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57

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**The collection of studies presented to
Professor Jerzy Kostrowicki
in commemoration of his seventieth birthday**

**Edited by
Piotr Korcelli and Wiesław Rożucki**

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INTERNATIONAL GEOGRAPHICAL COLLABORATION: ACHIEVEMENTS AND PROBLEMS. AN APPRECIATION OF THE CONTRIBUTION OF PROFESSOR JERZY KOSTROWICKI

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I

In writing a paper to assist the celebration of Professor Jerzy Kostrowicki's 70th birthday I cannot exclude a personal approach. We are of the same generation. We have been friends for 30 years. I have been welcome in his home in Warsaw as he has been in mine in London. We have worked closely together in the work of the International Geographical Union and the International Social Science Council. He is an Honorary Corresponding Member of the Royal Geographical Society of London and I am very proud to be an Honorary Member of the Polish Geographical Society. Our collaboration in the tasks of the International Geographical Union has been work between friends. At the Barcelona Regional Conference of IGU in 1986 we found ourselves fellow speakers in a symposium on "Life experience and the practice of geography". I listened with admiration and respect to his recollections of early times of great difficulty, of his survival and of the re-making, after the years of war, of intellectual life and achievement, and of years of progress in the study of geography.

When, in 1979, George Kish produced his *Bibliography of International Geographical Congresses 1871–1976* he sent me a copy inscribed by his own hand with the words "remembering our years in the vineyard". These words, which he probably repeated in some similar form in copies sent to other friends, gave me great pleasure and have caused me, then and since, to reflect upon the contributions of others in "the vineyard" of international geography. The name of Jerzy Kostrowicki has figured large in those reflections.

It seemed to me to be timely, on the occasion of his 70th birthday, to recall some important features of his work for international collaboration especially through the IGU. Successful international research efforts depend very much upon the initiative and energy of individual scholars willing to give their time to the organisation of scientific efforts, to inspiring a commonality of effort from colleagues in different lands and from varied traditions.

The tasks of overcoming barriers of distance and language in pursuit of common aims requires determination and patience as well as the ability to appreciate points of view arising from traditions other than one's own. Such work gives meaning to the internationality of science and bring results to be found not only in geographical progress but also in wider international understanding. Professor Kostrowicki is an example of a scholar who, like many others, has found great satisfaction in such endeavour.

II

Kish's Bibliography provides a starting point for discussion of Jerzy Kostrowicki's early contributions to international geographical scholarship. The first entries date from the 18th Congress of 1956 in Rio de Janeiro when he was joint author of two papers, one (with K. Dziewoński) on "Detailed land use survey in Poland", and a second (with S. Leszczycki) on "The contribution of geography to land use planning in Poland". It is worth recalling, in the context of the titles of these papers that Kostrowicki had studied earlier in 1947–1948 at the London School of Economics and Political Science where L. Dudley Stamp gathered students from many parts of the world to take up research in land use surveys and their applications to planning problems.

At the Stockholm 19th Congress in 1960 his contribution was on "Land utilisation survey as a basis for a geographical typology of agriculture", thus introducing the idea of typology into the field. This was developed at the 20th Congress in London in 1964 in a paper on "A geographical typology of agriculture: principles and methods", and at the 21st Congress, New Delhi, on "Agricultural typology, agricultural regionalisation and agricultural development", showing a further development of interest and theme.

At the 22nd Congress, Montreal, 1972, Kostrowicki widened the scale of his work with "A preliminary attempt at a typology of world agriculture", and this was followed at the 23rd Congress, Moscow, 1976, with a paper on "Types of world agriculture" as well as his Report on "The activity of the IGU Commission on Agricultural Typology" of which he was the Chairman. By the time of the 24th Congress, Tokyo, 1980, his interest had shifted on to work for "The map of types of agriculture for Europe", maps which, of course, have now been published (Kostrowicki 1984, 1986).

Further work was presented at the 25th Congress, Paris, 1984 including the Types of Agriculture Map of Europe. The IGU Regional Conference in Barcelona 1986 heard from him on the subject of "Agriculture of Mediterranean Europe: the transition from traditional to market-orientated agriculture" as seen from that map.

III

Such a listing of papers given at International Geographical Congresses is, however, only a simple indicator of Kostrowicki's contribution. The quality of his work was quickly recognised, as was his willingness to participate in international collaborative work, and he was appointed in 1956 to membership of the Union's celebrated Commission on a World Land Use Survey. That Commission, it will be recalled, had been formed at the Lisbon Conference, 1949, under the chairmanship of Professor Samuel van Valkenburg (USA) with Professor Hans Boesch (Zurich), Professor Pierre Gourou (Brussels), Professor L. Dudley Stamp (London) and Dr Leo Waibel (then of Brazil) as members. The Commission's first Report had recommended the inauguration of a world organisation under the auspices of IGU "to record the present use of land in all parts of the world on a uniform system of classification and notation with such amplification as might be necessary locally; and to secure publication of the results including maps and memoirs" (van Valkenburg 1950; Stamp 1960). The programme was ambitious but considerable progress was recorded. At the Congress in Rio de Janeiro, 1956, it was decided to re-organise the Commission "so as to make its coverage world-wide". Stamp became Chairman, Jerzy Kostrowicki and Henri Gaussen (Toulouse) became members. In addition to participating in the general work of the Commission, Kostrowicki took on a special role in investigating the state of land use studies in East-Central Europe and the USSR and, no doubt wherever possible,

encouraging their development. His report, concise and informative, of 1960 showed that no relevant studies had been made in Albania, Bulgaria and Hungary. There were no land use surveys as such for Czechoslovakia though "geonomic" maps and generalised maps of the natural bases for agricultural development had been made. For the German Democratic Republic there was an agricultural atlas published in 1956. Progress in Poland was reported on: an early start in 1946 on the model of the British Land Utilisation Survey had given place, with the organisation of the Institute of Geography, Polish Academy of Sciences, to a new survey, under the direction first of K. Dziewoński and later of J. Kostrowicki, with practical as well as scientific objectives. Whilst, in general, the IGU Commission's scheme was being followed, such divergences and many additions had been made to reflect the conditions and needs of the country. There were short reports on work in Roumania and on encouraging progress in Yugoslavia. A somewhat fuller report on approaches to and achievements in land use studies in USSR completed the Report. Two aspects of this report call for comment. First much was clearly being done to carry out research in Poland and to encourage work on land use studies in the wide region concerned: secondly, the report had an informative value which extended far beyond those immediately engaged in the work of the Commission. Indeed, the task of disseminating the results of work undertaken by those working within a country or region to a world-wide audience is an essential task for the Union.

As a further report published in *IGU Bulletin XV*, 1964, shows, progress continued. A conference of geographers involved in land use studies in East-Central and Eastern Europe was held in 1960 (*Geographical Studies*, 31, Warsaw 1962). Polish workers were active in making sample surveys and in disseminating methods through visits and exchanges to and with Bulgaria, Yugoslavia, Czechoslovakia, Hungary, Roumania and USSR. There was now more to report on Bulgarian work, on energetic work, for example, in Yugoslavia and Hungary as well as in Poland. More workers now emerged in field and cartographic work in the study of land use.

At the second land use conference held in Budapest in 1964, a regional sub-commission for East-Central Europe had been established, with Kostrowicki as chairman. Aims for the four years work and a uniform land use map for the whole of East-Central Europe was adumbrated. The volume *Land Utilization in East Central Europe, Case Studies* appeared in 1965 as an example of possible investigation.

