Aims of Economic Regionalization

Geographia Polonica 8

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INSTITUTE OF GEOGRAPHY • POLISH ACADEMY OF SCIENCES

GEOGRAPHIA POLONICA 8

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Proceedings of the Third General Meeting of the Commission
on Methods of Economic Regionalization
of the International Geographical Union,
July 23, 1964 London

Państwowe Wydawnictwo Naukowe
Warszawa 1965

Editors of the volume

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Adress of Editorial Board

Krakowskie Przedmieście 30, Warszawa 64
POLAND

PANSTWOWE WYDAWNICTWO NAUKOWE
(PWN —POLISH SCIENTIFIC PUBLISHERS)
WARSZAWA 1965

Printed in Poland

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INTRODUCTION

This book containing the Proceedings of the Third General Meeting of the Commission on Methods of Economic Regionalization of the IGU, is published as the 8th volume of «Geographia Polonica». It is also the last publication concerned with the Commission's works in the first period of its existence, i.e. in the years 1960—1964. The volume contains the final report on the activities of the Commission prepared by its Chairman — Prof. S. Leszczycki, and seven other papers delivered on the Third General Meeting; the discussion concerning these papers has not been included. In the report of the London meeting there are also directives for the further work of the Commission in the years 1964—1968.

Warsaw, February 1965

STANISŁAW LESZCZYCKI

REPORT OF THE MEETING

ANDRZEJ WRÓBEL

The Third General Meeting of the Commission on Methods of Economic Regionalization was held in London, July 23, 1964, as one of the meetings included in the programme of the 20th International Geographical Congress. It was attended by nearly 40 participants.

The first part of the Meeting consisted of the following papers:

1. R. T. GAJDA (Canada) — Research in methods of delimitation of economic regions in areas of extensive-dispersed economy — a case study from northern Canada.

2. W. J. CARTER (U.S.A.) — The State of Maine — an „underdeveloped" area with static frontiers on the periphery of a dynamic economy.

3. H. BEGUIN (Maroc) — Modèles géographiques pour la région du Sebou (Maroc).

4. C. MARINOV (Bulgaria) — A complex model of economic regions and more rational location of production.

5. A. BASSOLS-BATALLA (Mexico) — A new map of economic zones and regions of Mexico.

6. H. A. FAKOUSSA (United Arab Rep.) — Problems due to common geographical conditions in the Arab States.

7. J. SAUSHKIN (U.S.S.R) — Problems of the economic regionalization of the Soviet Union, 1960—1964.

The papers delivered caused animated and interesting discussion.

At the second part of the Meeting the Chairman of the Commission, Prof. S. Leszczycki presented the final report on the activities of the Commission for the period 1960—1964, as well as some directives concerning further studies in the period 1964—1968. His report is printed in this volume (p. 9-24). Supplementing the report, Prof. K. Dziewoński uoutlined the proposals for the programme of the 1965 Meeting of the Commission on the background of further work of the Commission in the years 1964—1968. The proposals were discussed jointly with the Chairman's report. In result, there was accepted a provisional programme of this Meeting as well as of the activities of the Commission

leading to its preparation. It was further resolved that the 1965 Meeting would be organized in Czechoslovakia by the Institute of Geography of the Czechoslovak Academy of Sciences which submitted this proposal.

Directive lines concerning the plan of the Commission's work in the period 1964—1968 have also been discussed and confirmed, anticipating studies in the following directions:

1. Problems of concepts and terms of economic regionalization,
2. International bibliography of economic regionalization,
3. Comparative review and appraisal of the political-administrative divisions and their role in the national and regional economies,
4. Organization of studies for establishment or improvement of planning and administrative territorial divisions,
5. Quantitative methods in the studies on economic regionalization,
6. Methods of establishment of statistical areal units for regional analysis and correlations of statistical and cartographical techniques for the studies on economic regionalization,
7. Typological problems of economic regions in underdeveloped or undeveloped territories,
8. Map of economic and administrative regions of the world.

GEOGRAPHIA POLONICA 8, 1965

AIMS OF ECONOMIC REGIONALIZATION

Report on the activities of the Commission on Methods of Economic Regionalization of the IGU for the period 1960—1964

STANISŁAW LESZCZYCKI

There are two parts in this article: the first and shorter one is a formal, organizational report, the second one, more detailed, refers to the aims and tasks of economic regionalization as defined in the discussions of the Commission during the last four years. The report is based mostly on the publications edited by the Commission, on discussions held at the two General Meetings (Utrecht — 1961; Jabłonna — 1963) as well as on the studies prepared in the Section of Economic Regionalization of the Institute of Geography of the Polish Academy of Sciences under the direction of Professor K. Dziewoński and Associate Professor A. Wróbel.

The proposals as to the further work of the Commission are presented here to serve as a basis for discussion on the plan for the work of the Commission on Methods of Economic Regionalization, in the period of 1964—1968.

ACTIVITIES OF THE COMMISSION BETWEEN THE STOCKHOLM AND LONDON CONGRESSES

The Commission was formally organized in 1960 at the International Geographical Congress held in Stockholm. Six ordinary members have been elected: S. Leszczycki (Poland) as the Chairman, Ch. D. Harris (USA), S. Ilesic (Yugoslavia), E. Juillard (France), E. Otremba (German Federal Republic) and J. Saushkin (USSR). The list of corresponding members has reached the number of twenty-one. They are: P. M. Alampiev (USSR), A. Bassols-Batalla (Mexico), B. J. L. Berry (USA), M. Blažek (Czechoslovakia), G. Bora (Hungary), C. S. Chandrasekhara (India),

K. Dziewoński (Poland), K. C. Edwards (Great Britain), C. Herbst (Rumania), O. Inchauspe (Argentina), G. Jacob (German Democratic Republic), J. Kamozawa (Japan), H. J. Keuning (Netherlands), Ch. Marinov (Bulgaria), N. Nicholson (Canada), M. Phlipponneau (France), L. Scheild (Austria), S. Schneider (German Federal Republic), O. Tulippe (Belgium), E. L. Ullman (USA) and A. Wróbel (Poland).

K. Dziewoński was the Secretary of the Commission and A. Wróbel his deputy. The Section of Economic Regionalization of the Institute of Geography of the Polish Academy of Sciences performed the duties of the technical Secretariate.

The Commission had two General Meetings: in Utrecht (Netherlands), on September 8-9, 1961 (17 participants) and in Jabłonna (Poland), on September 9-13, 1963 (46 participants). In addition, some informal talks and discussions have taken place on various occasions, e.g. during international meetings or individual visits to Poland as well as to other countries.

The materials of both General Meetings have been published by the Institute of Geography in Warsaw:

1. Economic Regionalization — Materials of the First General Meeting of the Commission held in Utrecht, Netherlands, from 8 till 9 September, 1961, *Dokumentacja Geograficzna* No. 1, Warsaw 1962.

2. Methods of Economic Regionalization — Proceedings of the Second General Meeting of the Commission on Methods of Economic Regionalization of the IGU, September 9-13, 1963, held in Jabłonna, Poland, *Geographia Polonica* No. 4, Warsaw 1964.

Information on the Meetings and on the activities of the Commission have also been published in the *IGU Newsletter* XIII, 1962, 1, and XV, 1964, 1/2, in *Przegląd Geograficzny* XXXIV, 1962 and XXXVI, 1964, and in "Izvyestia AN SSSR", Serya geogr., No. 6, 1963 [37].

Moreover B. J. L. Berry and T. D. Hankins prepared for the Commission and published *A Bibliographic Guide to the Economic Regions of the United States,* Chicago 1963.

To those publications of the Commission there should be added individual studies directly related to the field of interest of the Commission, published by its members [19, 21, 22, 25, 36, 41, 64].

The number of similar publications was much larger but they were not registered by the Secretariate of the Commission [2, 7, 8, 9, 13, 16, 30-32, 35, 43, 45, 51-53, 57, 65]. It is, however, worth while to mention about the earlier published "Problems of Economic Region. Papers of the Conference on Economic Regionalization in Kazimierz (Poland), May 29 — June 1, 1959". *Prace geogr.* IGPAN, 27, Warszawa 1961, pp. 360.

Realization of the resolution of the Jabłonna Meeting

The resolution adopted in Jabłonna, in 1963, formulated in 12 points the tasks and aims of the Commission. The tasks of the organizational character have been, on the whole, fulfilled. Here should be mentioned: publication of the materials of both General Meetings, preparation of the final report for the first period of the activities of the Commission, application to the Executive Committee and the General Assembly of the IGU for the extension of the term of the Commission for another four--year period, and support for the proposal of a new commission on „Applied Geography" to be concerned, among others, with the programme of professional training.

Bibliography of economic regionalization

Within the framework of the Commission the compilation of an international bibliography on economic regionalization has been initiated. S. Schneider (German Federal Republic) elaborated a detailed project for the bibliographical classification in this field based on the Universal Decimal Classification (UDC); this project was published in the volume of materials of the Jabłonna Meeting [54]. As it has already been mentioned, B. J. L. Berry has published such a bibliography for the U.S.A. and P. M. Alampiev, H. Bobek with S. Schneider, F. E. I. Hamilton and E. Juillard began to prepare similar bibliographies for their respective countries and languages.

Now I would like to pass to the second par of my report dealing with aims, tasks and methods of economic regionalization.

Basic aims of economic regionalization

I am still of the opinion that the formerly agreed aims of economic regionalization are valid [42]. They are divided into two groups: 1. pertaining to the research work and 2. to the applications for practical purposes. The research aims for geographical sciences may further be divided into:

the regionalization of various phenomena taking place on the earth surface, which are objects of geographical studies — on the one side, then economic regionalization is a method of work, a spatial generalization of phenomena and may be considered as a mean or tool of research;

the analysis of the division of the earth surface forming in reality an economic space — on the other side; then economic regionalization means studies of existing economic and social conditions and rela-

tions considered in space with the division of the earth surface into parts included. Such a division is necessary for the description of economic geography of various parts of the earth surface. With such a division the much discussed problem of the "objectively existing" regions and their more or less complex character is intimately connected.

Practical aims in economic regionalization are related to the economic development of certain areas, considered within the framework of larger units, such as countries or states, forming separate political entities of (at least to some larger extent) "closed" economies. For such a practical point of view studies are undertaken mainly to estimate how existing administrative divisions may and should be used for management of regional economy or how planning regions should be defined for the optimization of regional development within the framework of the national economy.

History of economic regionalization

It is well known that not only geographical sciences but economic ones and, lately, the regional science also deal with economic regionalization. Obviously there must be some differences due to the varying aims and tasks of various sciences. But in this article I will limit myself to the problems arising in relation to economic regionalization within geographical sciences only.

The historical development of the concept of regionalization and its use by geographers is not yet elaborated. However it is well known that the problems of regionalization were always within the scope of geographical research, forming one of its more important tasks. The existing studies are of national character, the outlines of the history of regionalization in English, French, German, Russian and other geographical works were elaborated, but nobody has undertaken such a work on a comparative basis for the whole international field of geographical sciences. Even when we omit general problems of regionalization in geography and limit ourselves to the economic regionalization — its history is still to be prepared. This may be the first of the future tasks of the Commission.

On the background of the historical development the relation between economic and natural (physiographical) regionalization should be defined and the possibility of new studies on the problem of geographical regionalization directed towards the establishment of complex and integrated regions, described once by D. Whittlesey [61] as "compages", should then be discussed. Numerous geographers consider these to be an impossible

task. In their opinion search for the methods of the delimitation of integrated geographical regions cannot give positive results. Personally, I feel that such a study should be undertaken because there is only one geographical reality — the surface of the earth — and it should be possible to establish proper criteria for its basic spatial division into smaller parts.

Problems of economic regionalization

One of the aims in geographical research is to define spatial structure of the analyzed phenomena taking place on the earth. Here, for obvious reasons, I limit my remarks to social and economic ones. These phenomena are of nuclear, linear or areal character and they are either continuous or discontinuous in their distribution. Various methods of regionalization are used for their spatial generalization. Usually the results of the spatial analysis are presented on maps either by range lines (among them izolines) or by areas in which the given phenomena take place. At the same time, the intensity of these phenomena is registered as well as their spatial correlation with other ones. By way of cartographical analysis, this leads to the establishment of spatial coincidence, covariation [1] and so on, which, in turn, enables us to enrich our research by defining casual relations.

The spatial analysis implicates, therefore, methods for delimitation of areas of the given phenomena and for presenting the results of such an analysis corresponding cartographical methods are necessary. Here is the second task for the Commission on Methods of Economic Regionalization, i.e. — to compile and to compare methods of spatial analysis and of cartographical presentation of regions of various types.

Theoretically every phenomenon taking place on the earth may be regionalized — there is, therefore, an infinite number of various regions. These regions are usually divided into two basic classes [26] depending on the character of a given phenomenon: 1. uniform or zonal, and 2. nodal or polarized ones. The first indicates that in a certain area the given phenomenon is present in a more or less continuous form whereas in the adjacent areas it is not present in the similar from. The second indicates that within a given area there exist some relations which integrate this area into a certain whole. Usually such an area possesses its central place (or several central places) which by its functions is connected with its closer or more distant neighbourhood.

