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retombées des recherches. Il y a évidemment une différence entre prévoir une inondation catastrophique et changer le temps au Vietnam.

La Prairie américaine est citée comme exemple : on sait que la sécheresse des années trente y a provoqué une érosion éolienne catastrophique sur des sols défrichés. Il semble actuellement possible d'augmenter les précipitations par ensemencement des nuages à l'iodure d'argent mais une telle opération inciterait des fermiers à défricher des nouvelles terres et à accroître leur bétail. Arrive une nouvelle période de sécheresse pendant laquelle il est impossible d'agir sur la pluie, le surpâturage et les nouvelles cultures entraîneraient un désastre plus grand que le précédent. Le résultat net serait négatif au point de vue économique sans parler des répercussions sociales.

Les auteurs passent alors en revue les modifications atmosphériques causées par des changements de la biosphère, particulièrement des conditions de la surface : albedo, conductivité thermique, rugosité, humidité, biomasse . . . dans les villes, les zones industrielles, les déboisements forestiers, l'assèchement de marais, etc . . . Une autre partie est consacrée à l'analyse des changements artificiels de certains éléments du climat : hausse des précipitations, dissipation du brouillard, lutte contre la gelée, la grêle ou les orages, détournement des tempêtes . . . et de leurs répercussions écologique ou sociale.

Actuellement, les connaissances des processus physiques sont insuffisantes pour justifier des expériences dangereuses ; de plus on parle beaucoup de consultation du public mais sans l'informer convenablement ou sans se préoccuper des raisons de son comportement : par exemple, des employés d'une usine qui pollue ont tendance à minimiser le problème de la pollution de l'air. Enfin, il y a d'autres alternatives qu'une modification du climat qui peuvent être moins coûteuses : il semble que la mortalité causée par les cyclones soit plus forte en Alabama qu'en Illinois, mais cela tient à une différence de protection des gens et non aux fréquences des tempêtes.

En conclusion, c'est un livre touffu, plein d'idées, qui insiste sur un examen très large des innovations technologiques, par une meilleure communication entre la communauté scientifique et la société en général. Cependant, il y a de nombreuses répétitions d'un texte à l'autre et pas mal de verbiage qui rendent la lecture difficile. C'est évidemment le danger d'un ouvrage collectif.

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PHILLIPS D.W. and McCULLOCH, J.A.W. (1972) *The Climate of the Great Lakes Basin*. Toronto, Environment Canada, Atmospheric Environment Service. 40 p. charts. \$1.50. Climatological Studies Number 20.

Besides the physical « discontinuities » in the atmosphere, there are perhaps certain climatological ones which tend to result from the presence of an international land frontier, whether the latter follows a watershed, or bisects a river valley, a drainage basin or large water body. Although the WMO has inspired a remarkable degree of coordination between nations with respect to instrumentation and techniques of observing and data processing, the production of a unified climatology of a region astride such a political boundary still requires good neighbours and a good organizer, and such studies remain few.

The recent AES publication, *The Climate of the Great Lakes Basin* by D.W. Phillips and J.A.W. McCulloch, would seem to be very good example of such work. The Great Lakes Basin, which contains « the world's largest single supply of fresh water » and more than 33 million inhabitants, is seen here as a natural entity, and it is fascinating to have a uniform climatological treatment and discussion of the shores and immediate hinterland.

Supplementary reports, based on accumulated ship data, are to offer further information concerning the over-water conditions. These will be awaited with great interest.

After a concise, clear, geographical *introduction* to the region, the authors deal with the *climatic controls* — latitude and solar input, topography, weather systems, the Lakes, and the effect of man's activities on climate. Of these, the sections on weather systems and the Lakes are particularly informative. However, the latitude and solar input paragraph does seem a little thin. While the authors may understandably have wished to avoid repeating information given in a later section, I feel that a fuller paragraph or two at this point would have been valuable. To supplement the paragraphs on the remaining controls, the addition of the 2000-ft contour to chart 1, and the inclusion of an additional chart showing the generalized land use of the basin might have offered a clearer picture of the surface controls involved. The discussion on weather records, which follows, also includes a useful paragraph explaining by example how to estimate return period values given the mean and standard deviation and tables of standard normal distribution.

The body of the study consists of 57 charts which offer a wealth of information on the distributions of the major weather elements. In the case of temperature, precipitation, radiation and evaporation, the variability is expressed as well as the mean. For spatial distributions, charts for January, April, July and October represent the seasons, while month-by-month statistics for these elements are shown on station diagrams superimposed on the base map. Wind speed frequencies and mean values are shown by direction in a series of station wind roses drawn up on charts for the four seasonal months. Other charts deal with the mean distributions for snow cover, vapour pressure, potential and actual evapotranspiration, sunshine, sky cover and maxima ice cover. Fog values have been tabulated. Although the map scale of the published charts is relatively small, the high quality of the work of the AES cartographers and the judicious use of colour have produced results that are both very pleasing and servicable.