Dudley Stamp's death in 1966 was a great blow to the work of the Commission and, indeed, to international collaborative work generally, but, under the chairmanship of the late Dr. Hans Boesch, activity continued and indeed developed, especially in advisory work on land use surveys.

It was at about this time that the idea of studying agricultural typology as well as land use, began to assume prominence.

The development of those studies in East-Central Europe was carried forward a further stage at the 3rd Conference on Land Use held by East-Central European Geographers at Maribor, Yugoslavia in October 1969 (Kostrowicki 1970). In addition to reports on further progress in land use studies and mapping, an important resolution was made to extend the sub-Commission's work in the field of agricultural typology and indeed to re-name it as the "Sub-Commission on Land Use and Agricultural Typology". A first task in this connection was the devising and testing of common criteria, methods and techniques; agricultural typologies for each of the member countries and for the whole area could then be produced.

Jerzy Kostrowicki remained a member of the Commission on the World Land Use Survey until, in 1972, the Union judged that its main work had been accomplished. However, as has been indicated, for some time previously, the concept of agricultural typology had been becoming increasingly active in his thinking.

IV

Largely, I think, at Kostrowicki's suggestion, a Commission for Agricultural Typology had been established at the London Congress, 1964, and he was appointed Chairman. In the context of the changes in geographical thinking taking place at this time this was an appropriate move. The subject was becoming more specialised, in its investigations. The need was recognised for a deeper insight into problems and for stronger explanatory power. The use of quantitative techniques provided opportunities to measure distributions more exactly, to examine precisely degrees of correlation, to classify, to apply tests to hypothesised statements. There was an increasing interest in model building. At the same time the value of earlier synthetic approaches to regional studies was under question. Each of the specialised sub-disciplines had to draw for its explanations upon aspects of the physical and the human environment.

In terms of land use studies, while fact finding and surveys were still required, new developments were seen in terms of stronger explanations of the distributions noted and described. More attention was due to the nature of agriculture itself, to the systems of organisation in operation in different areas, to the influence of land and farm ownership, to the economic factors involved and to the decision-making processes of governments, purchasing organisations and farmers themselves. The geography of agriculture grew in importance as one of the main sub-disciplines of economic geography.

Kostrowicki's reaction, so far as it is possible for a friendly and interested observer to judge, was to move towards a typological approach. Here was, at least in part, an alternative to traditional regional geography, and certainly an avenue for advance in agricultural geography. A typology was a form of classification not distributed into *a priori* categories but allowing groupings to be made of individuals or phenomena "according to their similarities around sets representing the most common (typical) occurrences" (Kostrowicki 1977). Such an approach could lead to a clearer understanding and interpretation of reality and could provide opportunities for application in planning and policy making.

So the first task of the new Commission, in which Kostrowicki was joined by members from USA, Ghana, USSR, Australia and Japan (there were to be later changes in membership), was to establish criteria, methods and techniques to distinguish types of agriculture. It is possible to follow the Commission's work through its Reports published in the *IGU Bulletin*. Methodological problems occupied much thought. How best could indices be combined representing various agricultural characteristics such as intensity of agriculture, land and labour productivity, degree of commercialisation etc? There were conceptual problems in clarifying notions of land utilisation systems, land use combinations, farming systems to name only some. Sample studies were undertaken to test the criteria and methods proposed. An outline typology of world agriculture was to be worked out. Regional studies in individual countries could serve as a basis for a multi-level world typology. International enquiries were set in train and questionnaires issued.

The interest aroused by this project was well demonstrated at the meeting of the Commission in Verona in 1970. Over 60 persons representing 18 countries as well as FAO took part and 39 papers were advanced. Some agricultural economists joined the discussions. The titles of the papers, printed in *IGU Bulletin XXII*, 1971, give a clear indication of the nature of the discussions and it may well be seen how students of the geography of agriculture were responding to the wider changes in geographical studies briefly referred to earlier. Also worthy of mention in connection with the Verona meeting was the discussion of the use of typological methods in the investigation of agricultural development.

Another point of general interest emerging from the Commission's work at this time is the attempt both to work out a typology on the world scale and to continue regional

studies in order to test the proposed criteria and techniques against the varied conditions of different countries. It was hoped to organise a number of regional sub-commissions to facilitate such studies. The meeting held at Pecs, Hungary, after the IGU Regional Conference, Budapest, 1971, served both to advance this programme and to prepare a scheme of work for 1972-76 (Kostrowicki 1972). Forward thinking is an essential attribute of a successful Commission.

The Second Verona meeting of 1974 agreed to devote the years 1974-76 to the compilation of maps of individual countries and their cartographic presentation and to the completion of bibliographical work (Kostrowicki 1975). The Commission report for 1976 (Kostrowicki 1976) contains more information on which its work can be assessed. By 1976 the Commission was coming to the end of its work. Basic principles of, and a methodology for, agricultural typology had been agreed, a list of criteria had been prepared and a scheme made for world agricultural types.

Together with the studies published in *Geographia Polonica*, 40, 1979, it is possible to form a view on the success of the Commission's work. While it had not been possible to produce the finished world map, a great deal of stimulus had been applied to work in the field of study. Eight successful meetings had been held. Members from as many as 45 countries had attended. Agreement had been reached on a list of 27 variables that could be employed to characterise a type of agriculture and a world hierarchy had been evolved. The value of quantitative techniques had been appreciated and suitable methods evolved. Grigg (1981), while regretting that rather little interest in the work had been shown in Britain, referred appreciatively to the Commission's achievements, making particular mention of the studies specific to countries, notably France and Canada. The relevant literature had been documented. Active co-operation had been maintained with the Food and Agriculture Organisation of the United Nations. Suggestions for future work had been advanced and active international inter-communication and debate had been promoted. Not all the credit for the progress achieved must be given to the Chairman. As he himself wrote (Kostrowicki 1979), the members of the Commission had been active, as had corresponding members in a number of countries: at the same time, it is apparent that it is hardly possible for a Commission to achieve this degree of success without a vigorous, practical and purposeful Chairman with his heart as well as his mind engaged in the benefits to be derived from international collaboration. He has continued to work and the publication of the map of types of agriculture in Europe 1984 is a signal achievement.

It had been intended to continue work on agricultural typology within the terms of reference of other, newly formed, Commissions, and for a time after 1976 Kostrowicki acted as Chairman of the new Commission on Agricultural Productivity and World Food Supply. But an increasingly heavy load of administrative duties in his own country forced him to relinquish this task.

This gives point to a note of the problems and constraints under which the IGU Commissions operate. The Union, though in size the largest of the members of the International Council of Scientific Unions, is also one of the poorest and very small funds only are available to its Commissions and Working Groups. Governments, national academies and others who, in individual countries, support international research and co-operation in geography are not conspicuously generous, sometimes not even reliable, in their funding. While some help is available from international organisations, like UNESCO, their budgets are limited and advance planning is needed to get good projects entered into their forward planning. In recent years (too recent for the Commission on Agricultural Typology) co-operation with the United Nations University, based in Tokyo, has been immensely helpful to some geographical commissions and groups. It is also to be regretted that while many business organisations and national research bodies are willing to support intra-national research projects, their interest does not often extend beyond national boundaries.