Many geographers consider that all regions of every kind may be included into one of these two classes. Some geographers, however, are doubtful in this respect.

But going along these lines of thought we are always assuming that the economic regionalization consists in generalizing — for research purposes — distributions of single phenomena or their groups on the earth; in this meaning it is a tool for research consisting of the choice of criteria for delimitation proper and corresponding to the aim of the given research, as well as of the methods of spatial analysis and of cartographical presentation of its results.

The third task for the Commission lies in the improvement of research methods by adjustment to the basis of initial materials i.s. statistical data, maps, descriptions, inquiries, and so on, by defining criteria and methods of delimitation of various regions determined in connection with the aims of undertaken studies. Moreover, we have to remember that it demands a continuous effort without which the geographical research will not be able to prosper and to develop properly.

Geographical research on the economic spatial structure

The second task of economic regionalization is the research of spatial economic structure, evolved in result of the development of productive forces and social division of labour in the diversified geographical environment. The social division leads to the specialization of certain areas in production and to the diversification in types and levels of economy. These, in turn, form the basis for the development of stronger internal connections within the given area. In such a way, there arise some territorial complexes of production and services which are — but only to a certain degree — economically "closed", for instance, in form of sovereign states.

With time the spatial economic structure is developed, covering the whole economy i.e. both in the aspect of its spatial diversification and in the aspect of its spatial connections which are reflected in the complicated mosaic of extremely variant regions of uniform or zonal as well as of nodal character.

The development of spatial economic structure does not take place simultaneously in the whole of the territory. Usually some areas grow quicker than the remaining ones. It is possible, therefore, to observe some diversification in the level of economic development. It results in:

1. territorial diversity of the level of development (capital investments) marking the degree of intensity in use of the natural resources and, in general, of the geographical environment by the given community;

2. territorial diversity in the creation of national income when calculated — for comparison — per capita of the regional or local population

or per square kilometer of the regional or local area which demonstrates the intensity of economic development;

3. territorial diversity in the division or — better — in the consumption of national income which demonstrates the regional or local variances in the level of life.

On this basis it is possible to delimit the uniform zonal regions corresponding to various levels of economy. Obviously the selection of criteria may be questioned as well as the choice of research methods. However such possibilities do exist and may easily be supported by concrete cases. For instance, I have made a study for Poland [41], based on global indices calculated per regions (voivodships) of value of capital investments (fixed assets) as well as of national income as created and distributed.

On such a basis it seems that we may formulate the fourth task of the Commission i.e. the study of new, more precise, quantitative methods of research of spatial economic structure of a given area where the task of a geographer will be to describe this structure, to explain its genesis and to indicate the trends of its future changes.

In some cases it may happen that this diversification of spatial economic structure will be so developed and well defined that by using specific indices it will be possible to define separate areas basically variant to such a degree that they may be described as a good approximation of socio-economic regions of more composite character, forming territorial complexes of production and services, specialized and internally integrated [2—6, 14, 17, 29, 39, 43, 46, 53].

Such complex economic regions are needed in the descriptions of economic geography of a given country. For this reason they were frequently defined for various countries by numerous writers. Very often, for one country these regional divisions varied because their authors used different criteria and different methodic assumptions for their delimitation. Sometimes, they even were quite subjective and illogical in their selection.

Complex economic regions are also necessary for studying the economic development in its spatial aspect. In their delimitation their history has also to be taken into account i.e. their changes in time and space. These are often reflected in the settlement network which form the basis of their spatial development. Here lies the importance of settlement theories such as the theory of central places trying to define in abstract but economic terms the relation between the central place, or core, and its peripheries and neighbouring zone and to show how the influence of the central place on its hinterland grows smaller with distance. This may be used for the delimitation of some regions. These regions will have

direct reflection in the landscape, therefore, also on the topographical map and that is why such maps and aerial photographs may be used in such a research.

In result, the fifth task of the Commission may be formulated. This is to work out the methods and criteria for the delimitation of complex economic regions needed for the development of economic geography, for the preparation of regional monographs of given territories and for planning of the economic and social development of various parts of a country.

The interregional, international relations (of spatial character) should also be taken into account, and especially those which define the role and importance of a region, or even a state, within the framework of a larger economic entity. For such purposes balance sheets showing the functions and "closures" of the economy of the given area may be used. But research in this direction is of a different character. We have to assume *"a priori"* some divisions into regions (areas) and then to compare them between themselves within this apodictically fixed system. Nevertheless the analysis of interregional relations may be undertaken within the geographical studies of economic regionalization (the sixth task of the Commission). But this problem is usually dealt with by the economists and regional scientists.

Typology, taxonomy and hierarchy of economic regions

Problems of typology, taxonomy and hierarchy of economic regions are relatively little known. Although we posses numerous studies on the typology of economic regions, written by such eminent geographers as J. Charbonnet [15], N. Kolossovski [38], E. Otremba [48], and others [27, 47, 50, 55, 56, 58—60, 62], the formulations of this typology were not thoroughly discussed. It is usually based on cycles and interconnections in production or on professional structure of population. Sometimes various forms of landscape, resulting from different structure of production, serve as a starting point. For economic geography these problems seem to be significant. That is why I consider their study to be the seventh task of the Commission. It should consist of the comparative analysis of the typologies so far presented (the analysis should be made on the truly international basis), and of the proposals of principles on which an unified typology — for the whole world — could be evolved. This is certainly necessary before the system of economic macroregions of the world, needed for dydactic and documentary purposes, may be worked out and generally accepted.

With the typology of economic regions their hierarchy is intimately

connected. The hierarchy of natural regions has been discussed many times already. The principle was then accepted that regions may be ordered in a hierarchical scale in correlation with their size. Another basic assumption was that every region might be divided into a finite number of regions of lower rank (microregions) and, *vice versa*, that a certain number of regions of lower rank made up the larger region (macroregion). At the same time, it was agreed that the criteria of delimitation of their uniformity might change when passing from one rank of hierarchical regions to another. These assumptions may be applied to the case of economic regions of the uniform, zonal character. However in the case of nodal regions the application is not so easy. These regions may not be continuous and the sum of several regions of lower rank is not equal to the region of higher rank. Recently, the problem of regional hierarchy was discussed by A. Wróbel in a larger dissertation [64]. In spite of his achievement the problem of regional hierarchy is still open and should be studied together with other problems defined in this report (the eighth task of the Commission).

There still remains for discussion the problem of taxonomy, i.e. of a unit serving as a base for comparison as between various economic regions. If we intend to compare regions of different countries and states, e.g. of the USSR and the USA, on the one side, and of Poland, Belgium or the Netherlands, on the other, this is fundamental. Taxonomy also finds its application when the economic regionalization is to be applied for practical cases, e.g. when we are to compare economic regions with some units of administrative division (the ninth task of the Commission).

Concepts and terminology of economic regionalization

At the end of this discussion on economic regionalization as a part of geographical research I would like to stress the divergences which prevail in the understanding of specific concepts and the chaos which is characteristic in the use of various terms. We all know that the term "region" may be and is generally used as a synonim of "area" or "space"; all efforts to limit its use to some part of space or area are completely futile. For this reason, in order to indicate what kind of an area we intend to talk about, it is necessary to qualify the term "region" by some adjective. Even then the problem is quite complicated. For instance, we talk about the uniform regions — but both zonal and nodal regions may be considered as uniform, — this depends on the criteria and data we have used in their definition. The same applies to functional regions: on the one side, every area may fulfil some functions within a greater unit; on the other, the term functional may be used in the meaning: the unity of some area

based on the functional integration of its parts. Similar difficulties develop in using such concepts as homogeneous and heterogeneous regions in which the additional concepts of genesis and of complexity are clearly implied. Further examples may be added *ad infinitum*. The terminology now in use for the definition of a region is both rich and diversified, but surely it should be in some way ordered. The same applies to the other basic concepts such as "economic regionalization" or those connected with the description of a region, e.g. "centre", "core", "hinterland", "range", "peripheries", and so on. In result, we may conclude that the one of the most important future tasks of our Commission is to organize further studies of concepts and terms connected with economic regionalization as understood and discussed in this report. Their final effect should be in form of the publication of an international glossary of terms pertaining to economic regionalization (the tenth task of the Commission).

Practical application of economic regionalization

I am passing now to the last part of this report, namely to the problems of practical applications. The latter may take form of the use of economic regionalization with respect to:

1. critical appreciation and revision of administrative divisions,
2. regional management of certain branches of national economy or of some economic activities,
3. regional planning.

1. Economic regionalization and administrative divisions

Political and administrative units may play larger or smaller part in the development of regional economy. This depends on the powers possessed by the given unit in the field of economic organization which, in turn, are derived, before anything else, from the socio-economic system of the country (whether capitalistic, socialistic or other).

A classical example of such a unit forming a separate economic region and existing objectively may be found, at present, in the form of an independent (sovereign) state, with a "closed" economy (at least relatively) within its territory [20]. Obviously its international trade may be controlled by the state government although it influences, to some degree, the whole national economy.

In our times, due to the growing difficulties in "closing" of the economy within the national territory, states form some supranational associations, such as, for instance, the Council for the Mutual Aid in Central and Eastern Europe or the Common Market in Western Europe, whose influence on the economic development of each participant state

is steadily increasing. Such co-operation implies wider and wider planning activities leading toward the planned territorial social division of labour (in form of specific economic functions) which, in turn, will have its reflection in the regional development of these countries. In this way, regional planning on the international scale will become necessary.

Each state is divided into a series of political and administrative units which usually form two or three hierarchical levels of territorial organization. Units of each level have their concrete powers pertaining to the management and organization of social and economic activities.

Administrative divisions are often very old (in Europe they sometimes are derived from the feudal times) and then they usually do not correspond any more to the present social and economic conditions. In result, there emerges a strong divergence between the antiquated administrative division and the spatial economic structure. It is therefore necessary to determine through scientific research how large this divergence is and what should be done for its diminution. This problem is not purely geographical, nevertheless, a geographer whose job is to study the spatial economic structure has an important role to play in such a work. In special cases, when it is possible to define complex economic regions, they surely may serve as one of the bases for the proposed reform of the administrative divisions. This should be accepted as the eleventh task for the Commission [34]. Such studies should also deal with the problems of optimal correlation between the administrative division and the management of the regional economy. This is specially important for socialist countries in which lower administrative units receive important economical powers and tasks, as well as for the so-called developing countries where their reformed administrative division should provide basis for a quickened economic development.

2. Economic regionalization and regional management of economic activities

Economic regionalization may be practically used in the preparation of the territorial organization for the direction of economic activities. Usually, in the same country there are used several divergent systems of territorial organization and management (for instance, in railroads, forestry, water economy, electric power systems, and so on). This problem demands careful thinking. It is not quite clear whether the postulate of total unification of the territorial organization and management is justified. However, some order based on the acceptance of certain rules of procedure will surely be useful and obviously necessary (the twelfth task of the Commission).

3. Economic regionalization and regional planning

Finally, economic regionalization may be applied in regional planning. The development of regional economies implies the establishing of the most proper planning regions. Taking into account the value of geographical environment, abilities of local population, present stage of capital investments as well as specialization in production and services, technological progress and other similar problems it is possible to work out directives for the future development of every specific area. In this way, a system of planning regions may be evolved which will become "objective" when they are approved by the authorities supervising planning activities, and are implemented by the creation of the necessary planning bodies (advisory councils and professional bureaus or studies). For example, in the socialistic countries the possibilities for the application of economic regionalization in this field are the greatest. This is the basic task of economic regionalization in the USSR. The majority of Soviet geographers identify economic regionalization with the delimitation of economic planning regions (so-called basic *Gosplan regions*). The established regions have to be then thoroughly described and analyzed and the perspectives of their future economic development defined.

For planning purposes (both economic and physical, i.e. regional) the Soviet geographers consider regions to be territorial productive complexes, objectively existing and with perspectives of creative development in future. It is, therefore, possible for each region to work out a model of their final development, to study their interrelations and to define their role in the national economy. These are, without any doubt, most fascinating and most useful studies. No wonder why these studies take the first place in the programme of research of Soviet geographers and economists. These studies are very well developed and may serve as model ones for others.

Here we have the next important (the thirteenth) task for the Commission — to establish standard methods in the application of economic regionalization for the delimitation of planning regions serving as the framework for the preparation of the perspective programmes of the regional economic development as well as for the regional schemes of development.

Map of economic macroregions of the world

Coming to the end of the article I would like to return to the postulated preparation of the map of economic macroregions of the world. This idea started at Jabłonna a very animate but indecisive discussion. The matter has been put off and now it is the moment for bringing it

forth again. I have recently come to a conclusion that there are three ways to solve this task. We may assume as basic criteria either — 1. the capital investments such as the settlement and transport networks which are registered on the maps, or 2. the professional structure of population, especially of the population living on the basis of the nonagricultural occupation, but then the corresponding statistics would be necessary, or 3. the traditional description of the most important aspects of economic life in given territories.

The third criterion has already served for numerous economic maps of the world [12, 18, 23, 24, 40, 44, 49]. They raise, however, various objections, the most important one being that of subjectivism. In spite of that it is possible to take them as the starting point for typological studies concerned with economic macroregions but based on more objective criteria.

