Hamelin’s index and zone delimitations were drawn primarily for academic purposes and could be easily redrawn as data and conditions changed.

Conclusion

Indexing is a tidy way to combine certain factors, which together give a reasonably accurate summary of a region or community. Thus, Louis-Edmond Hamelin’s legacy endures. The methodology of which he has been a key Canadian proponent has been widely adopted as the most useful in the pursuit of the definition and delineation of the North. It is a testimony to his depth of understanding of geography in general and of the North in particular that he recognized and championed a broad approach, which combined elements of both the emotional and the empirical North to the task of cutting through the illusion of the North and exposing the reality to the scrutiny of academics and federal task forces alike.

Hamelin’s work, with that of his Soviet predecessors and his many successors, is evidence of a contemporary realization that the North is a complex place and must not be categorized or delineated by simplistic criteria. The North is an important part of the modern world, and as such deserves the same intensity of scholarship and scrutiny as any other area or subject. The dream and the reality of the North are equally important and any definition of the North must

necessarily reflect both. While residents, scholars and students may have wildly divergent notions about what the North means to them, indexing provides the key to amalgamating those notions into something which has meaning and utility. Where the problems exist—where the subjective feelings and the objective measurements produce conflicting assessments—indexing has emerged as a very useful tool. More accurate and more encompassing than any single-factor definition can possibly hope to be, indices such as those of Hamelin, Burns, Richardson and Hall, Burkhanov, the Task Force and the others mentioned in this study, have proven to be most likely to yield useful results.

Crises of northern definition will no doubt continue for years, and the North will continue to exercise a powerful attraction over dreamers, tourists, residents and academics. But today, with the broader approach to definition that is permitted by indexing, academics and governments will be better prepared to understand the North in all its aspects. With indexing, we can take both into account. And that, as we have seen, is the first step to broadening the definition of the Canadian North.

Amanda Graham is the first graduate of Yukon College's Northern Studies Programme and the 1990 recipient of ACUNS' Polar Studies Undergraduate Medal for Canada. This essay is a revised version of her winning paper.

NOTES

- ¹ Louis-Edmond Hamelin. *Canadian Nordicity: It's Your North, Too*. (Montreal: Harvest House, 1979). pp 1-13.
- ² *Ibid.*, p. 281.
- ³ *Ibid.* p. 15.
- ⁴ Arthur Strahler and Alan Strahler. *Modern Physical Geography*. Third Edition. (New York: John Wiley and Sons, 1987). p. 58.
- ⁵ Hamelin. *Canadian Nordicity*. p. 16.
- ⁶ Steven Young. *To the Arctic: An Introduction to the Far North*. (New York: John Wiley and Sons, Inc., 1989). p.13.
- ⁷ A recent work on northern hydrology begins with a discussion of six distinct physical boundaries of the North. They are: Polar circles, temperature, snow and ice cover, frozen ground, vegetation, and run-off direction. It was found that with these types of boundaries "the North could be defined geographically to include as little as the area north of the Arctic Circle or to encompass the entire land-mass of Canada and much of the northern United States." T.D. Prowse, "Northern Hydrology: An Overview", in T.D.Prowse and C.S.L. Ommanney, *Northern*

- Hydrology: Canadian Perspectives*, National Hydrology Research Institute Science Report #1, (Saskatoon: NHRI, Supply Services Canada, 1990), p 6.
- 8 Hamelin. *Canadian Nordicity*. p. 16.
 - 9 Terence Armstrong, George Rogers and Graham Rowley. *The Circumpolar North*. (London: Methuen and Co., Ltd., 1978).
 - 10 V.F. Burkhanov. "Criteria for Determining an Engineering-Geographic Boundary of the North of the USSR." *Soviet Geography: Review and Translation*. Vol XI, No.1, January, 1970. p.27
 - 11 *Ibid*.
 - 12 *Ibid*.
 - 13 *Ibid*. p.28.
 - 14 There is little direct evidence in the articles or the books cited here for the date when Hamelin first began work on his global nordic index, but this quote suggests that it was the early 1960s: "I feel that this to some degree substantiates my working hypotheses first stated *almost ten years ago*." My italics. Louis-Edmond Hamelin. "A Zonal System of Allowances for Northern Workers: an example of Applied Geography." *the musk-ox*. Vol. 10, 1972. p.11.
 - 15 The address was called "A Polar Index." Hamelin. "A zonal system ..." p.14.
 - 16 The original article was published in French and reprinted by the Laval Centre for Northern Studies. An English translation, by David Barr, subsequently appeared. Louis-Edmond Hamelin. "Un système zonal de primes pour les travailleurs du nord: Un exemple de géographie appliquée." reprint from *Cahiers de Géographie de Québec*, #33, Dec., 1970, pp.309-328; #34, April, 1971, pp.5-27. *Melanges*, #39. Quebec: Laval Centre for Northern Studies, n.d.
 - 17 Louis-Edmond Hamelin. *About Canada: The Canadian North and its Conceptual Referents*. (Ottawa: Dept. of Secretary of State, 1988.) p.41.
 - 18 Hamelin used the word in its original adjectival sense.
 - 19 Hamelin. *Canadian Nordicity*. p.15.
 - 20 *Ibid*.
 - 21 *Ibid*. p.18.
 - 22 Hamelin. *About Canada*. p. 21.
 - 23 For a complete outline of Hamelin's criteria, see Hamelin, *Canadian Nordicity*. pp 19-21.
 - 24 Hamelin. *Canadian Nordicity*. p. 29.
 - 25 He altered criteria numbers 1, 4a, 4b,4c, 6, 7, 8, 9a & 10. These numbers reflect the order in which Hamelin originally presented the criteria. For further elaboration, see Hamelin, "A zonal system ..." or *Canadian Nordicity*. pp 19-21.
 - 26 Hamelin. *Canadian Nordicity*. p.16.
 - 27 "Several surveys soon convinced me that here and there, certain allowances are paid to workers in Northern Canada. Among the government departments and private bodies which offer such benefits, one should note the Department of Indian Affairs and Northern Development, The National Harbour Board (Churchill, Manitoba), the provincial "Hydros", the Direction générale du Nouveau-Québec, certain Near North regional education commissions, and perhaps the majority of the large private companies." Hamelin. "A zonal system ..." p. 8.