Some argue that, in these circumstances of limited financial support, it is best for the IGU to limit stringently the number of its commissions and working groups and to give rather more substantial help to a few activities. I think not. The quality of IGU funding is so small that little practical difference would ensue. No Commission would, even if that policy were to operate, have enough money to establish an adequate research centre and to employ full-time research workers. No, the work of the Commission under review, demonstrates clearly how well, despite inadequate IGU funding, international co-operation can flourish: how successfully those who are interested (and very many were) can extract funding from national and local organisations to enable them to attend Commission meetings and to make their own invaluable contributions. What is centrally important to a body such as IGU, devoted to advancing international co-operation, is to recognise good projects and to encourage those who put them forward and who are willing to give time, always in the midst of busy administrative, teaching and research lives, to international research and discussion. The Union must, of course, press its case for better funding: it must also continue to encourage enterprise in international research whenever good projects arise. This is not to say that it should not apply high critical standards in accepting projects: it should also develop its evaluation procedures, but "encouragement" rather than "limitation" should be its watchword. In this respect the experience of the Commission on Agricultural Typology should stand as an example of what can be done.

V

There is more yet to be said of Professor Kostrowicki's contribution to international scientific collaboration. His experience in the work of two IGU Commissions, his high international standing, his personal knowledge of geographers and their work gained from visits to universities and organisations in so many parts of the world, his widely recognised powers of judgment, were major factors leading to his election as a Vice-President of the International Geographical Union for two periods 1976-80 and 1980-84. Such an appointment is more than an honour: it requires continued application to the work of the Union and careful oversight of a number of Commissions and Working Groups. During his time as a member of the Executive Committee much time was given to problems relating to the organisation of Commissions and Working Groups: Jerzy Kostrowicki, from his great practical experience, played a full part in this task.

But there was still more to be done. In 1976 IGU secured admission to the International Social Science Council and he was a clear choice as one of the Union's representatives. Soon his contributions were to earn election for him as Member of the Executive Committee, a post which brought new duties in its wake, especially to present a geographical approach to international socio-economic problems as well as to encourage interdisciplinary investigations. As a representative of the IGU in 1982 he was also elected to the Executive Committee of the Scientific Committee on Problems of the Environment (SCOPE).

He also worked hard, if with less success than he hoped, to foster both geographical and inter-disciplinary approaches in the activities of the Commission for Application of Sciences to Agriculture, Forestry and Aquaculture (CASAFA) established in 1978 by ICSU (Kostrowicki 1981).

Another aspect of international collaboration in which Polish geographers have taken a leading part is the organisation of seminars with geographers of another country. I have already written (Wise 1977) of the origin of the Anglo-Polish seminars, the first of which was held at Nieborów in 1959, and of the pleasure and profit which these seminars have brought, and still bring, to British colleagues. Professor Kostrowicki has been a leading spirit in maintaining and developing a tradition which was initiated by Professor Leszczyki and others. His contribution to the first seminar, on

“Polish Land Utilisation Survey” (Kostrowicki 1961), while providing a report on the scope and progress of research at the time, also made the important point that, while based on the same principles as the British Land Utilisation Survey, it was necessary to adapt tasks, methods, degree of detail to meet the different conditions found in Poland and the particular requirements of a planned economy. Comparison was also made with land utilisation surveys in Italy and USSR. Thus an international dimension was introduced into the discussion from the outset. This point will be taken up again later. The Franco-Polish series of colloquia has met as frequently as has the Anglo-British series. And I know that Professor Kostrowicki finds himself at least as welcome in France as he is in Britain. Others will have more knowledge than I of the seminars which have been organised with geographers of other countries, USA and USSR for example: I had the privilege to be in Warsaw on one occasion when geographers of Hungary were the guests. In the organisation of such seminars our Polish colleagues have set an outstanding example. Such seminars, while not replacing IGU meetings, have certain advantages in bringing together for discussion on a common theme for a sustained period the leading research workers in two countries leading to a depth of discussion, continuing dialogue and speed in publication. For his work in promoting such seminars Professor Kostrowicki deserves our best thanks.

VI

One last point. My colleague, Professor Emrys Jones, in an essay reviewing progress in human geography 1952–1977 (Jones 1979) referred to the problems in geography of thinking and conducting research on the world scale while also continuing to study the diversity of regional, national and local conditions. “Geographers”, he remarked, “should try and distinguish carefully between what is universal in their thinking and what is culture-specific”. The attempts by Kostrowicki and his colleagues to develop and apply a world typology of agriculture have not neglected this problem. From the surveys and analyses of different countries, and through the meetings which have brought together geographers from many different backgrounds, the attempt was made to identify and distil principles that were generally useful and acceptable and to order a hierarchy. The problem referred to by Emrys Jones is one which would bear much wider study in the context of an evaluation of IGU Commissions and Working Groups. Among the possibilities which occur is the further development of comparative studies.

Professor Jerzy Kostrowicki will arrive at his seventieth birthday knowing that he has the warm congratulations, respect and gratitude of colleagues in very many parts of the world for his long, determined and successful efforts in developing and sustaining international geographical collaboration. Only some indications of the range of his work have been given and others will add their own recollections. He has indeed been a worker, and a leader of workers in what George Kish would regard as “the international vineyard”. He has combined the love of his own country, whose geography he has significantly advanced, with a truly international spirit.

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CLUSTER ANALYSIS AND LARGE DATA SETS: A CASE STUDY OF FARMING SYSTEMS IN FRANCE

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With the increasing availability of large, spatially-indexed data banks and the emergence of sophisticated geo-processing systems, agricultural geographers are now in a position to undertake much more detailed and wide-ranging investigations into the typological and regional structure of farming systems. These technological developments also allow a more experimental and critical stance to be adopted in studies of a taxonomic (classificatory) nature. This is important since classification is essentially an exploratory process — a search for meaningful or revealing patterns of order within complex multivariate data sets. It is not a search for single solutions that can be regarded as “definitive” or “true”. Typologies and regionalizations can be effected in many different ways, and it behoves would be taxonomists to test and evaluate a range of classificatory models, and to justify the categorizations that are eventually selected for subsequent interpretation. Needless to say, the fact that it is now a relatively simple matter to generate maps and plots of classified units aids this process of experimentation considerably, for from a geographer’s point of view it is often the meaningfulness of the resultant spatial distributions that is of paramount diagnostic importance. It is not possible here to examine these various issues in great detail; the more limited aim is to consider the general problem of classifying large sets of agricultural data. In so doing, particular emphasis will be placed on “iterative partitioning” methods of cluster analysis.

CLASSIFYING LARGE DATA SETS: ALTERNATIVE APPROACHES

Over recent years agricultural geographers, in common with other social scientists (Aldenderfer and Blashfield 1984), have made widespread use of hierarchical agglomerative methods of cluster analysis (Byfuglien and Nordgard 1973; Aitchison 1975, 1986; Anderson 1975). One problem posed by such methods is that they place quite severe limits on the sizes of the data sets that can be handled. This is because they operate directly on $N \times N$ matrices of similarity coefficients. In an analysis of 1000 cases nearly half a million coefficients have first to be calculated, and then subjected to a series of differing merger rules in order to establish a hierarchical classification. Even with modern computing systems and more efficient algorithms such an exercise is extremely demanding in terms of storage and processing capacity. It is partly to avoid this sort of problem that geographers, and others, have resorted to “assignment” or “allocation” approaches in dealing with large numbers of taxonomic

units (e.g. farms or aggregate statistical units). These approaches have taken many forms, but all involve the a priori designation of classes, groups or types of farming systems to which individual cases will be referenced for purposes of classification. Normally, types are described on the basis of critical or threshold values for selected attributes. Thus, the typology of agricultural holdings established for the European Community recognizes 17 "principal" and 58 "particular" types of systems according to the relative significance of specified enterprises; the enterprises being rated using standard gross margins. As to the type categories themselves, these are very arbitrarily defined using a series of convenient threshold values for enterprise proportions — 33.3% and 66.6% (Aitchison 1986).