Such a map is needed in the documentation, information and didactic work and it should, therefore, become one of the tasks (the fourteenth) of the Commission on Methods of Economic Regionalization.

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Thus I have passed in review the full range of necessary research in the field of economic regionalization and of the tasks still standing before the Commission. The proposals presented are, of course, under discussion: they may be changed, or supplemented, some of them may be abandoned.

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GEOGRAPHIA POLONICA 8, 1965

RESEARCH IN METHODS OF DELIMITATION OF ECONOMIC REGIONS IN AREAS OF EXTENSIVELY-DISPERSED ECONOMY. A CASE STUDY OF NORTHERN CANADA

ROMAN T. GAJDA

PURPOSE

The object of this paper was to develop a method for delimitation of economic regions in areas of extensively-dispersed economy, taking as an example the Canadian North. This method may be applicable to other areas of similar characteristics, i.e., cold lands associated with higher latitudes or altitudes, hot arid lands or parts of wet tropic.

The field investigation was conducted in the summer of 1961 in the Districts of Mackenzie, Keewatin, part of Franklin and in the Northern Yukon, i.e., north of the 60th parallel.

The result of this study is an attempt to develop a system of economic regions for the study area. The method may be applicable to the Canadian North as a whole and perhaps to other parts of the world having similar economy.

PREVIOUS WORK

Although the problems of the delimitation of economic regions has attracted the attention of Canadian geographers, most of the research on economic regionalization conducted so far has been more or less on a subjective basis. The actual methods by which regional division of the country is arrived at have seldom been described. In particular, there is little or nothing published in Canadian or world literature with regard to the methods of delimitation of economic regions applicable to areas of extensively-dispersed economy.

In Canada about the only exception is a study by Weeks and Sametz [5] who made a broad attempt to differentiate the economic regions in the North, but apparently due to the lack of statistical data, confined them-

selves to large political divisions and districts comparable in area to provinces in the south. Nicholson [2] presented economic regions of Canada including the north, based on physical and population factors but without support or adequate details, concerning their delimitation. They could be called "demonstration" regions for educational purposes only. An appraisal of the situation existing in research on economic regionalization in Canada was made by Nicholson and Gajda [3].

Problems

In considering the delimitation of economic regions in the North the following problems arise:

1. Availability of statistics for small areas. The chief limiting factor is availability of relevant statistical data. The fact is that the amount of statistical data published in Canada by the Dominion Bureau of Statistics for areas smaller than a province is considerably less than on an "All Canada" basis. With regard to the districts of the Northwest Territories, it is completely lacking in the details necessary to assist in delimitation. The Census Division called Health Districts (formerly Registration Districts), are the smallest units used for census purposes, but are very large for our purpose.

2. Unit Area. The present census divisions in the North, are rather arbitrary with little or no correspondence to the existing situation. Furthermore, no useful economic data has been published for these units, so as a result we can derive little useful information which could assist in delimitation of economic regions. It appears that the solution to this problem lies in the initiation of a program to adjust the existing census divisions in the north to modern requirements by creating census divisions having better characteristics of internal homogeneity and make them available to scientists for the purpose of their research. With the extensive program of the development of the north such data would be invaluable.

3. Definition of "The North". In Canada, the term "The North" has had the popular connotation of frigid emptiness, barrenness or wilderness. Recently, however, "The North" has been thought of as an area for exploitation and development. The term "The North" needs some explanation. In a real sense actually two quite distinct Canada's exist. One, the Ecumene [1], a highly urbanized and industrialized zone with its continuous and integrated transportation and communication systems lying adjacent to the United States in which have been developed the production of goods and services, domestic markets and external trades, in other words the entire national economy. The other Canada is a mixtu-

re of ecumene, sub-ecumene and anecumene, a vast undeveloped land embracing about 3 million square miles, with a population hardly greater than Bermuda's. This has been the popular connotation of the North. The old description of northern Quebec as "the land that God gave to Cain" is perhaps the extreme statement, but it conveys something of the general attitude that has been held towards the North. In general terms, the North begins where continuous agriculture ceases.

To those engaged in administration, the North is restricted to areas north of the 60th parallel and embraces the Yukon and Northwest Territories, an area close to 1·5 million square miles.

„The North" in the context of this study refers to Canada north of the 60th parallel, and deals particularly with areas within the Mackenzie and Keewatin Districts. This area is not just a vast snowfield but holds great potential for development.

4. Terminology and Definition. "Economic Region" is used here in a broad sense in order that it may have a multi-purpose application. Regionalization deals with the total adjustment which the population of an area has made to a particular combination of natural resources and other important environmental factors.

The extensive-dispersed economy of the Canadian North is discontinuous, that is, areas in which economic activities take place are separated by barren areas. Nevertheless, there is sufficient similarity between areas of extensive activity that they may be grouped into regions.

Characteristics of areas of extensive-dispersed economy

Generally, extensive-dispersed economy applies to vast areas, sparsely populated, in which the economic activity is spotty. As a rule, the population is migratory. The habitation is a tent, primitive dwelling or snow hut which is easily transported or replaced. The animals provide nearly everything their owners use. If crops are cultivated they are few and monotonous. Occupance is of subsistence character. With the intervention of factors such as administration and increasing government assistance, transportation, mining or other factors related to the activities in the ecumene, the economic patterns in areas of extensive-dispersed economy become more complex. Resources which would not otherwise have been developed, undergo limited local development, for example agriculture, mining, forestry, hunting, fishing, trapping, grazing, etc. In some areas more than one resource exists to create a productive area having multiple economic characteristics; in others the resources represent only a good potential.

The development of communities is usually highly localized, with little or no relationship to other similar communities; the communities are related to centres in the ecumene, often located at great distances. The communities with their corresponding servicing areas are usually surrounded by areas of "null" economy, like islands in the sea. The existing resources are developed slowly due to the uncompetitive price at outside markets. Both production and transportation costs are substantially higher than in developed industrial areas. Although the advance of technology has brought considerable development and changes in social structure, the majority of the people are still engaged in primary extractive activities. It is suggested that the above characteristics, with some modification and reservation, apply broadly to wide areas of the world, be they located in cold zones, in tropical deserts or in humid low latitudes.

In summary the extensive-dispersed economy means: 1. very few people (dispersed or living in clusters); 2. scattered settlements; 3. simple economic activities, usually primary, based on limited agriculture, hunting, fishing, trapping, grazing, with some mining and forestry; 4. limited transportation facilities, and low accessibility; 5. sporadic contacts and connections with more developed economic regions (usually involving great distances); 6. very limited or non-existing industrialization.

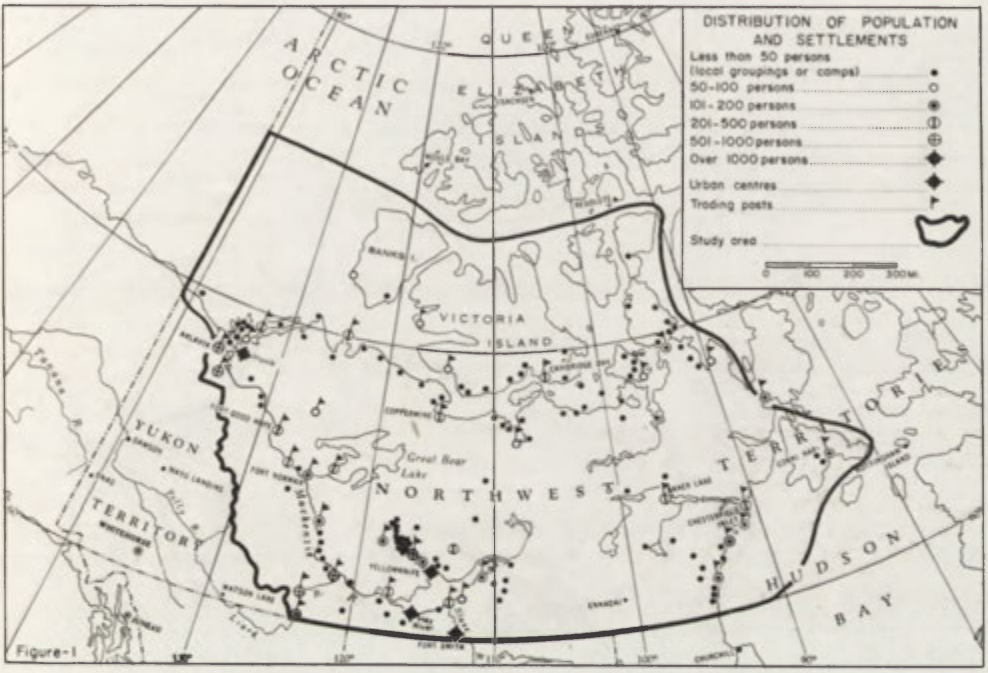
The concept is somewhat similar to that of extensive agriculture as opposed to intensive agriculture.

Economic situation in northern Canada

To understand the present economic characteristics of the Canadian North it should be emphasized that in the past this vast territory was inhabited only by several Eskimo and Indian tribes. The animals of the land and sea were the chief items of their subsistence economy. The most important contacts with the white population occurred in the 19th century through whalers and in the 20th century through the arrival of white traders followed by missionaries with the subsequent establishment of government post. A third important contact occurred in connection with the Second World War when northern weather stations were established and the development of the "Distant Early Warning" radar stations took place. These were followed by an extensive development program of the Federal Government.

As a result the North underwent considerable changes. Schools were built in every settlement and other construction included several hostels, hospitals, nursing stations, administrative offices and living quarters for white as well as native population. The impact of these developments on

the native way of life was tremendous and the scattered population started to concentrate more and more in larger communities and adjacent areas (Fig. 1). The important basic pattern of hunting and trapping economy underwent a transition to a wage earning economy, particularly in the last decade. Thus the migratory way of life changed considerably



to a more sedentary one and this trend was enhanced by the extension of various services and facilities already existing at the settlement. This situation has been aggravated by unstable and lower trading prices for the most important economic resource, namely fur, as well as by the disastrous decline in the caribou population which further affected an important subsistence base of the native population. The above trend is continuing today and is changing radically the economy of the whole area. Although the trapping, hunting and fishing are still the main occupation and will perhaps for a long time play an important role in the native subsistance economy, nevertheless the wage employment, together with the growing social assistance, already represents a considerable per cent of the family income.

Still of paramount importance to the stable and sound economy are the natural resources, both existing and potential (Fig. 2), among them

minerals, and oil in particular which may represent one half of the mineral potential. The development of these resources depends of course on accessibility (which is the key to mineral exploitation) and to the richness of the deposits if it is to be economically workable. These resources alone will have an important impact on the economy of the North. Other

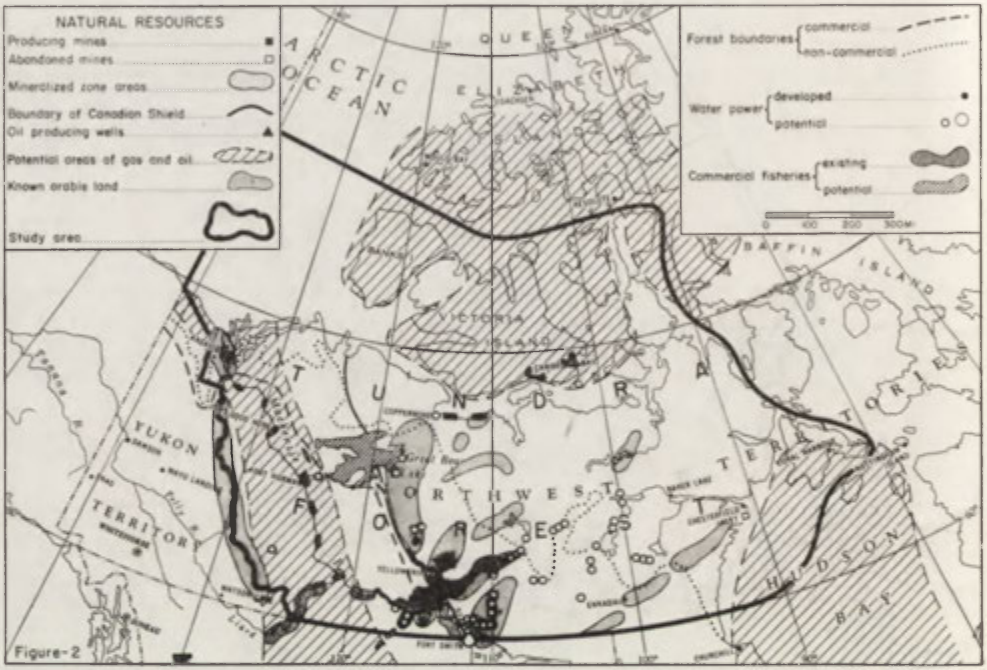


Figure-2

important problems awaiting solution are properly planning the utilization of subsistence resources, rehabilitation of the trapping areas, dispersion of population and developing local industries. Unless the mining industry can absorb the available labour force, the native population on the increase during the past decade will have to depend on the present inadequate wage economy and social assistance. The other undesirable alternative is partial relocation of the population to the economically developed southern regions.