- 28 Hamelin. "A zonal system. . . ." p. 11. For further discussion of the problem of northern mobility see K.S. Coates and W.R. Morrison, "Transiency in the Far Northwest After the Gold Rush: The Case of the *Princess Sophia*, in K.S. Coates and W.R. Morrison. *Interpreting Canada's North: Selected Readings*. (Toronto: Copp Clark Pitman Ltd., 1989). pp 185-198.
- 29 *Ibid.* pp 8-9.
- 30 *Ibid.*
- 31 In a footnote, Hamelin remarks that "to show the variation in the different situations, we noted that at Hay River, in 1970, employees were only offered a cost-of-living allowance." *Ibid.* p.9, note 7.
- 32 *Ibid.*
- 33 *Ibid.* pp 9,12.
- 34 For example: D.W. Phillips and R.B. Crowe. *Climatic Severity Index for Canadians*. (Downsview, Ontario: Environment Canada Atmospheric Environment Service, 1981), and E. Wiken (compiler). *Terrestrial Ecozones of Canada: Ecological Land Classification Series, No. 19*. (Ottawa: Lands Directorate, Environment Canada, 1986).
- 35 B.M. Burns, F.A. Richardson and C.N.H. Hall. "A Nordicity Index." *the musk ox*. No. 17, 1975. p.41.
- 36 *Ibid.*
- 37 Burns, Richardson and Hall. "A Nordicity Index." p.41.
- 38 *Ibid.* p.43.
- 39 Hamelin. *Canadian Nordicity*. p.22. A comparison of the results of three nordic indices appears in Figure 1.
- 40 R. Brunelle, M. McGillivray, and E.P. Poole. *The Report of the Task Force on Tax Benefits for Northern and Isolated Areas/Rapport du groupe de travail sur l'indemnisation fiscale des localités isolées et du nord*. (Ottawa: Supply and Services, 1989). p 3.
- 41 Brunelle, McGillivray, and Poole. *The Report of the Task Force . . .* pp 3-4.
- 42 *Ibid.* p. 1.
- 43 *Ibid.*
- 44 It is interesting to note that Yukon government employees are not paid an allowance of the isolated-post type. They receive a "Community Allowance" which apparently relies on distance from Whitehorse for its relative amounts. Inquiry did not reveal who had suggested this system. The low is paid for Carcross (\$350 per annum) and the high for Old Crow (\$2673 per annum for single employees). Employees with more than one year's service are entitled to the Yukon Bonus, round-trip airfare to either Edmonton or Vancouver or its cash equivalent. Ref.: Article 33 and 38 of "The Collective Agreement Between Government of Yukon and the Public Service Alliance of Canada," 1987. pp 60, 65.
- 45 Personnel Management Manual. *Isolated Posts Directives*. Vol. 25. (Ottawa: Treasury Board of Canada, 1987). Schedule H, p.H1.
- 46 *Ibid.* p.H5.
- 47 *Ibid.* p.H7.
- 48 Brunelle, McGillivray, and Poole. *The Report of the Task Force . . .* p. 21.

⁴⁹ *Ibid.*, p.49.

⁵⁰ Brunelle, McGillivray and Poole. *Report of the Task Force on Tax Benefits*. pp 48-9.

⁵¹ *Ibid.* p. 7.

⁵² *Ibid.* p. 19.

⁵³ In December,1990, the Minister of Finance announced that an interim "Middle Zone" would be established to ease the removal of benefits from certain areas. The new zone was announced after a group from Flin Flon, Manitoba urged the government to consider partial benefits for their community. They cited remoteness and higher costs of living in their argument.

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