A similar, but much more elaborate, classificatory model has been established for the identification of world types of agriculture. Overseen and orchestrated by Professor Jerzy Kostrowicki on behalf of the International Geographical Union, Commission on Agricultural Typology (1964–1979, this system makes reference to a comprehensive suite of 28 variables measuring various social, operational, production and structural attributes. An unusual and attractive feature of the Kostrowicki model is that it is open-ended, and allows for the entry of new types of farming, should those that have already been identified fail to capture the true complexity of a particular situation. To date, the model recognizes over 100 types, organized in a hierarchy of three orders. These types, it should be stressed, are not arbitrary or theoretical entities; they have emerged empirically through detailed analyses of data sets drawn from all parts of the world. The Kostrowicki model has been widely applied and tested, with the most notable achievement being the compilation of a types of farming map for the whole of Europe (Kostrowicki 1980, 1984).

It is not necessary here to describe the Kostrowicki system in detail. Suffice it to say that the allocation of individual cases to recognized typical classes is achieved through the determination of deviation coefficients. These coefficients simply indicate how close an observed set of attribute scores are to those that define the pre-defined types. Using various thresholds for the deviation values it is possible to categorize cases by assigning them to particular types of farming classes. It is to be appreciated that the success of the Kostrowicki model depends largely upon how adequately the types that have been recognized capture the functional distinctiveness of prevailing systems of farming. In so saying it also has to be recognized that the model is attempting to embrace the full variety of world agriculture. This is clearly a very tall order, and underlines the boldness of the venture. Inevitably, this boldness will expose the typological model to criticism from those who feel that the framework fails to do justice to the subtleties of pattern that characterize areas with which they are particularly familiar. Be this as it may, there is no gainsaying the fact that the Kostrowicki model seeks to differentiate farming systems on the basis of a very wide-ranging set of attributes. Not surprisingly, this creates problems when it comes to describing individual types (i.e. the ascription of labels), with recourse having to be made to rather generalized tags and symbols. Whilst these and other systems of "assignment" can be formally distinguished from systems of "classification" *sensu stricto* (i.e. methods that derive groups or types from the data themselves rather than imposing them *a priori*), there is one methodological approach that serves to bridge the gap between the two. This approach, termed "iterative partitioning" or "iterative relocation", is attractive in that it allows the classification of extremely large data sets, and at the same time maintains many of the characteristics of the more frequently used hierarchical agglomerative methods (e.g. Ward's Error Sum of Squares).

ITERATIVE PARTITIONING

This approach to classification can handle large data sets because it does not necessitate the computation and treatment of full $N \times N$ similarity matrices. Iterative

partitioning methods begin with an allocation of individual cases to a pre-specified set of classes or clusters. The number of clusters that are chosen depends on the level of detail or discrimination that is required for the task in hand. This stage in the process is clearly critical, for it greatly influences the eventual typological outcome. Unfortunately, there is no body of theory to guide the taxonomist on such matters, and reliance has to be placed on intuition, experience and, more often than not, a degree of experimentation. Most algorithms allow individual cases to be allocated to an empirically-derived group of classes (e.g. farms may be initially categorized on the basis of some previous system of classification or through reference to other criteria not being used in the typological study itself). A further alternative is simply to allocate individuals to a given number of clusters in a random or arbitrary manner.

Having arranged the initial assignment, the next stage is to see if this partitioning of the taxonomic population can be improved by iteratively moving individual cases between classes or clusters. This "relocation" procedure can be achieved in various ways. One popular approach is to calculate the centroids of the initial clusters (i.e. the means of the attributes that are being used in the classification), and then sequentially to transfer individual cases to those clusters with the nearest centroids. Once a full pass of the data set has been effected new cluster centroids are re-calculated. The process of centroid evaluation and case relocation is iterated until there is no further transfer of individuals between clusters (i.e. until a stable solution has been arrived at). This method of iterative partitioning is commonly referred to as a "k-means" strategy. An alternative strategy is the "hill climbing" approach, in which cases are transferred when a specified "objective function" is optimized. These functions can take various forms, but commonly focus on between or within cluster variances to assess the efficiency of particular partitions. The type of function selected affects the type of cluster that is eventually distinguished. Thus, adopting the trW function (i.e. the trace of the pooled within-cluster covariance matrix) orients the analysis towards the identification of tight hyperspherical clusters.

Whilst iterative partitioning methods allow taxonomists to work with very large data sets it has to be stressed that it does not necessarily lead to "globally" optimal solutions. To achieve this it would be necessary to test all possible partitions — an impossible task. Aldenderfer and Blashfield (1984) have noted, for instance, that a study of 15 cases and 3 clusters would require an examination of over 217 billion unique partitions. Whether or not a particular solution is globally optimal, rather than locally optimal, cannot be determined objectively. As in so many areas of typological analysis the taxonomist is left stranded, with few means at his/her disposal to justify or validate a given classificatory structure. In the literature there is much debate as to the effect of differing starting positions on the pattern of clusters; likewise little is known about the relative value and merits of different objective functions. What is clear, however, is that the iterative partitioning approach does at least seek to compensate for a poor initial classification. This certainly does not apply to the more popular agglomerative methods where hierarchies of clusters are greatly (irretrievably) influenced by the fusions that take place in the early stages.

In the analysis that follows use is made of a suite of programs specifically developed to facilitate the classification of census data for the United Kingdom (Openshaw 1983). This versatile package contains numerous options and generates a range of descriptive statistics that can be used to evaluate particular taxonomic solutions. The process of "iterative partitioning" is achieved by seeking to minimize within cluster sum of squares at each iteration.

FARMING SYSTEMS OF FRANCE: A CASE STUDY

The data on which this case study is based relate to 2725 "rural" cantons within mainland France (i.e. cantons with at least one commune that is officially classed as

"rural" — the main settlement having a population of less than 2000 inhabitants). The 12 typological attributes have been purposively selected in order to highlight regional variations in the productivity and viability of farming systems. Such matters are currently of particular significance given the problems facing French agriculture: problems which apply to the European Community at large, and which stem from the need to cut the spiralling cost of the Common Agricultural Policy. Massive surpluses, the damaging impact of intensive farming practices on the environment, and the abandonment of land in certain disadvantaged areas are but three aspects of the difficulties that have to be resolved. Whilst some notable changes in policy have already been implemented, the debate still continues on such matters as the withdrawal of land from agricultural production, the promotion of low-input farming systems, and the diversification of farm enterprises. It is not intended here to consider such issues in a detailed or direct manner: suffice it to say that the selected attributes are of relevance to various aspects of the current debate, as it manifests itself in the farming regions of France. As to the attributes themselves they serve to discriminate between cantons according to certain structural characteristics, intensity and productivity criteria, and a number of pertinent social features (Table 1). Of the latter, variables 9 and 10 seek to emphasise variations in the availability of on-farm successors (i.e. a ratio relating the number of family males under 40 years of age to the number of existing farmers) and in levels of educational attainment. Attributes 11 and 12 can be regarded as surrogate "environmental" variables since they have been used by the French Ministry of Agriculture to distinguish "less-favoured" farming regions following the EC directive 75/268. Subjecting the matrix of correlation coefficients for the 12 attributes to a Principal Components Analysis yields insights into the structure of the data set and enables the derivation of orthonormalized scores for cantons on the full suite of components. It is these scores that are used in the iterative partitioning procedure. As to the PCA itself, it distinguishes a first axis on which scale and labour productivity variables are heavily loaded (i.e. variables 1, 2, 5, 6, 8, 9 and 10 having eigen loadings in excess of 0.65, with variable 4 recording a figure of -0.78). The fact that variables 9 and 10 are highly loaded on this particular axis is revealing, for it suggests that it is the most prosperous regions that are likely to have the least problems as far as the