The delimitation of economic regions—method and criteria

In view of the above criteria the problem is how to delimit into economic regions the broad and vast areas of northern Canada that are based on an extensively-dispersed economy. The research method, essentially

a cartographical one, was adjusted on the basis of original material consisting of statistical data, field work and distributional maps depicting various phenomena. The criteria for the delimitation of economic regional units were taken from studies of geographical, economic and social conditions. The dominant criteria and the information required was: 1. location of settlement, distribution of population and population structure. 2. the distribution of natural resources. 3. the nature of economic activities. 4. the extent of economic and social contacts within and outside the area. 5. the degree of stability of the native economy.

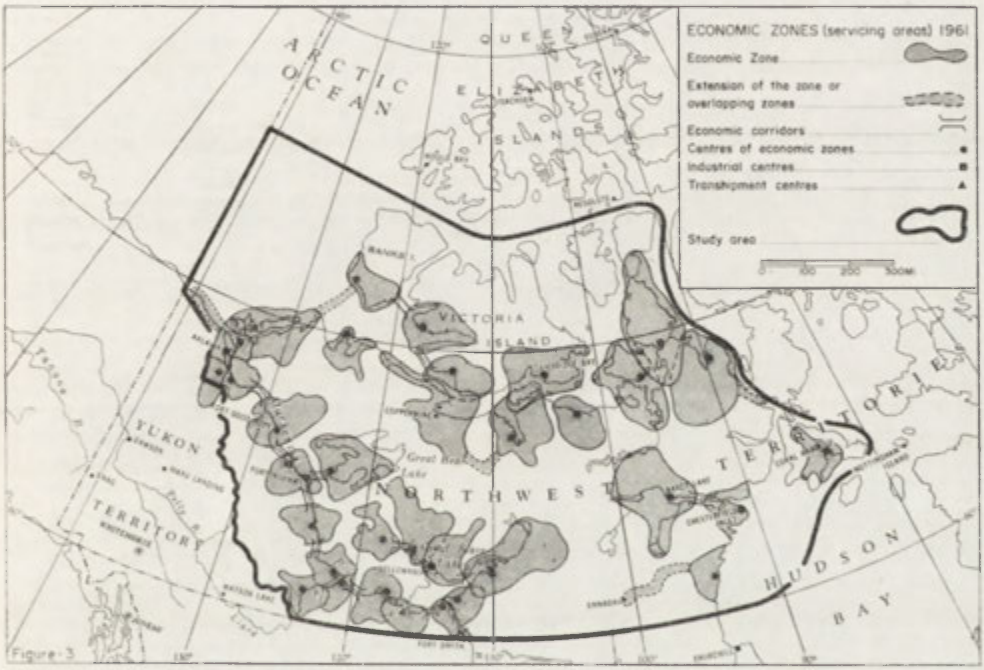
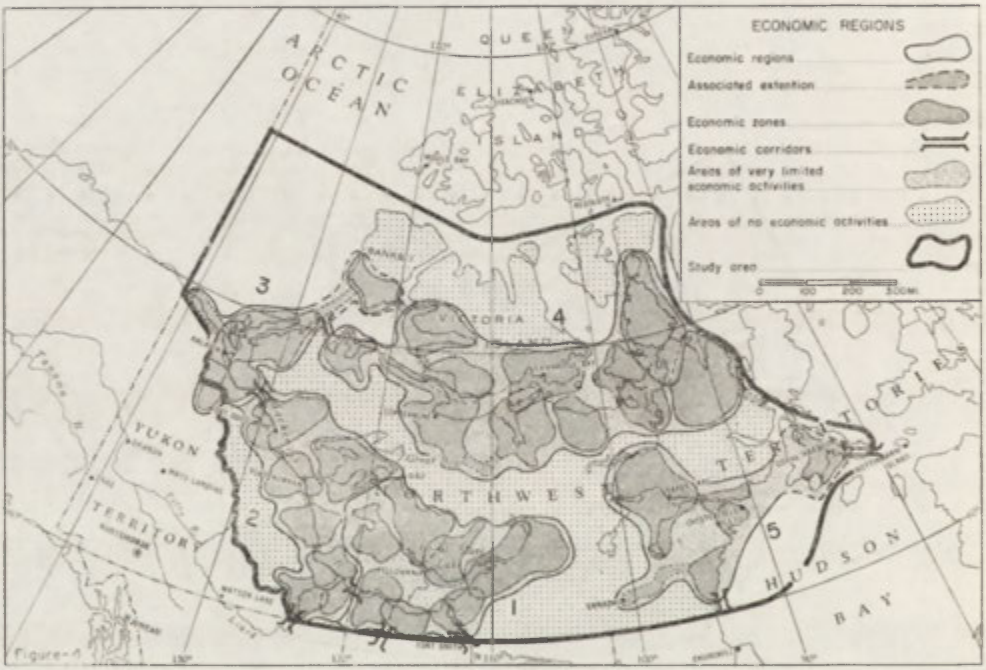


Figure 3

The economic activities identified and assessed were: hunting, fishing, trapping, mining, forestry and local industries. In addition, wage employment (full-time or casual) was also evaluated. Furthermore, the development and influence of transportation and communications as well as accessibility or the degree of isolation of communities was assessed. In the process of economic regionalization an adequate system of small component units called economic zones was established as the basic units characteristic for the area under study (Fig. 3). These units are of a special character, namely, servicing areas which represent permanent or

temporary utilized areas in which the nucleus is a settlement or trading post, i.e., a local economic centre. The size of these units depends on the characteristic features of the unit concerned; the unit size is variable and is related to the dominant economic activities of the population. As a rule, such units are separated by economically non-utilized areas so that the functional relations between them are very limited or non-existent.

Units or economic zones were aggregated into economic regions (Fig. 4) characterized by comparative "homogeneity" from the point of



view of the past and potential economic development. The boundaries of each region were designed to unify the areas which have basic similarity of economic life, and to separate them from adjacent regions whose economic life differs.

In the actual process of regionalization the criteria were applied by assigning a percentage value to the basic factors where this was possible. It should be recognized that the basic criteria actually represented complexes of other component criteria.

The choice of criteria depended to some extent on circumstances specific to different areas and to the availability of the basic statistical data.

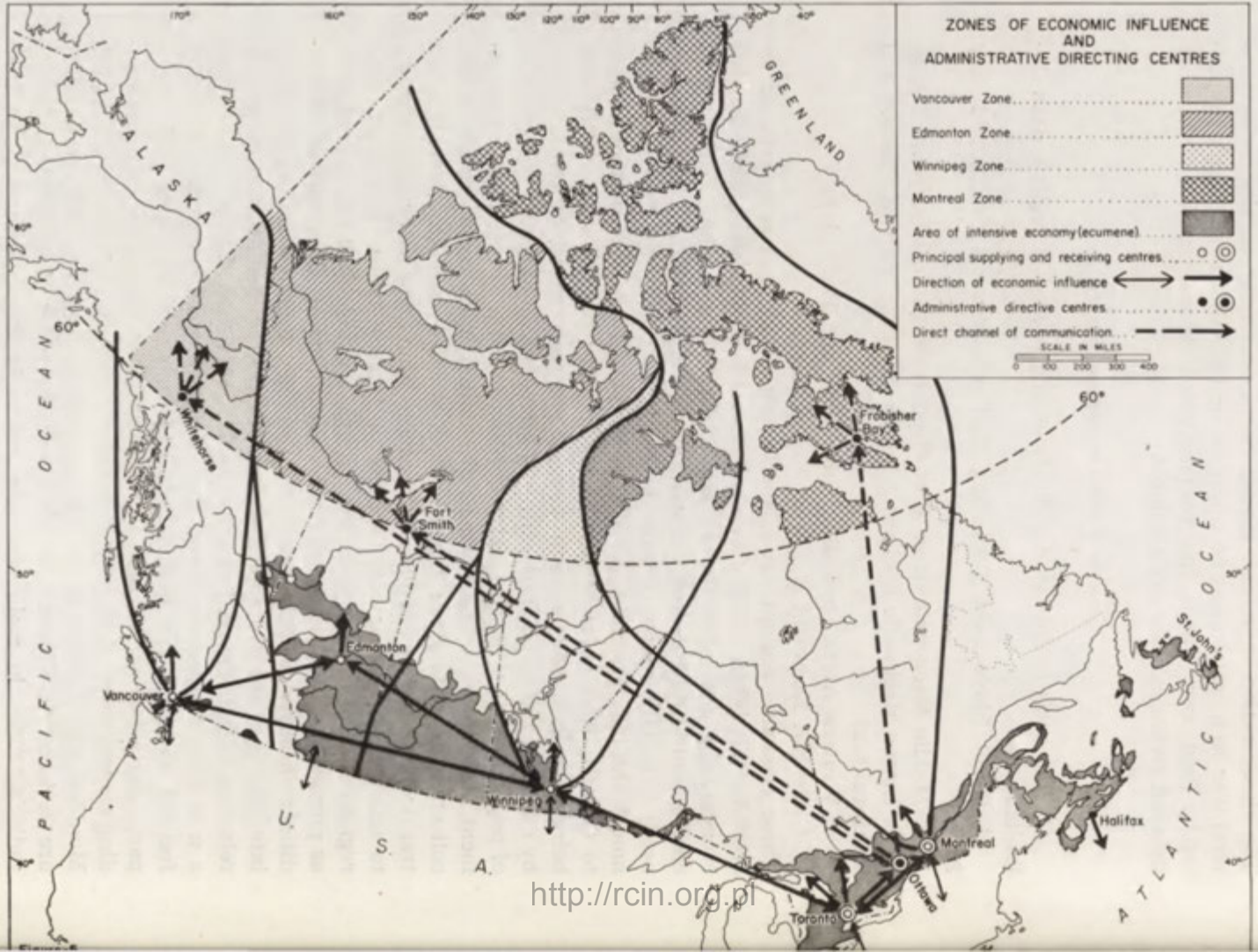
The classification therefore, though based uniformly on the chosen criteria was to a certain degree empirical and qualitative although supported by field observations. Improvements will become possible when more detailed statistical data are available.

Economic regions in the study area

On the basis of this study, the following economic regions were delimited:

1. Great Slave Lake (including Yellowknife, Fort Smith and Hay River)
2. Middle Mackenzie (from Fort Good Hope to Fort Simpson)
3. Lower Mackenzie (including Inuvik, Aklavik, Fort McPherson and Tuktoyaktuk)
4. Western Arctic (including Back River and Pelly Bay)
5. Central Keewatin and West Hudson Bay.

These economic regions are connected either by sea waterways or by economic corridors usually along inland transportation routes. Though economically not self-sufficient and underdeveloped, these regions hold considerable future potential for development. At present, their economy needs stimulation from outside the North, i.e., from the Federal Government through planning. Such a policy would by no means be unique to Canada. It is characteristic of many other countries, the difference being that in Canada's north there is indirect control of the economy by means of the creation of centres of attraction and voluntary movement of population. In some socialist countries control is direct and the government aims to settle the nomadic population upon fixed centres either collective or state stock ranches. Both policies have the same goal of transforming the way of life of the people from nomadic or semi-nomadic to sedentary. Another consideration of interest is the fact that such regions or economic zones are increasingly characterized and indeed form as pointed out by Watson [4] not by the spreading of homogeneous conditions throughout their length and breadth, but by focusing the main interests and needs at commanding centres. In fact, distant economic relations with these centres are often stronger than the local ones. Thus a new kind of economic area, that of diversity of economic conditions, focused upon a single harmonizing centre is now emerging and this is particularly true with regard to the North. Five such economic commanding centres were distinguished namely Vancouver, Edmonton Winnipeg, Montreal with Toronto as one having an overll economic influence. These are indicated in Figure 5 which shows the zones of economic influence radiating from the main economic centres in the south as well as from



commanding administrative centres. It is of interest to note that at present the administrative divisions in the North are based mainly on population factors and disregard economic regionalization. Similarily, the new proposed administrative divisions, that of Mackenzie and Nunassiag, seem to follow the same principle.

In the foregoing discussion the term "economic region" has been used, and the existance of such regions may well be questioned. However, there is in existence a land both underdeveloped and sparsely populated. There is moreover some economic activity no matter how small. There are trading centres and economic contacts with large supply and receiving centres, though located hundreds or thousands of miles outside of previously discussed economic regions. It is true that these economic regions are of different types and character in comparison with developed economic regions in the south. Nevertheless they exist albeit in a developing or transition stage and hold a great potential for future development, comparable to that of southern Canada.

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GEOGRAPHIA POLONICA 8, 1965

THE STATE OF MAINE — AN "UNDERDEVELOPED" AREA WITH STATIC FRONTIERS ON THE PERIPHERY OF A DYNAMIC ECONOMY

WILLIAM J. CARTER

Portland, the chief seaport and largest city in the State of Maine, is only 105 miles (169 km) from Boston, yet from many significant aspects these cities are situated in different regions. Boston is the northernmost of that strip of urban nuclei extending from the suburbs of Washington, D. C. along the Atlantic seaboard of the U.S., to which Dr. Jean Gottman has given the designation of Megapolis [8]. Although culturally and historically Boston and Portland are both within New England, their interests have long been divergent, their geographic hinterlands have different economic bases, and their future development plans are along separate courses.