The main text provides a commentary on the charts, which have been placed together at the back of the report. The problem of the separation of text and charts has been partially resolved by repeating some of the essentials of the text at the foot of each chart. The writing is easy and pleasant to read, well set-out and the salient climatic facts have been well-chosen. Specific examples are detailed in the text to illustrate further particular points of interest, and supplementary information from other authors has been incorporated, resulting in an important list of references for further reading. One detail perhaps needs comment. In the *radiation* section, further information as to the actual location and site (downtown, suburbs, country) of the stations plotted, and in the case of the net radiation, of the type of surface which was measured would enhance the usefulness of the graphs. At Guelph, Ottawa and Toronto, the net radiometers sample the standard short grass surface. While these values give a useful estimate for agricultural areas, when the fields are covered by short crops or pasture, the net radiation can be expected to vary considerably for other surface conditions, such as built-up areas, forest, swamp, fallow, for crops of greater vertical extent and for water; in the north, the surface conditions at Churchill are different again. A note to this effect would have given more substance to this section.

Considered as a whole, perhaps one of the most interesting uses of this study, in planning, will arise out of the quantitative understanding that it offers on the degree to which a large inland body of water, such as the Great Lakes, can modify the weather elements of the surrounding territory. The influence of this local heat source or sink is seen on most charts: incoming solar radiation and sunshine, « related to the ability of the lakes to control the growth and dissipation of clouds during winter and summer », evaporation, atmospheric humidity and local winds, the many aspects of temperature and the creation of local « snow belts ». One of the most striking features of the lake effect is that it is relatively local, with only a narrow extension inland, as the authors stress. Another point to emerge is that although the seasonal effects may be very marked, they

may be cancelled out in the annual mean, as in the case of insolation. The importance of the size and depth of the water body is clearly shown in the contrasting influences of the largest and deepest of the lakes, Superior, and of shallow Lake Erie. This is of particular interest today when hydro-electricity power sites are also being set up in low-lying country, resulting in vast relatively shallow expanses of water, rather than the creation of less extensive but much deeper reservoirs.

This is a most welcome contribution to the *Climatological Studies* series of the AES. A french edition is in preparation.

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CANADA

HAMELIN, Louis-Edmond (1973) **Canada : A Geographical Perspective**. Toronto, John Wiley of Canada Ltd. 234 pages.

For the last twenty years a geography that has sought statistical precision and spatial rigor has disdained broad, regional interpretations. Far better, too many of us have assumed, studies of traffic flows to supermarkets, of suburban housing complexes, or of linkages within the Central Business District. In such studies, after all, lies utility and social science respectability. This may have been an understandable trend in our field, but it is a narrowness much to be deplored. The public has been denied broad, geographical interpretations of place except as they emerge obliquely in literature or thinly in popular travel books; and geographers have shied away from a scholarly challenge demanding wide erudition, considerable synthesizing skill, and an ability to conceptualize at a high level of abstraction. Thus it is more than satisfying to have one of Canada's eminent geographers take up again the neglected task of broad regional synthesis by writing a geography of Canada.

Professor Hamelin brings much expertise to this task: his years of research as a geomorphologist, and as director of the Centre d'Études nordiques at Laval, his service on the Council of the Northwest Territories and considerable familiarity with the problems of Indian and Eskimo, his long interest in French Canadian rural society, his wide travel and reading about Canada. Most interesting, perhaps, he brings a sense of Canada larger than the sum of its parts. All of this has gone into *Canada : A Geographical Perspective*, a book that is considerably more than a translation of Professor Hamelin's *Le Canada*, published in 1969. Data from the 1971 census have been incorporated, and many sections enlarged.

Much in this book is excellent. The initial chapter on the north, introducing Canada as a northern country, is a bold, commanding stroke. The section on indigenous peoples, significantly beginning a chapter on cultural groups, is handled with great knowledge and understanding. The treatment of an evolving French Canada, short as it is, is also a highlight. I like Professor Hamelin's bold use, reminiscent of Griffith Taylor at this best, of diagrams and pictograms, and I like his writing which, in this effective translation, retains its sharpness, clarity, and wit. There are also weaknesses. The opportunity to follow up chapter one's excellent introduction to Canada's northerness is not seized. The treatment of economic organization and of urban Canada seems very derivative, and lacks the spark of Professor Hamelin's best sections. Like any of us, Professor Hamelin is most effective with what he knows best. Overall, the book tends to become a series of fragments, a reflection both of the enormous difficulty of writing