TABLE 1. Typological attributes

Structural characteristics:

1. Standard gross margins per agricultural holding ('000 FFr)
2. Labour inputs (standard labour units) per agricultural holding
3. % Farmers aged 55–65 years
4. % Marginal (i.e. under 4000 ECUs) and part-time farms
5. Average farm size (hectares)

Intensity and output characteristics

6. Agricultural area per labour unit
7. Standard gross margins per 100 hectares
8. Standard gross margins per 100 labour units

Social characteristics

9. Potential on-farm succession rates
 10. % Farmers under 40 with at least secondary education
 11. Rural population densities (km^2)
 12. % Active population engaged in agriculture
-

future management of farms is concerned; succession ratios and percentages of young, trained farmers being well above the average. This particular dimension captures 41.8% of the variance in the r-matrix. The second component accounts for 16.6% of the variance and focusses attention on those regions where gross margins per unit area and rural population densities are high, and where agricultural areas per unit of labour are low (variables 7, 11 and 6).

As has been noted, an initial problem in adopting an iterative partitioning approach to typological analysis is that of selecting the most appropriate number of groups or classes for purposes of description and interpretation. The difficulty here is that the complexity of patterns within a particular data set is often unknown. Previous studies may suggest a suitable number of partitions, and it is possible to base the initial discrimination on some previous classification, but such situations do not normally apply. The approach adopted in this study is to effect a series of cluster solutions ranging from a two-fold to a ten-fold set of partitions, with initial allocations being based on a sequential and systematic allocation of individual units to the specified numbers of clusters (e.g. in a 3 cluster solution, cantons 1, 4, 7... would be assigned to cluster 1, 2, 5, 8... to cluster 2, and cantons 3, 6, 9... to cluster 3). The structure of the clusters generated at each partition level is then examined in the light of diagnostic descriptive statistics and the interpretability of the results. For each cluster those variables yielding mean values that are more than one standard deviation above or below their respective global means are deemed to be of diagnostic interest. Variables that do not fall into this category are then re-assessed to determine if their associated cluster standard deviations are significantly less than global standard deviations. Together, these distinguishing criteria help identify those variables that give character and cohesion to particular clusters. In addition, following Openshaw (1983), consideration is given to the proportion of cantons within each cluster that lie above the third, and below the first global quartile values for each of the variables. Those variables returning proportions in excess of 50 are assumed to be diagnostic for purposes of evaluation. Finally, in seeking to assess the meaningfulness of alternative classification reference is made to the types of farming enterprises that characterize the respective clusters. This is achieved by matching the derived typologies to a recent classification of French cantons based on a range of enterprise attributes (SCEES 1979, 1983). In so doing, the spatial patterns exhibited by the series of cluster formations are also considered. It is not possible here to present the results of each and every stage in this exploratory and "inquisitorial" approach, and reference will simply be made to patterns derived at the 3 and 5 cluster levels. On the basis of the evaluative criteria identified above it is these levels that appear to offer the nearest generalizations of the data set.

Figure 1 charts the distribution of cantons at the three clusters stage, whilst Table 2 details associated attribute characteristics. Cluster 1 is undoubtedly the most distinctive of the three clusters, with particularly high scores on variables relating to scales of production and labour productivity. In terms of future viability it is notable that the 355 cantons also score highly both in terms of potential in-farm succession rates and the educational background of young farmers. The great majority of these cantons define a core region of "industrialized" farming systems and are dominantly located within the Paris Basin. Especially strong concentrations are associated with such regions as Beauce, Vexin, Soissonnais and Champagne. Table 3 shows that farming activities in the cantons that make up this cluster are mainly concerned with the cultivation of cereals (72% of cantons). Cluster 2 contains 1285 cantons and is less well-defined. Whilst the majority of cantons in this cluster lie around and within the core area defined by cluster 1, a substantial number are to be found in the Massif Central, in Haute Garonne, interior Brittany and in central parts of the Alpine region. In general these areas record scores that are close to global averages (Table 2). That said, three distinguishing features of the cluster are the low levels of productivity per unit area, the