The State of Maine is not a continuation northeastwards of Megapolis, but of that relatively poor, relatively sparsely settled area extending from Alabama along the Appalachians into Pennsylvania, across New York State and the Mohawk-Adirondack area, thence across Vermont, northern New Hampshire, and beyond Maine into the Maritime Provinces of Canada. The southern half of this area has received a recent political designation, Appalachia, and is the object of a bill now before the U. S. Congress to give $ 228 million in immediate economic aid to a region termed "the largest and most stubborn rural slum in the U. S." The long-range program calls for as much as $ 4 billion [11]. Outside Appalachia, state programs, more or less dependent upon federal aid, aim at lifting the economic level in the poorly endowed and "underdeveloped" areas of N. Y., Vermont, and New Hampshire. Beyond Maine in Canada, Quebec demands provincial self-determination, while the Maritime Provinces, more recently dubbed the Atlantic Provinces, call for financial subsidies from Ottawa. Thus, on the entire perimeter of Megapolis, there is a series of areas which, diverse among themselves, have in common a relationship of dependency, confused between attraction and repulsion toward the dominant megalopolitan complex along the Atlantic sea-

board or to its small Canadian counterpart centered in Montreal. These dependent areas do not lack in cities for manufacture and trade, in university towns, or in resorts, and their cultural landscapes vary from the rich dairy valleys of Vermont to the coal-grimed shacks along the runs of West Virginia. However, they all are characterized by excessively large empty areas such as were so graphically mapped by the late Dr. Lester E. Klimm in 1954 [12]. And all of them have failed to retain the interest and hopes of their young people, as evidenced by the fact that for decades there has been a net out-flow of population, looking for better opportunity elsewhere.

Within that peripheral area bordering on Megapolis, Maine has its own unique history, resources, and opportunities. Whether it complies with one of the several definitions for a region, I leave to the judgement of my learned peers in geography. Certainly, Maine has persisted as a political unit with relatively unchanged political boundaries for a period of 145 years since its severance from Massachusetts and admittance as a State in 1820. At that early date the northern bounds of settlement as shown by Moses Greenleaf's contemporary map closely correspond with the division today between forest and settlement. The exception is along the Aroostook and St. John Rivers in the northeastern corner of the State, where settlement followed the end (1939) of the fracas with the British as to where the boundary should be located.

If the area of settlement has remained relatively constant, the acreage devoted to farming has steadily shrunk since its peak of 3,485,000 acres (1,408,000 hectares) in 1880. Today the figure is 1,077,000 acres (436,000 hectares) of cropland [3, 5, 20]. In the same period the percentage of rural population has only dropped from 77·4% to 60·1% indicating that Maine, although participating in the general decline in New England agriculture, did not make so marked a shift from rural to urban residence. There has been another population movement, characteristic of New England, but accentuated in Maine, the steady migration from the state decade by decade of those seeking better economic and cultural opportunities elsewhere. This movement was in full stride by 1880. In the period 1880-1960, although excess of births over deaths resulted in population growth from 648,900 to 969,300, there has been a net emigration of 246,000 native whites, offset by an immigration of 92,000 foreign-born whites and only 2500 negroes, for a net loss in potential growth to the state of 152,000. Significantly, the immigration of foreign-born whites (largely from French Canada) trickled to a halt in the depression decade of 1930-40 and turned full about to a net emigration in the period 1950-60 [10, 18]. In 80 years Maine had lost 38% in a potential population gain. Projections made by the Outdoor Recreation Resources Review

Commission Staff to the year 2000 show that unless reversed this trend will continue and Maine will have in that year a population of 1,494,000, or an increase of only 54% in 40 years when a 95% increase is projected for the U. S. as a whole [14].

If this were not symptomatic of more deep-rooted problems, Maine would have little to worry about. However, one criterion for the difference between a developed and an underdeveloped country is in the shortage of skilled labor in the latter. When there is a continued net emigration, there is a drain upon skilled labor which tends to be progressive. The causes and mechanism of this movement are a problem that sociological analysis could well study. In a technological age, Maine is ill-prepared for competition when a 1962 study by the National Science Foundation shows that in numbers of scientists per thousand population Maine ranked 43rd among all the states and 6th and last among the New England states [13].

Other symptoms: Maine has more than her share of people 60 years of age and over, less than her share in the age brackets from 25 to 49; the state's proportion of adults who completed one or more years of college is less than the national average; and personal income per capita in Maine for 1961 was the lowest of any state in the Northeast Census Region [3].

Yet Maine is not without resources and not without consciousness of her problems. Since the opening of the 1600's when the English from the fishing banks of Newfoundland pushed in behind the French to establish year-round fishing and fur trading posts along the coast of "the maine" from the Penobscot River southward, the supports for the Maine economy have been what the economists term the primary products of fishing, forest, and soil. Though the economists place these activities within a single category, history belies their compatibility. Following the "roystering and wine-gulling" fishermen came the Puritan merchants of Boston. In 1630 it is estimated that Maine had 400 European inhabitants, Massachusetts 500; in 1770 Maine had 31,000, Massachusetts 235,000 [1, 10]. Over the protests of its colonists Maine had been attached to Massachusetts since 1652 and the dominance of Boston was established. Yet speculative land fever, the demand for lumber in the cities to the southward, and the attraction of fertile patches of loamy soil accessible to river and coast, brought a growing and restive population which attained political independence from Massachusetts in 1820.

In the next 100 years the towns of Maine were faced with great problems and opportunities. The backbone of the economy was the exploitation of the huge stands of first white pine, then spruce, hemlock, and fir which remained in the interior. Lumber, barrel staves, bolts, shingles,

turned spokes and tool handles flowed to market along the Atlantic coast. Hemlock bark brought the tanning industry, with shoe manufactury close following. Shipbuilders supplied Maine hulls for fishing and cargo to buyers at home and abroad. Maine men traded, manned ships, and came home to build the gracious white homes that mark the seacoast towns. In the interior, water power brought the textile industry, attracted labor from French Canada into the twin towns built alongside the falls in the Saco, the Androscoggin and the Kennebec. Under the leadership of John A. Poor, the magnificent deep-water location at Portland became the hub of a rail network, a winter port for Montreal, and a route from Ontario to the Maritime Provinces. The Maine coast drew the intellectual interest of scientists and artists; in their wake would come the wealthy of New York and Boston to establish summer homes on the island and peninsulas from Mt. Desert to Casco Bay, support a local economy of tertiary services [4, 9, 16].

But confronted by both opportunity and accelerated technological change, there was failure in local leadership. Parochialism and inter-community jealousies nullified responsible planning. Derwent Whittlesey made a classic comparison in 1933 of the contrasting social responses made by Lancaster, N. H. and Ellsworth, Me. to changing relationships with a distant metropolitan region [22].

Persons performing the functions of merchants and bankers are the prime movers in shaping the development and form taken by villages and cities. It does not matter whether the economy is socialist or capitalist the functional relationship is the same. And in Maine there was failure in the urban nuclei to overcome the regional colonialism dominated by Boston and New York, to break the economic and political barriers of freight rates and tariffs, to bring meaningful structure to the settlement pattern, and to arrest the interlocking factors tending to a position of relative regional inequality as regards income, education, and man-fashioned landscape. There was political failure too, in neglecting to build upon the common fishery and commercial interests shared with the Canadian Maritime Provinces to strengthen the position of Portland, whose superior geographic location was by-passed by the all-Canada rail route to Halifax leaving today only the pipeline to the Shell refinery in Montreal as witness to John Poor's dream of the 1840's [4].

Fortunately, in the area most important to the future of the Maine economy, there was constructive response to technological change. As the lumber industry began to feel the competition of Wisconsin and Michigan pine, a new industry came into the Maine woods when paper manufacturers first learned (1868-69) to substitute ground pulpwood for

rags as a source of fiber. By the end of the century when the soda and sulphite processes had given the ability to make strong-fibered pulp from wood (principally spruce), Maine was cutting 342,347 cords (872,985 m^3) annually or 17% of the national total. That spruce was the most suitable wood for the existing paper and pulp technology was a happy chance, since the natural white pine areas of southwestern Maine had long since been cut over. By 1962, Maine mills were consuming 2,442,668 cords (6,228,803 m^3) but now only 5·5% of the U. S. total [17,23]. Until 1937, Maine had led the country in pulp production, and in 1962 still ranked 5th in the states. In the period 1937-62 the major expansion has been in the South and Northwest which together now produce 78% of U. S. pulp.

With the heavy investment in plant required by the nature of the pulp and paper process, there was a demand for security in wood supply. This led to the purchase of large forest holdings in Maine by the paper companies and their endeavor to maintain those holdings against the perils of fire, disease, insects, and tax assessments. Their defensive tactics have been highly successful against the first three adversaries, less successful in the matter of taxes. They brought a measure of stability and resource planning to forest management, items sadly lacking in the days of sawmill dominance. The importance of this forest management to the state is evident when we consider that 86% of the land area is classified as commercial forest and of this 23 large companies (the majority being paper companies) own 8,376,000 acres (3,390,000 hectares) or 49% of the total forest land area. State, Federal, and Municipal holdings are slightly over 1% [6].

These paper companies are for the most part integrated corporations operating on a nationwide basis, and even where their original plant location was in Maine competition has forced them into other regions. An example of this latter is the Great Northern Paper Company whose holdings are the largest in the state. Following close behind in size of holdings are International Paper Company with 910,000 acres (368,000 hectares) and St. Regis Paper Company with some 700,000 acres (283,000 hectares).

In the economy of the state, the pulp and paper industry ranks first in value of manufactured product, contributing in 1962 $ 448·2 million or 27·9% of a state total. Other forest dependent industries bring the total to 35·8% [11]. Naturally, the future of the forest is crucial to development planning. A report by the Forest Service of the U. S. Department of Agriculture issued in 1960 gave a timber inventory equivalent to 200 million cords (510 million m^3), and estimated growth as now more than twice current usage. Soft spots were pointed out in overcutting of

sawtimber and low utilization of some species. In general, the report was favorable [6].

Maine's Department of Economic Development was created in 1955 under Governor E. S. Muskie, a democrat and political rarity in the state. On a limited budget it has proceeded to promote Maine resources for industrial, recreational, and agricultural development. Particularly successful has been the growth shown in recreation, when it is estimated that 1,700,000 visitors from out-of-state came in 1962 and contributed $ 287 million to income. It has demonstrated the use of cartography in analyzing the local regions of the state, and it has stimulated towns to prepare and act on plans for local development. In a statewide program, however, the DED has been hamstrung by conflicting interests.

Whether DED activities were instrumental or not, within the past 12 months three major expansions have been proposed:

1. Six paper companies have announced the building of new mills or major expansions, calling for new investment of $ 124 million. These programs have the potential of increasing the consumption of pulpwood by as much as 50% [7]. This is more of an expression of faith in the future of the state than shown by the graduates of the Pulp and Paper Curriculum at the University of Maine, of whom 709 were employed by the paper industry in 1962. Of these only 241 had elected to remain in Maine [19]. Further, this expansion is in the teeth of an Armour Research Foundation report made for the Maine DED which forecast only a modest growth in the pulp and paper industry [15].

2. The allocation of 33,000 acres (13,355 hectares) to Aroostook County by the Department of Agriculture for sugar beet production and the subsequent announcement of a beet sugar processing plant to be erected at Houlton meant that Maine agriculture would receive a boost and an alternative crop to potatoes. Thanks to the Castro regime!

3. The reinstallation of the Passamaquoddy Tidal Power Project by the U. S. Department of the Interior based upon new technical achievements in turbines and high voltage transmission lines called for angry cries from Maine's private power companies and confused reaction among the citizenry. Whatever its economic merits there is no doubt as to its colossal size, with a total estimated cost of $ 1,025·4 million and a potential capacity of 2·5 bilion kwh of electricity a year [21]. It would dwarf France's La Rance project but would come on the line 10 years later. Unless the Maine citizenry demand this project, it will never be built. And Maine citizenry have little access to the facts. Their state university ignores geography as a discipline, prefers to compartmentalize its studies along trade school lines.

Regional development is to important a subject to be left in the hands of the specialist technicians. It is the purpose of geography to see that the right questions are being asked of the technical branches of the various scientific disciplines. "Coordination" and "inter-disciplinary studies" too often bog down for the lack of a graphic, referable framework. Geography and its chosen instrument cartography provides just such a frame.

Alternative paths for Maine development: 1. and unwilling and undirected satellite, subscribing to the recreational and raw material needs of the growing megalopolitan complex to the southward, or 2. as a self--conscious, politically directed region, rationalizing its relationship to U. S. and Canadian economies in a manner to create a landscape and environment that bring pride, not nostalgia, to its native citizenry.

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A sampling of questions arising from the subject of this paper:

1. What is the present and projected balance of payments resulting from an input-output analysis between Maine and the national economy in terms of primary projects, secondary manufactures, and tertiary services?

2. What is effect of transportation rates on competitive location of industry? Power rates? Tax structure?

3. How can political interest in urban communities be stimulated to point of financing such amenities as sewage treatment and off-street parking?

4. How can the conflicting interests be resolved which arise from the disposal of industrial wastes and its effect on fishing and recreational activities?

5. How can Maine best cooperate in inter-regional research in areas most related to her resources, such as wood chemistry, structural wood and stone, fisheries, soils, potato genetics, hydro-electric and atomic power, and application of power to chemical processes related to textiles and leather?

6. How can Maine attract design talent needed in such areas as ship and boatbuilding, furniture, textiles, urban redevelopment, and structural components from wood and stone?

7. What has been the return on new capital investment in different Maine activities and how can it be improved? What is effect of such investment on local economy?

8. How have the locations of power plants been related to the existing markets for power, and how have they extended those markets upon completion?

9. What has been comparable experience of countries climatically and economically similar to Maine, such as Norway and Finland?

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GEOGRAPHIA POLONICA 8, 1965

A NEW MAP OF ECONOMIC ZONES AND REGIONS OF MEXICO

ANGEL BASSOLS BATALLA

The author is a member of the Commission on Methods of Economic Regionalization IGU and this work, presented to the XXth International Geographical Congress, derives from the experiences obtained within the Commission and from cabinet and field work started in 1960.

Due to many factors there are few studies on regional division (even natural division) in underdeveloped countries. In Mexico, since 1945, works of research about agricultural, industrial, communication and other kind of regions were produced. This paper intends to apply modern ideas about economic regionalization, that is, to present in a map the synthesis of many aspects seen from a new scientific viewpoint.

Unfortunately, there are no uniform criteria to define and analyse economic regions. For some people economic specialization must be considered the basic principle (so called homogeneous regions); for others, the economic influence of a city on a given area (nodal regions); yet for others the most important criteria are decisive production relationships and economic branches (complex regions). In some cases, even natural zones are believed to coincide with economic regions and some people think that the existence of industrial enterprises and abundant natural resources are basic conditions for the definition of a given economic region. But everybody assumes that internal economic links, the influence of cities as nuclear points and the role of natural, human and historical factors, are decisive in the integration of economic regions. We consider that zones or regions exist objectively in the world and that man must create adequate methods to know their character and determine the territory they occupy, knowing that limits are never fixed by a strong line but by a belt of land that changes in time and with economic development.

It is necessary to develop a special theory about economic regions in underdeveloped countries of Latin America, because of their peculiar socio-economic conditions which differ from those of industrial countries. It might be very useful to include in that new theory at least three basic

facts: a) manufacturing industry is scarce and it does not determine the existence of regions; agriculture, stock-raising or mining are in many cases the main factors, b) there is great disparity in development between regions that include large cities and the countryside, which is backward and suffers from bad communications and vestiges of feudalism. There are even some "special-regions" of which little is known, which are scantily populated and completely undeveloped economically, c) there is not enough census data and map, that is of those materials which are needed to apply the ordinary methods in developed countries.

Consequently, in order to design this new map of economic regions of Mexico we in the School of Economics, National University, followed special methods: 1. Research during 1961 of all important publications and experiences of Mexican and foreign authors or institutions in economic regionalization. 2. Accumulation of data, maps, books needed for the work. 3. Covering excursions through all economic regions of the country (more than 38,000 km in 3 years) in order to visit industrial enterprises and agricultural areas, cities and communication lines and to check the limits of regions and continue accumulating data *in situ*. 4. On return to the office, the organization of figures and data of the natural, demographic and economic character of each region. Then we proceded to analyse all regions in detail.

We established a hierarchy of units which integrates the country as follows: a) economic zones or great basic regions, b) typical economic regions within the zones, c) economic districts within the regions, and d) subregions and microregions. In this map we only included the division into zones and regions.

As main features to be taken in consideration in the analysis of regions, we have: 1. Natural (topography, climate, soil, hydrography, eventually vegetation). 2. Natural resources of all sorts. 3. National economic specialization and importance in international trade. 4. Internal and external economic connections. 5. General indices of economic development. 6. Population (total, density, urban and rural, economically active, cities). 7. Main data of economic activities. 8. Transport and communications.

The map shows that in Mexico there are at least 8 great economic zones and 107 regions (Fig. 1). The zones take their names from the geographical localization in the country: I. Northwest, II. North, III. Northeast, IV. Southern Pacific, V. West-Central, VI. South-Central, VII. Gulf of Mexico, VIII. Yucatan Peninsula. Some natural aspects are important in delimiting the zones. For example, among the topographical phenomena the West Sierra Madre ranges are important, the East Sierra Madre and the East-West Eje Volcánico to a lesser degree; among those

of hydrographical character, the valleys of important rivers or the lack of them in the Yucatan Peninsula; basic climatological factors. But decisive aspects have always been the demographic (density and types of human activity) and economic (degree of development of capitalism, specialization in branches of production; influence of cities, communications and internal economic ties).

Research has enabled us to verify the great regional differences existing in this underdeveloped country, where 52% of the economically active population are still engaged in rural occupations, but where in recent years a considerable development of manufacturing industries has occurred, a fact that enables those industries to contribute more than 25% of national product in 1962 (35% considering all kinds of industries), as against 20% from rural sector. The Republic is already a country with a wide net of highways, railroads and air communications and large-scale construction in the main cities, such as Mexico City, Guadalajara, Monterrey, Puebla; yet the contrasts among the various zones and regions of the country are very strong and reveal different degrees of economic and social development.

We refer here only to the economic zones of the country in order to show the specialization of production and differences between them. It is important to hint that we try to preserve the territorial unity of States and Municipios, but in some cases this is not possible because administrative divisions do not suit the reality of economic geography.

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The arid Northwest — Sonora, Sinaloa, Baja California, north of Nayarit — specialize in powerful cereal, cotton, tomato, sugar cane, agriculture of a capitalist nature; stock-raising in Sonora, copper mining and salt exploitation, fishing for lobsters and other types.

The North — Coahuila, Durango, Chihuahua, San Luis Potosi, Zacatécas and Nuevo Leon — is a poor interior steppe and semi-desert plain with wide mountainous sectors, where mining is predominant (lead-zinc, silver, iron ore, coal). Several industrial regions exist in Monterrey, Monclova, Nueva Rosita, Parral and there are also agricultural regions — cotton, cereals, vineyards — and livestock regions in Chihuahua, Durango and Coahuila.

In the Northeast — steppes of Tamaulipas and Nuevo Leon without Monterrey — the most important industrial product are oil and gas, with irrigation agriculture and livestock in the third place; export-import operations with the United States play an important role in the economy of this zone.

ECONOMIC ZONES AND REGIONS OF MEXICO

Fig. 1. Economic Zones: I — Northwest, II — North, III —Northeast, IV — Southern Pacific, V — West-Central, VI — South-Central, VII — Gulf of Mexico, VIII — Yucatan Peninsula.

Economic Regions: 1 — Tijuana, 2 — Mexico Vale, 3 — Ensenada, 4 — Vizcaino-Santa Rosalia Desert, 5 — Santo Domingo-La Paz Valley, 6 — Valleys of Southern-Lower California, 7 — Sonora-Caborca Desert, 8 — Nogales-Cananea, 9 — Hermosillo-Guayamas Coast, 10 — Sonora Mountains, 11 — Lower Yaqui Valley, 12 — Lower Mayo Valley, 13 — Lower Valleys of Fuertelos Mochis, 14 — Valleys of Central Sinaloa-Culiacán, 15 — Southern Sinaloa-Matzatlán Valleys, 16 — North Nayarit, 17 — Casas Grandes, 18 — Juárez Valley, 19 — Sierra Tarahumara Mountains, 20 — Central Chihuahua Valley, 21 — Ojinaga Valley, 22 — Parral, 23 — Delicias Valley, 24 — Allende, 25 — Juménez, 26 — Sierra Mojada-Cuatro, Ciénegas Mountains, 27 — Piedras Negras Valley, 28 — Nueva Rosita--Múzquiz, 29 — Monclova, 30 — Sierra Durango Mountains, 31 — Central Durango Valley, 32 — East Durango, 33 — La Laguna, 34 — Saltillo, 35 — Monterrey, 36 — Zacatecas Valley, 37 — North Zacatecas, 38 — El Salado, 39 — Arroyo-Geleana, 40 — Nuevo Laredo-Anáhuac Valleys, 41 — Cerralvo-Sabinas Hidalgo, 42 — China, 43 — Matamoros Valley, 44 — Montemorelos-Linares, 45 — Central Tamaulipas-Victoria, 46 — Jaumave-Tula, 47 — El Mante, 48 — Tampico, 49 — Nayarit Mountinous Valleys, 50 — Bolaños Valleys, 51 — Juchipila Valleys, 52 — Aguascalientes-Pinos, 53 — Central Jalisco-Guadalajara, 54 — Los Altos, 55 — South San Luis Potosi 56 — Guanajuato Mountains, 57 — Valleys of Southern Jalisco-Guzmán, 58 — Chapala-Meseta Tarasca, 59 — Los Reyes-Uruapan, 60 — Lower Guanajuato, 61 — North Michocán-Morelia, 62 — Zitácuaro, 63 — Querétaro Valley, 64 — Querétaro-Cadereyta Mountains, 65 — Central Hildalgo Valleys, 66 — North Mexico, 67 — Mexico-Toluca Valleys, 68 — Mexico Dale, 69 — Sahagún-Calpulalpan, 70 — Morelos-Chiautla, 71 — Tlaxcala Valleys, 72 — Puebla-Izúcar Matamoros, 73 — Eastern-Serdan, 74 — Nayarit Coast, 75 — Jalisco Coast, 76 — Autlan, 77 — Colima-Manzanillo, 78 — Michoacán Coast, 79 — Tierra Caliente, 80 — Grande Guerrero Coast, 81 — Guerrero-Chilpancingo Valleys, 82 — Chica Guerrero Coast, 83 — Upper Mixteca-Tehuacán, 84 — Lower Mixteca, 85 — Chica Oxaca Coast, 86 — La Cañada, 87 — Central Oxaca Valleys, 88 — Oaxaca Isthmus, 89 — Central Chiapas Valleys, 90 — Chiapas-Soconusco Coast, 91 — Huastecas Mountains, 92 — Lower Huasteca-Poza Rica, 93 — Sierra Norte Puebla Mountains, 94 — Papantla--Martinez de la Torre, 95 — Jalapa-Misantla, 96 — Orizaba-Veracruz, 97 — Lower Papaloapan Valley, 98 — Veracruz Isthmus, 99 — Chontalpa-North Chiapas, 100 — Usumacinta-Carmen, 101 — Campeche Coast, 102 — Mérida, 103 — Valladolid, 104 — Tizimin-Chetumal

Special Regions: 1 — Central-Lower Northern California, 2 — Mountainous Isthmus, 3 — Lacandonia, 4 — Central Quintana Roo.

A — Limits of an economic zone, B — Limits of an economic region, C — Borders of states, D — Border of Mexico, E — Special regions

The West-Central — valleys (central and east Jalisco, North Michoacán, Guanajuato, southern Nayarit) are predominantly agricultural with stock-raising. They are densely populated and include isolated industrial cities of León, Guadalajara, Salamanca.

The South-Central Zone (Querétaro, southern Hidalgo, México, Morelos, Tlaxcala, Distrito Federal and various regions of Puebla) is the "heart" of the Republic. The economic region of Mexico City and vicinity (more than 5 million inhabitants) includes the concentration of circa 55% of all Mexican industrial production and more than 25% of the electrical output. We find an important degree of agricultural and stock-rasing development in the high steppe valleys of Toluca, Puebla and Mexico.

Southern Pacific — is a broad tropical-mountainous zone of little economic development, starting in Nayarit coast and extending down to Chiapas to embrace almost the whole of Oaxaca, Guerrero, southern Puebla and Michoacan, Colima and west Jalisco. These are territories of heavy indian and mestizo population, whose economy is based almost completely on agriculture (coffee, corn, tropical fruit-trees) with a bad system of communications and a low standard of living.

The Gulf of Mexico — Veracruz, Tabasco, northern Chiapas, the Huastecas and northern Puebla — produces more than 90% of all oil and gas, but also these tropical and subtropical regions have an important part of the country's production of sugar cane and coffee, cocoa, banana, fruit-trees. This is the only zone in Mexico where water is abundant due to heavy rains in the mountains of Veracruz and Chiapas, and the Tabasco plain. There is also fishing (shrimp and other sorts) in the Gulf. Finally, Yucatan Peninsula is *sui generis* desert in almost all respects, for the land of henequen lies in the north and tropical forests in the south and east, where the predominance of agriculture is absolute and the population has a very low standard of life (similar to that in Southern Pacific).

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We wish to conclude this work by stating that it was not undertaken for pedagogical purposes. We hope that it will be used in the future for economic planning, providing that the new regions which will emerge in the course of economic development are included in time. Thus this map should open the way for a quicker development of the country, based on a scientific knowledge of the territory and the economic reality of Mexico.

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GEOGRAPHIA POLONICA 8, 1965

PROBLEMS OF THE ECONOMIC REGIONALIZATION OF THE SOVIET UNION 1960—1964

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1. In the Soviet Union economic regionalization is not only a method by which complexes of productive forces, economic conditions and economic phenomena, in their territorial diversity, are reduced to order for study purposes. It also, and principally, serves as an important weapon for planning the national economy and the economy of separate areas within the country.