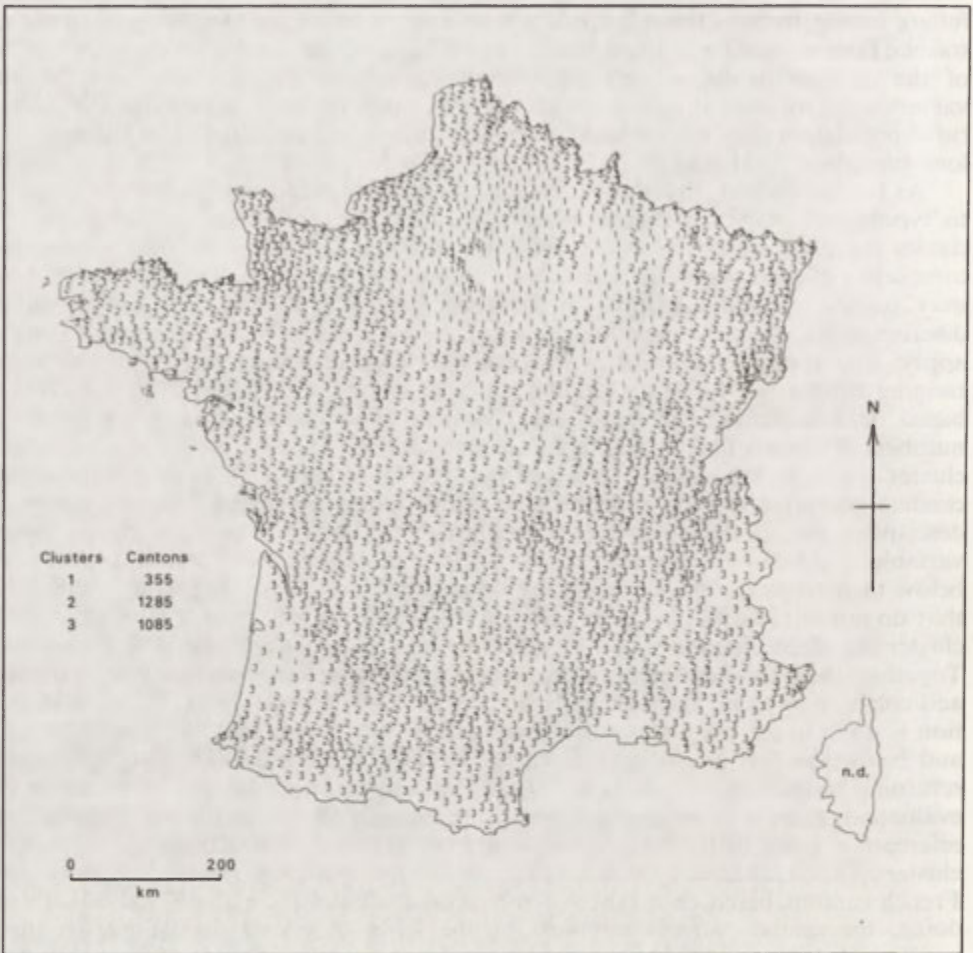


Fig. 1

importance of agriculture in terms of local employment, and the generally low density of rural populations. Pastoral farming systems characterize the great majority of cantons in cluster 2, with both dairying and livestock fattening being well represented (Table 3). The 1085 cantons in cluster 3 tend to dominate along coastal and frontier regions, with high numbers occurring in Alsace, the Alps, the eastern and southern fringes of the Massif Central, the Pyrenees, Aquitaine, Brittany, and the Cotentin Peninsula in Normandy. Farms in these areas tend to be smaller than average, and return low gross margins per unit of labour. Many are marginal or part-time units. The vulnerability of systems in these areas is further underlined by low on-farm succession rates, higher proportions of older farmers, and the limited educational experience of those farmers under 40 years of age (Table 2). Not surprisingly, given the range of environments in which they are encountered, the cantons of this cluster are characterized by a diversity of production systems. Dairying and beef/sheep enterprises (including extensive grazing systems) dominate, but viticulture also figures prominently (Table 3).

Figure 2 charts the distribution of cantons at the five cluster level. Cluster 1 includes 529 cantons. Apart from small groupings in the Massif Central, Alpes du Sud and

TABLE 2

Variable	Cluster means		
	1	2	3
1	26.7* ⁺	10.7	6.7 ⁻⁾
2	1.9* ⁺	1.5	1.3 ⁻
3	20.7	22.0	24.2
4	26.3* ⁻	35.3	57.0
5	63.9* ⁺	29.6	15.8 ⁻⁾
6	34.9* ⁺	19.6	12.7
7	44.0	41.7	51.9
8	13.7* ⁺	6.9	5.2
9	80.6* ⁺	59.3	30.7 ⁻
10	9.3* ⁻	6.0	3.5 ⁻
11	41.8	34.7	52.7
12	15.8	28.5	16.1

* Cluster mean greater than +1 or less than -1 standard deviation from global mean.
*)⁻ More than 50% of cases above Q3 or less than Q1.
) Cluster standard deviation significantly less than global standard deviation.

TABLE 3

Types of farming*	Numbers of cantons : 3 cluster level		
	1	2	3
Dairying	19	444	394
Beef-heap	16	221	130
Viticulture	5	82	149
Horticulture -arboriculture	14	26	76
Cereals	255	173	89
Extensive grazing-polyculture	45	339	246
Unclassified	1	—	1

* Source: SCEES 1983.

Haute Garonne, the cantons in this cluster are mainly located in outer parts of the Paris Basin and include areas where farms are relatively large in terms area and total gross margins. Labour productivity is also well above average, as are on-farm succession indices (Table 4). Most of the farms in these regions are devoted to cereal production, but pastoral farming systems also occur in significant numbers (Table 5). In the main, cluster 1 surrounds a dense swarm of cantons (cluster 5), 187 in number, that occupies the heart of the Paris Basin — most particularly the regions Ile de France, Champagne and Picardy. Here scales of production and labour productivities are of a very high order indeed. Nearly 90% of the cantons that belong to this cluster are highly capitalized cereal-growing areas. Cluster 2 defines the most vulnerable of the five classes. The average percentage of part-time and marginal farms is extremely high, whilst scales of production and labour productivities are of a very low order. So too are on-farm succession rates and levels of secondary training. Regions with high numbers

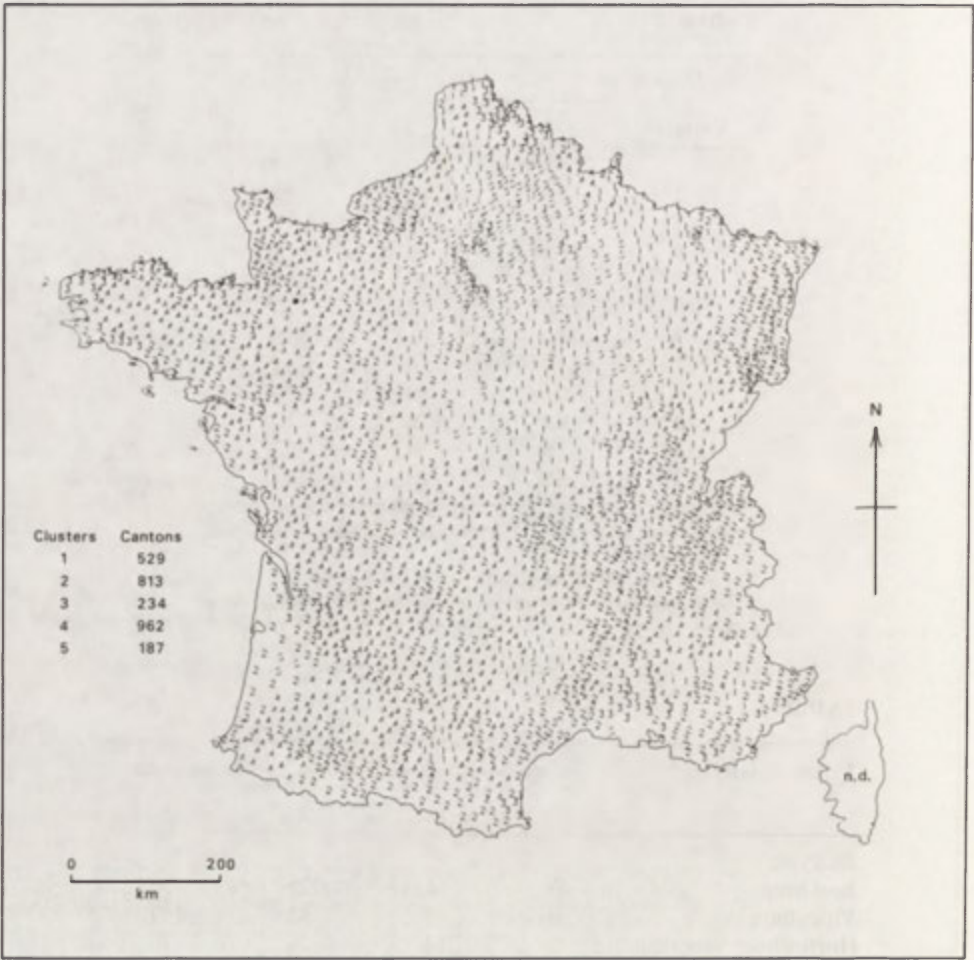


Fig. 2

of cantons in this cluster include Alsace-Lorraine, the Alps, Languedoc, the Pyrenees, coastal parts of the Landes, southern Brittany, and the Lower Seine. With this distribution it is to be expected that the cluster encompasses a wide range of arable and pastoral farming systems (Table 5). Cluster 3 brings together those cantons with high rural population densities and high levels of productivity per unit area. Gross margins per holding are also high, despite the fact that holdings tend to be rather small. Perhaps the most illuminating characteristic of the cluster, however, is the very low level of on-farm succession ratios, and the limited proportion of young farmers with secondary qualifications. Cantons in this cluster are to be found throughout mainland France, with notable concentrations in Nord, the Lower Rhone, Roussillon, the Gironde, and northern Brittany. As Table 5 confirms, these areas are largely associated with intensive forms of horticulture, arboriculture and viticulture. Finally, cluster 4 distinguishes those cantons in which agriculture is of crucial importance in terms of local employment, the mean percentage for the 962 cantons being 33.8. Scales of production are slightly higher than those recorded by cantons in cluster 2, but gross margins per unit of labour are somewhat lower.

TABLE 4

Variable	Cluster means				
	1	2	3	4	5
1	14.4 ⁺	5.9 ⁻	14.7 ⁺	8.9)	32.9 ⁺⁺
2	1.5	1.2 ⁻	1.9 ⁺	1.5	2.1 ⁺⁺
3	21.3	24.1	23.0	22.6	22.7
4	33.7	61.1 ⁺⁺	37.3	37.6	22.9 ⁺⁻
5	45.1 ⁺	15.8 ⁻	16.9 ⁺	24.3)	73.4 ⁺⁺
6	30.2 ⁺⁺	13.3	9.2 ⁺	16.2	36.5 ⁺⁺
7	3.3)	4.3	11.3 ⁺⁺	3.9	4.6)
8	9.4 ⁺	4.9 ⁻	7.9	5.8)	15.5 ⁺⁺
9	71.4 ⁺	29.7 ⁻	49.6	51.3	82.3 ⁺⁺
10	6.6	3.3 ⁻	5.6	5.5	11.3 ⁺⁺
11	31.2	47.4	107.1 ⁺⁺	30.2)	39.2
12	19.7	13.4	13.0	33.8	15.4

For key to symbols see Table 2.

TABLE 5

Types of farming*	Numbers of cantons : 5 cluster level				
	1	2	3	4	5
Dairying	123	281	35	418	—
Beef-sheep	91	116	2	155	3
Viticulture	12	110	60	52	2
Horticulture-aboriculture	7	41	55	7	6
Cereals	157	66	58	69	167
Extensive grazing-polyculture	139	198	24	261	8
Unclassified	—	1	—	—	1

* Source: SCEES 1983.

CONCLUSION

French agricultural policies since 1945 have focussed particular attention on the problems facing farming systems in mountain farming regions. The designation of "less-favoured" farming regions has reaffirmed this particular regional focus, although its compass does now extend to include disadvantaged zones largely on the immediate periphery of the mountain cores. A revealing feature of the results generated here is that this view of the situation grossly oversimplifies the true situation concerning the vulnerability of farming systems. Such systems are to be found in a range of different environmental situations and embrace all types of agricultural enterprises. Given this, it could be argued that in future, policy measures should adopt a more sensitive approach to the identification of problem areas, and should avoid the administratively convenient solution of crude blanket designations, especially those based on a narrow range of environmental criteria. The availability of powerful data-processing systems, and algorithms of the type described here, allow a more sophisticated methodology to be adopted — one that can be used to highlight the existence of local nuances and differences within a comprehensive and integrated survey of national patterns.

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ATTRAITES ET LIEUX TOURISTIQUES

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Chacun a entendu ou utilisé l'expression "attraites touristiques". Les plages méditerranéennes et leur soleil, la ville de Rome et ses monuments, Chamonix et ses hautes montagnes, la Norvège et ses fjords, sont considérés comme des valeurs touristiques sûres et correspondent à quatre grands types de tourisme: le bord de mer, la visite historique, la montagne, le circuit. Pour ne pas retenir que ces exemples particulièrement réputés, il est loisible d'en évoquer d'autres, plus modestes et souvent méconnus, sauf si l'on a eu la chance de visiter certains d'entre eux. La planète regorge de jolies petites plages, d'églises romanes très simples ou de châteaux fortifiés majestueux, de moyennes montagnes verdoyantes et reposantes, de golfes et caps marins sans ambition etc. Mais l'homme du XX^e siècle, qui voyage de plus en plus, recherche tous ces sites pour les visiter ou y séjourner. Eblouis, ou simplement intéressés par ces derniers, ils en diront même qu'ils ont une "vocation touristique".

Si cette vocation est suivie de flux touristiques, elle créera des lieux touristiques: station isolée et plus ou moins célèbre, comme le Mt. Saint-Michel; stations dispersées mais nombreuses au milieu d'un espace qui n'est que partiellement touristique, comme celles du Languedoc; régions touristiques véritables, dont le tourisme est l'activité majoritaire si ce n'est unique, comme dans les hauts massifs alpins acquis au tourisme d'hiver.

Mais, on constate que ces attraites, ces valeurs touristiques, n'engendrent pas nécessairement ces flux auxquels l'ont pouvait s'attendre ni ces régions touristiques, qui se sont pourtant multipliées depuis les années cinquante. Le monde tropical offre tout ce que les amateurs de tourisme balnéaire peuvent souhaiter, mais il est encore peu fréquenté; les grandioses montagnes andine et himalayenne sont peu courues, tout comme la Chine, au passé pourtant si riche. Inversement, on est étonné de constater la réussite d'un pays comme la Hongrie, malgré sa quasi-absence de mer, de montagnes et de monuments (sauf à partir du XVIII^e s.); on est surpris de voir des stations de ski alpin dans des régions qui s'y prêtent peu.

Il convient donc de relativiser la notion d'attraites touristiques, et de mieux réfléchir sur son contenu. Pour cela, nous allons faire un bilan de ces attraites, tels qu'ils sont couramment admis aujourd'hui; ensuite, nous pourrions réfléchir sur la valeur de ces attraites.

I. LES TYPES D'ATTRAITES TOURISTIQUES

Actuellement, la liste des attraites engendrant divers types de tourisme est très longue et englobe même ce qui était considéré comme antitouristique il y a peu. Par exemple,

seule une vieille ville historique était estimée intéressante; aujourd'hui les grandes réalisations urbanistiques modernes (La Défense; Marunouchi à Tokyo; le nouveau centre de Stockholm etc.) sont objets de visites, de même que des usines ou de vieilles villes industrielles. A la limite, tout peut paraître intéressant, au moins à quelques-uns.

a) LA CLASSIFICATION DES ATTRAITS

Quelle classification de ces attraits présenter? Beaucoup ont été tentées. La plus célèbre est due à P. Defert, fondateur de la recherche touristique en France. Il distingue le lithôme (lié à la pierre), l'hydrôme (lié à l'eau), le phytôme (lié à la végétation), l'anthropôme (lié à l'homme); récemment, il a ajouté le mnémôme (lié à la mémoire du passé). Cette classification est très intéressante, mais aussi, comme toutes les autres, discutable. Nous préférons opposer deux grandes familles d'attrait, ceux qui tiennent à la nature et ceux qui relèvent de l'homme; cela nous paraît plus simple et permet de distinguer des sous-catégories qui associent plusieurs attraits et mènent à des types de tourisme.