For the guidance of political and cultural life, for the management of industry, construction and agriculture, and for planning the economy as a whole, there has now appeared in the USSR a system of regions and administrative units at four levels. The regions are ranked as follows:

a) the local administrative region and the collective- and state-farm production board, which share the same territorial limits and which were established for the management of agriculture; a town of major importance in an oblast has the same rank as a local region;

b) the *oblast*, *krai* and republic which are parts of economic region; a town which is of major miportance in a republic, but nevertheless subordinate to the central town of a group of *oblasts*, has the same rank as an *oblast;*

c) the economic region, which may be either part of a union republic (e.g. in the RSFSR, Ukrainian SSR and Kazakh SSR) or a union republic itself. These regions have been delimited of the management of industry, (through the economic councils — *sovnarkhozes*) and construction (through territorial construction boards): one city, Moscow, has been established as an independent economic region;

d) the major economic region, delimited as a basis for planning the whole economy on an all-Union scale.

Because the Soviet Union is so large and diverse and has such a complex economy, there are a number of exceptions within the taxonomic

system, and cases where ranks overlap. For example, the Central Asian region is both an economic region and a major economic region and it includes for union republics. The Lithaunian economic region consists of the Lithuanian SSR and Kaliningrad *oblast,* part of the RSFSR. The Moldavian SSR is unique in being the only economic region which is not part of one of the 18 major economic regions.

Science is faced with the task of perfecting this complex four-level regionalization system. Scholars, among them geographers, are being called upon to participate in working out scientific principles for improving the territorial-administrative breakdown of the USSR on a basis of economic regionalization. Thus the principle of the unity of economic and administrative regionalization, put forward during the life of V. I. Lenin, is once more acquiring great significance. At the same time the most vital element is the economic principle of regionalization.

2. In 1960, at the Third Congress of the Geographical Society of the USSR, a symposium was organized on "Economic Regionalization" [15]. Six papers were presented: (1) "The present state of economic-geographic research on the economic regionalization of the USSR", by O. A. Konstantinov, (2) "Problems of general economic regionalization at the present stage", by P. M. Alampiev, (3) "Current problems in the economic regionalization of the USSR", by J. G. Saushkin and T. M. Kalashnikova, (4) "On the economic regionalization of the Ukrainian SSR", by I. A. Kugukalo, (5) "On intra-*oblast* regionalization", by I. V. Komar et. al., and (6) "The role of population geography in problems of the economic regionalization of the USSR", by V. V. Pokshishevsky. During the symposium an interesting discussion developed in which 48 scholars took part, in addition to the main speakers. The substance of the discussion was published in a separate book. A resolution passed by the symposium stated: "Discussion of the papers showed that when differences exist between versions of the economic regionalization of the USSR, work must be based on the following principles: that regions exist objectively, that the long-term prospects for their specialization within the USSR as a whole must be taken into account (the region as a link in the all-Union division of labour), that their development will be many-sided, that technical progress will take place, that the highest possible productivity of materialized labour must be attained, and that account must be taken of the national economic situation". Mention was made in the resolution of "the special importance of developing research towards working out a newtork of major economic regions and setting up co-ordinating bodies in those regions".

3. Science correctly foresaw how the basic processes of economic regionalization would operate in the country. In 1962-1963 a consolidation of economic-administrative regions (as a rule, of those consisting of one *oblast*) occurred. These were changed into economic regions of intra-republic significance. The hundred former economic-administrative regions were reduced to 47 regions, delimited on the economic principle. Groups of economic regions formed major economic regions (at first, in 1961, 17 in number, but now 18). There are a few intra-republic economic regions which are at the same time major economic regions: Volga-Vyatka, Central Black Earth, North Caucasus, and South (Black Sea Coast). The Byelorussian SSR is at the same time a union republic, and an economic region, and a major economic region. The group of Central Asian union republics forms both an economic region and a major economic region. Special mention must be made of the Kazakh *krays* — Virgin Lands, West Kazakhstan and South Kazakhstan — which have powerfully developed economies. They are economic regions, but by their specialization and economic importance they are qualified to be ranked with the all-Union major economic regions.

The economic and major economic regions are now, as a rule, quite clearly defined territorial-production complexes, existing objectively in actual fact and having great prospects for the development of their productive forces. Studies on territorial-production complexes, carried out in the USSR by I. G. Aleksandrov, L. L. Nikitin, N. N. Baransky, V. M. Chetyrkin and, especially, N. N. Kolosovsky, have found concrete expression in the current regionalization system.

4. The all-round development of the productive forces of the Soviet economic and major economic regions required the establishment of bodies to co-ordinate the work of the different branches of the economy and of the territorial units lower down the taxonomic scale. In the economic regions, in addition to the economic councils and territorial construction boards, Councils for the Co-ordination of Economic Development were formed (except in the single-*oblast* and single-republic economic regions, where the republic *oblast* and state planning boards carry out the same function). In 1963, Planning Commissions were formed in the major economic regions. These Planning Commissions set in train a great deal of work on the all-round development of the productive forces of the major economic regions, bringing in a variety of specialists including geographers.

5. So far, the economic and major economic regions have been delimited without changing the territorial boundaries of *oblasts*, *krays* or re-

publics. In a number of cases these boundaries have become outdated and do not fit to the current economic situation or distribution of productive forces. At the present time we can see in action the interesting process of "regionalization from the bottom up", to which V. I. Lenin attached great importance at the beginning of 1920. For example, the Middle Volga region was delimited on the principle that its boundaries should embrace the main petroleum industry area, located between the Volga and the Urals. The region includes the Tatar and Bashkir ASSRs and Kuibyshev *oblast*. But the boundaries of these administrative-territorial units cut across the main oil deposits, and fields being worked have remained outside the Middle Volga region, despite being within its economic sphere of influence. At the present time, the petroleum industries of Orenburg and Perm *oblasts* are under the authority of the Middle Volga *sovnarkhoz*. Conversely, ferrous and non-ferrous metallurgical plants in the mining area of the Bashkir ASSR, located near the boundary with Chelyabinsk and Orenburg *oblasts*, are subordinated to the South Ural *sovnarkhoz*. Thus the factual boundaries of economic regions are changing while the boundaries of administrative-territorial units still remain unaltered.

6. One further problem of economic regionalization is in urgent need of attention — the delimitation of intra-*oblast* economic-geographic subregions, especially industrial regions (industrial nodes or regions where construction is concentrated). It is imperative to delimit such industrial regions and carry out research in connection with the regional plans which are coming into ever greater use in the Soviet Union and in other countries. In addition to the intra-*oblast* subregions, Soviet economic geographers are marking out subregions within the major economic regions. In a number of cases, the boundaries of these latter subregions have been drawn independently of existing administrative-territorial units. The first experiment in delimiting this type of subregion was carried out by V. F. Pavlenko [22], who divided the Central Asian major economic region into eleven subregions, some of which include parts of different republics (the Lower Amu-Darya, Bukhara-Samarkand, Ferganа, Dushanbe and other regions). This is a matter entirely within the competence of science, having at the same time great practical importance. It is evident that the delimitation of economic-geographic subregions, industrial regions and nodes, and regions where construction is concentrated will play an ever-increasing role in planning, especially in regional planning and in forecasting the development of particular industrial nodes and urban agglomerations.

This is true also of agricultural regionalization, which is at present of special importance in the USSR in connection with the policy of intensifying agricultural production. Combinations of branches of agriculture, closely linked with zones of the geographical environment, do not as a rule fit within the boundaries of administrative-territorial units or even of economic regions.

7. The period from 1960 to 1964 has been marked by great activity on the part of Soviet geographers and economists working towards the solution of the theoretical and some of the practical problems of economic regionalization which have been forcing themselves on our attention with ever-increasing frequency.

This activity has been devoted primarily to theoretical questions of delimiting and substantiating major economic regions and working out their long-term development prospects. Much effort has gone towards producing economic-geographic outlines of individual major economic regions.

The basic theoretical problems of economic regionalization have been stated in the works by P. M. Alampiev [2], J. G. Saushkin[30-35], and in the collections of essays "Problems of the Distribution of Production and Economic Regionalization" [26] and "Theoretical Problems of Economic Regionalization" [40]. A special volume of *Voprosy Geografii* (Problems of Geography) was devoted to the long-term development prospects of regions of the USSR [7]. Certain questions of economic regionalization are debated in V. A. Anuchin's book [2], in the collection of essays "Methodological Problems of Economic Geography", in B. N. Semevsky's book [37], in A. I. Probst's book [27] and in an article by J. G. Saushkin [35].

Two books are devoted to the major economic regions of the USSR: that by L. N. Telepko [39] and "Geographical Problems of the Development of the Major Economic Regions of the USSR". The process by which economic-administrative regions are being consolidated and a network of economic regions formed is treated in a booklet by J. G. Saushkin [33]. A. I. Vedishchev's book [41] gives the main features of the major economic regions.

Research on inter- and intra-regional economic ties has received much attention in the Soviet scientific literature. Problems of the development of transport and economic regionalization are becoming ever more closely interwoven. Among the works on this topic one must mention above all the monograph by J. I. Koldomasov [13], the relevant volume of *Voprosy Geografii* [8] and the small but nonetheless interesting collection of essays "Problems of Economic Ties and Transport" [25].

Of the monographs devoted to particular major economic regions, among the most important methodologically are those on the Central [5], Volga-Vyatka [16], East Siberian [43], and Northwestern [38] regions.

New quantitative, mathematical methods are becoming ever more widespread in economic regionalization and in the analysis of inter- and intra-regional production ties. Soviet economic geographers are greatly interested in the work of the Regional Science Association and are evolving methods of modelling regional production complexes, taking into account also the contribution of economists to the problem of modelling regions and applying mathematical methods to the distribution of productive forces.

In recent years the theory of economic regionalization has been successfully linked with the theory of the development of industrial regions (nodes) and with the theory and practice of regional planning. V. G. Davidovich set out in broad terms the problem of the formation of industrial nodes [6]. Then articles appeared by S. I. Pomazanov [23], V. N. Gorlov., J. G. Saushkin and J. A. Trofimovskaya [11], S. P. Ivanow [12], J. F. Zolotarev [44] and other geographers. The question of studying industrial concentrations has also been raised in a booklet by J. G. Saushkin [31]. Many years' work on regional planning has been summed up in D. I. Bogorad's book, in the essay collection "Problems of Regional Planning" and in other publications. Regional planning methods are expounded in the book "Regional Planning of Economic-administrative Regions, Industrial Regions and Nodes" [29].

A great many theoretical and practical works have been devoted to the agricultural regionalization of the USSR as a whole and also to particular parts of the country. Outstanding are the works of A. N. Rakitnikov [28], which he himself has recently summarized, a work by I. F. Mukomel [18], the volume of *Voprosy Geografii* [24] devoted to the topic, and collections of works on the agricultural regionalization of the Central Black Earth Region [9] and of Samarkand and Bukhara *oblasts* [1].

8. The correctness of theoretical propositions in the field of economic regionalization is tested by the practical work of developing and distributing productive forces, and this testing process takes a long time. Now, ten years after the death of N. N. Kolosovsky, his tremendous contribution to the theory of economic regionalization can be seen with ever-increasing clarity. His method of energy-production cycles is coming to dominate not only economic geography, but also planning, regional planning and transport. There is no indication that discussion of N. N. Kolosovsky's views is fading out of Soviet literature. Critical observations have come from P. M. Alampiev, A. J. Probst, L. N. Telepko and certain

other scholars. On the other hand J. I. Koldomasov [13] in his study of inter-regional transport ties, and many people at the Institute of Complex Transport Problems base their work on Kolosovsky's theoretical propositions. An interesting theme was followed up by I. V. Lasis in his article "Towards the Evolution of a System of Regional Production-Territorial Complexes in the USSR, using the Method of Energy Production Cycles". He compared N. N. Kolosovsky's scientific forecasts (made in 1947) with the economic reality of 15 years later (1962). The accuracy of those forecasts is astonishing, there could be no better vindication of Kolosovsky's theories. The most important service rendered to science by Kolosovsky consisted in the fact that he, basing his work on the scientifically established truth of the objective existence of economic regions, discovered the laws of the development of economic regions and of their territorial-production complexes. He made the study of economic regions an exact science to which, in particular, mathematical research methods are fully applicable. In doing so, Kolosovsky spoke out strongly against voluntarism in economic regionalization, which was making itself felt in various guises both in theory and in practice. His point of view on the choice of the optimum version of regionalization is now being confirmed in the solution by mathematical methods of problems of optimum choice.

9. During the recently-concluded Fourth Congress of the Geographical Society of the USSR, a number of papers on the economic regionalization of the country were examined at meetings of the symposium "Basic Problems in the Economic Geography of the USSR". These papers were: (1) "Scientific foundations for a long-term general plan for the distribution of productive forces in the USSR", by N. N. Nekrasov, (2) "Transport and the formation of economic regions", by I. I. Belousov, (3) "Agricultural regionalization", by A. N. Rakitnikov and I. F. Mukomel', (4) "Ways of attempting to build economic-geographic models of regional territorial-production complexes", by J. G. Saushkin et. al., (5) "Problems of improving the regionalization of production and the utilization of industrial output", by I. G. Feigin, (6) "Geographical bases of regional planning", by J. N. Pertsik, (7) "Geographical aspects and problems of the industrialization of Siberia", by V. A. Krotov. Discussion of the papers was very constructive and gave indications of a successful start in the application of various exact methods to the solution of problems of economic regionalization. Four years ago the main problem before us was to work out a network of economic regions for the country. That problem, while it has not yet entirely vanished, no longer stands in the foreground. The main task now is to work out a general scheme for the development and distribution of productive forces on the basis of economic regions

and of power-industrial and industrial-agricultural complexes. In connection with this the distribution by regions and complexes of the rapidly growing chemical industry and of energy production are of particular importance, and the problem of constructing a territorial model of the national economy of the USSR on a regional basis, which was first put forward in 1964 by N. M. Budtolayev, V. P. Novikov and I. G. Saushkin has assumed major significance.

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GEOGRAPHIA POLONICA 8, 1965

MODÈLES GEOGRAPHIQUES POUR LE BASSIN DU SEBOU (MAROC)

HUBERT BEGUIN

La mesure de données et de relations du monde rural est impérieusement exigée par la nécessité d'établir des programmes de développement agricole. Il en est ainsi des relations géographiques d'interdépendance entre population agricole, niveau de vie, superficie occupée, type d'agriculture, potentialités du milieu naturel. Ces relations peuvent s'exprimer sous la forme de modèles géographiques. Ceux-ci ne permettent pas seulement la mesure. Ils expriment aussi sous une forme concise et synthétique les mécanismes d'interdépendance entre facteurs. Ils servent donc la connaissance géographique aussi bien que ses applications pratiques. C'est ce que voudrait montrer cette communication en prenant pour exemple une tribu du bassin du Sebou, les Tsoul.

ELABORATION DU MODÈLE

Les Tsoul occupent un territoire de collines marneuses de 524 km². Ils sont 51 000, presque tous occupés dans l'agriculture (9800 ménages agricoles). Près du quart du pays est impropre à l'agriculture, laissant 402 km² de terres cultivables dont 361 km² sont effectivement exploités (jachères comprises) et 41 km² restent à utiliser. Dans ce qui suit, on se limitera à l'examen des activités agricoles: cultures annuelles et arbustives.

Les statistiques agricoles donnent les superficies des diverses cultures et leurs rendements. L'enqête sur le terrain montre comment ces cultures se combinent en rotations, entre elles et avec la jachère.

Convenons de définir le potentiel d'une étendue donnée comme la production annuelle d'une unité de surface soumise à une rotation et à une technique agricole déterminées. Désignons le potentiel par le symbole V. Il est déterminé par le quotient de la production nette (P: exprimée en dirhams-DH) de toutes les cultures d'une rotation pratiquée sur

une surface unitaire, par la durée de cette rotation (années de culture et de jachère : $c+j$):

$$V = \frac{P}{c+j}$$

Dans ces conditions, l'agriculture des Tsoul peut être caractérisée par le tableau (Tableau 1).

Le potentiel moyen (V) de cette agriculture se calcule aisément: il est la moyenne des potentiels caractérisant chaque rotation, pondérée par les surfaces correspondantes. Dans ce cas, on trouve $V = 88$.

TABLEAU 1. CONDITIONS D'AGRICULTURE DES TSOUL

Cultures et rotations	P (DH)	$c+j$	Potentiel V DH/ha	Surfaces soumises à ces rotations (km²)
Oliviers	339	1,1	308	20
Autres fruitiers	222	1,1	202	12
Cér. + Lég. al. (rend. élevés)	248	2	174	8
Cér. + Lég. al. (rend. moyens)	244	2	122	44
Cér. + Lég. al. ou Orobe (rend. bas)	220	2	110	40
Cér. + Lég. al. ou Orobe + Ja.	240	3	80	42
Cér. + Sorgho + Ja.	170	3	56	30
Cér. + Ja.	88	2	44	130
Cér. + Ja. (rend. très bas)	64	2	32	35
				361

(Cér. = céréales d'hiver Ja. = jachère rend. = rendements Lég. al. = légumineuses alimentaires, fèves principalement)

Le potentiel moyen (V) multiplié par la superficie à laquelle il s'applique (s) donne la masse du produit agricole net. C'est cette masse que se partagent les 9800 ménages agricoles (p) et qui leur procure un revenu net par ménage u. Ainsi on peut écrire:

$$s \cdot V = p \cdot u \tag{1}$$

Dans le cas des Tsoul, on a : $36\,100 \cdot 88 = 9800.u$ d'où l'on tire la valeur du revenu agricole moyen par ménage : $u = 324$ DH.

Mais le potentiel n'est pas une grandeur fixe. Il varie considérablement dans l'espace selon le type de sol et selon la rotation. Cette variation géographique peut se représenter graphiquement. Pour ce faire, il faut admettre l'hypothèse que voici: les gens occupent d'abord les surfaces susceptibles de hauts potentiels et ne s'adressent aux terres médiocres qu'à mesure que la pression démographique les y contraint. Dès lors, les variations du potentiel en fonction de la surface occupée peuvent être représentés par une courbe qui reflétera la situation actuelle;

en abscisse on portera les superficies occupées tandis que les potentiels correspondants seront portés en ordonnée. Cette courbe expérimentale pour le pays des Tsoul est représentée ici (Fig 1). Son allure suggère

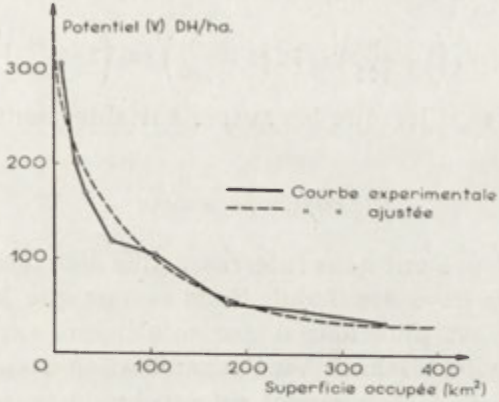

Fig. 1. Courbe expérimentale pour le pays des Tsoul

qu'une parabole peut y être ajustée. Quelques itérations conduisent à la courbe ajustée suivante: $V = 357 + \frac{5}{6} s - 33s$

Par conséquent, le potentiel moyen (V) varie avec la surface (s) de la manière suivante:

$$V = \frac{\int_0^s v \cdot ds}{\int_0^s ds} = 357 + \frac{5}{12} s - 22s$$

En y remplacant V par sa valeur, la relation (1) appliquée au pays des Tsoul devient:

$$s\left(357 + \frac{5}{12} s - 22s\right) = p \cdot u \tag{2}$$

Cette relation permet de trouver la superficie nécessaire à une population donnée pour un revenu net par ménage déterminé.

Le modèle peut aisement devenir dynamique et integrer le facteur temps. Ainsi, si la population augmente de k % l'an et que la croissance souhaitée du revenu individuel est de m % l'an, l'étendue nécessaire pour réaliser ces objectifs sera donnée par la relation:

$$s\left(357 + \frac{5}{12} s - 22s\right) = P_o\left(1 + \frac{k}{100}\right)^t \cdot u_o\left(1 + \frac{m}{100}\right)^t \tag{3}$$

où t s'exprime en nombre d'années.

Cependant, si la surface cultivable vient à être limitée, s devient une constante s_i à laquelle correspond un potentiel moyen donné V_i. A par-

tir de ce moment, les objectifs fixés au revenu d'une population en expansion ne peuvent plus être atteints que par une modification des techniques agricoles susceptibles d'imprimer à V une croissance selon un taux donné (soit n % l'an). Dès lors, le modèle devient:

$$s_i \cdot V_i \left(1+\frac{n}{100}\right)^t = P_o \left(1+\frac{k}{100}\right)^t \cdot u_o \left(1+\frac{m}{100}\right)^t \qquad (4$$

Il permet de trouver n lorsque les autres variables sont connues.

Utilisation du modèle

Nous pouvons à présent nous intéresser plus concrètement au développement agricole du pays des Tsoul. Nous savons que la superficie cultivable (402 km²) n'est plus loin d'être totalement exploitée puisqu'elle l'est à concurrence de 361 km². Vu l'augmentation actuelle de la population agricole (2,2% l'an), le moment est proche où toute la surface cultivable sera utilisée. A partir de ce moment, pour éviter une diminution du revenu par ménage, il faudra inévitablement accroître le potentiel moyen. Cet accroissement ne s'obtiendra que moyennant un certain coût dont il est utile de prévoir l'ordre de grandeur. A ce propos, celui qui a la charge d'établir un programme de développement peut se poser plusieurs questions. Quand sera occupée la totalité de l'espace cultivable? A quel rythme faudra-t-il accroître le potentiel moyen pour maintenir le niveau de vie actuel? Pour l'augmenter de tant par an? Le modèle établi fournit une réponse à ces questions.

Pour connaître la population maximum que peut faire vivre la région sans modification du système de culture et sans abaissement du revenu net par ménage, il suffit de remplacer s par la valeur de la superficie cultivable (40 200 hectares) dans la relation (2) et u par 324 DH. Il vient:

$$40200 \left(357+\frac{5}{12}\,402-22\;402\right) = 324 \cdot p; \text{ ou } 40200 \cdot 84 = 324 \cdot p$$

d'où: $P = 10\,422$ ménages soit 6% de plus qu'actuellement. Le potentiel moyen sera à ce moment de 84. Au rythme actuel d'accroissement de la population, toute la superficie sera exploitée avant 3 ans. A partir de la quatrième année, seule une hausse du potentiel moyen pourra assurer au cultivateur un revenu qui ne diminue pas.

On touche du doit un aspect essentiel du développement agricole des zones densément peuplées: si on désire éviter la diminution du revenu par tête d'une population agricole en expansion démographique, il est indispensable de réaliser des investissements destinés à accroître le potentiel en dehors de toute considération relative à la rentabilité propre

de ces investissements. C'est ce qu'on peut appeler le coût de la densité de la population [1]

D'autre part, il est possible de déterminer le taux de croissance à imprimer au potentiel moyen pour atteindre les objectifs de revenu que l'on se fixe. Ainsi, si on désire que le revenu par ménage augmente de 2,2% l'an (comme le population), l'application de la relation (4) permet de calculer l taux de croissance n du potentiel moyen. En effet:

$$40\,200 \cdot 84 \cdot \left(1+\frac{n}{100}\right)^t = 9800 \cdot (1{,}022)^t \cdot 324 \cdot (1{,}022)^t$$

ou

$$\left(1+\frac{n}{100}\right)^t = \frac{(1{,}044)^t}{1{,}063}$$

qui donne n pour n'importe quelle valeur de t. En pratique, t prendra une valeur correspondant à la durée du plan. Ou encore la valeur correspondant à la période durant laquelle la population agricole continuera de croître avant d'atteindre son maximum au-délà duquel le développement économique non-agricole sera capable d'absorber le croît démographique. Si, par exemple, $t = 20$ ans, on trouve $n = 4{,}1\%$ l'an. Si l'on estime que le revenu moyen par ménage restera inchangé, on trouve $n = 1{,}9\%$. Grâce à la réserve de terres cultivables, ces taux sont inférieures à ce qu'ils seraient sans cette réserve (4,4% et 2,2%).

Si l'action en vue d'accroître le potentiel moyen avait pu être entamée il y a 9 ou 10 ans, lorsque les Tsoul comptaient seulement 8000 ménages agricoles, elle eût été aisée. En effet, la période à envisager pour arriver au même terme eût été de 30 ans. Dès lors, si population et revenu doivent augmenter de 2,2% l'an, on écrit:

$$40\,200 \cdot 84 \cdot \left(1+\frac{n}{100}\right)^{30} = 8000 \cdot 324 \cdot (1{,}044)^{30}$$

ou $\left(1+\frac{n}{100}\right)^{30} = \frac{(1{,}044)^{30}}{1{,}303}$ d'où $n = 3{,}5\%$ l'an contre 4,4% sans réserves de terres.

Si l'objectif ne prévoit que le maintient du niveau de vie, on trouve $n = 1{,}3\%$ contre 2,2% sans reserves de terres. Encore faut-il ajouter que les investissements à réaliser pour atteindre ces taux s'appliquent à des surfaces d'autant plus petites que l'on s'y prend tôt. On mesure donc tout l'intérêt qu'il y a à entamer au plus tôt un programme de développement agricole. Les modèles ci-dessus peuvent constituer la base d'une mesure de ce que l'on gagne à agir vite et de ce que l'on perd à laisser prendre, sans agir, les quelqeus réserves de terres cultivables encore inexploitées.

[1] Notion qui sera développée ailleurs.

Conclusions

1. Des phénomènes géographiques peuvent être présentés sous la forme concise et synthétique de modèles qui permettent la mesure des interdépendances.

2. Cette forme permet de donner la mesure des efforts à consentir pour le développement agricole futur.

3. Cette forme permet à des relations de nature géographique de voir leurs conséquences mesurables en termes économiques.

4. A celui qui doit décider d'invester, cette forme explicite un argument qui va au-délà de la notion habituelle de rentabilité: celui du dépassement de la densité de population critique.

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