Attrait naturels et attraits humains donc. Dans le premier cas, il faut noter que l'attrait naturel est une possibilité (p. ex. un domaine skiable, convenant aux exigences du sportif moderne), qu'il est localisé dans l'espace et parfois même étroitement (5% des Alpes françaises seulement sont aptes à recevoir une station de ski), qu'il comporte des contraintes et des interdictions (problème du domaine constructible, qui doit être au pied des pistes, selon la conception de la station intégrée française; problème de l'exposition au soleil et au vent, qui dégradent la neige; grave problème des avalanches et du ski hors-piste etc.); en sens inverse, l'homme agit aussi sur la nature (ouverture des pistes en forêt; rabotage du sol pour le nivellement des pistes etc.). Le mot "attrait" ne doit donc pas être pris dans un sens trop restrictif et comporte une relation dialectique entre lui et le touriste.

Pour analyser ces attraits physiques, il faut d'abord les examiner les uns après les autres: le relief, le climat, les eaux, la végétation etc., mais il est indispensable de la faire sous l'angle du tourisme. Ainsi, au lieu de présenter le climat en simple climatologue pour savoir s'il est chaud ou pluvieux, J. P. Besancenot cherche à définir "l'idéal climatique" auquel le touriste aspire (les exigences de sécurité, de beau temps, de confort et de santé); puis il recherche dans les données statistiques ce qui permet de répondre à ces exigences et il propose une nombreuse famille d'indices: il peut alors dresser une typologie touristique-climatique des stations. Cette démarche est exemplaire, mais trop rare.

Ce ne sont pas les éléments isolés de la nature que l'homme recherche ou ressent dans un voyage, mais une combinaison de ceux-ci. L'étude des attraits physiques devra donc être plutôt l'analyse géographique globale et typologique de la haute montagne, de la plage de bord de mer, de la moyenne montagne, des grandes espaces forestiers etc. C'est cette réalité complexe qui mène à des types de tourisme précis.

Le spectacle de ce que les hommes font ou ont fait, a toujours constitué un puissant élément d'attraction: préhistoire, monuments anciens, folklore, vie quotidienne, habitudes et modes de vie dans des civilisations différentes ("l'exotisme"), exemples d'urbanisme moderne etc. Cela correspond à un souci ancien et qui s'affirme de plus en plus aujourd'hui. L'analyse de ces attraits d'ordre humain, tout comme celle des attraits d'ordre physique, doit être menée à partir des motivations des touristes et non à partir des attraits eux-mêmes; il faut savoir en quoi les visiteurs s'intéressent au passé ou aux monuments, et nous dresse un inventaire complet et élogieux de tout ce qui existe. Cette démarche permet ensuite de dégager des types de tourisme, ceux de circuit, de festivals, d'affaires etc.

b) REMARQUES SUR CES ATTRAITS

Il est remarquable de noter que la liste de ces attraits s'allonge; pour satisfaire une clientèle croissante, il faut lui offrir sans cesse plus de distractions, et en inventer de nouvelles. Actuellement, par exemple la mode est aux parcs de loisirs (Disneylands, aqualands, etc.) et aux golfs. Mais il faut prendre une certaine distance à l'égard de cette multitude d'atouts et relativiser ces données, pour éviter de se perdre.

S'il y a une infinité d'attraits, ils n'ont pas tous la même valeur. La France est un pays réputé par la multiplicité de ses atouts touristiques, mais son tourisme s'appuie sur deux valeurs sûres qui restent les plus importantes, la mer et la montagne: à elles deux, elles totalisent 58,5% des nuitées touristiques des Français en France (année 1986) et ce pourcentage s'élève à 62,8 pour les seules vacances d'été. Ces chiffres sont éloquentes.

On a noté dans les années quatre-vingts, une modification dans le comportement des touristes: ils sont plus exigeants, ils demandent des vacances plus actives avec animation, ils dépensent moins, etc., mais ces évolutions ne concernent pas tout le monde (c'est l'affaire des jeunes surtout) et n'entraînent pas de changements dans les lieux touristiques: on va toujours autant au bord de la mer, dont l'attraction est constante, mais on y aura un comportement un peu différent (développement de la planche à voile, du surf, du bateau etc.). Les grands attraits classiques ne sont pas démonétisés.

Tous ces attraits touristiques ne peuvent être mis sur un plan d'égalité. Un guide touristique en fait toujours un recensement complet et élogieux, mais il faut trier et classer. On ne saurait mettre sur le même plan Florence et Urbino, Paris et Lyon, les Alpes et les Pyrénées, les plages de l'Adriatique et celles de l'Angleterre méridionale etc. Il est difficile de comparer et de classer, mais le chercheur se doit de le faire pour mieux apprécier la réalité.

Les attraits n'auront pas la même signification, en fonction du type de tourisme pratiqué. Les parcs de loisirs relèvent plutôt du loisir de proximité et recherchent le voisinage des fortes densités. Le tourisme de circuit est sensible à la qualité et à la variété des paysages, des sites historiques, des manifestations d'ordre humain. Le repos campagnard pour le séjour, la neige pour le skieur, le soleil et la mer pour l'estivant sont l'essentiel. Il ne faut pas négliger d'opérer cette distinction.

Il est curieux de noter une certaine permanence de ces grands attraits touristiques. A partir de la fin du XVIII^e siècle, avec les débuts de la révolution industrielle, la société aristocratique et bourgeoise britannique lançait le tourisme et au cours du siècle suivant, proposait des types de tourisme, liés à certains attraits: bains de mer, alpinisme, thermalisme, séjour en montagne, séjours et circuits culturels, ski, voyages organisés etc. Avant le tourisme de masse, qui a explosé au lendemain de la deuxième guerre mondiale, les grandes valeurs qui ont assis ce tourisme de masse étaient déjà en place. Le fait est remarquable.

Il n'y pas encore de cartes localisant et appréciant les divers attraits sur le globe. Il serait intéressant de les cartographier tous et de comparer le résultant avec les espaces actuellement fréquentés.

IL LA MISE EN VALEUR DES ATTRAITS TOURISTIQUES

Puisque les deux cartes évoquées ci-dessus ne se superposent pas, c'est que l'existence d'un atout touristique ne signifie pas nécessairement la venue de flux. Sa mise en valeur dépend de plusieurs conditions.

a) ATTRAITS TOURISTIQUES ET PAYS ÉMETTEURS

C'est la demande qui crée le tourisme, et non l'offre touristique. A partir du moment où la société industrielle a donné aux hommes, simultanément, des revenus suffisants et du temps de loisir, le tourisme a fait son apparition, pratiqué par une minorité bourgeoise, la grande expansion économique des années cinquante et suivantes a donné le tourisme de masse. Mais la planète entière n'a pas encore été touchée par le phénomène. Il y a donc quelques grands centres émetteurs: l'Europe Occidentale (335 millions d'habitants), l'Amérique du Nord anglo-saxonne (270), le Japon (122) et, à un degré moindre (taux de départ en vacances plus faible), le monde socialiste européen et soviétique (420). Ces quatre ensembles, assez étroitement localisés sur le globe, ne totalisent que quelque 600 millions de personnes qui vont chaque année en vacances: 333 millions de ces touristes (en 1985) ont franchi une frontière pour aller à l'étranger, mais les revenus ne sont pas encore suffisants pour que chacun puisse aller n'importe où, et les touristes internationaux recherchent des pays agréables et qui ne soient pas trop éloignés. Cela explique que cent millions de ces touristes se soient rendus à l'étranger dans les pays méditerranéens et autant en Europe occidentale ou centrale, alors que l'Asie (Moyen-Orient excepté) n'en recevait que quarante, l'Amérique anglo-saxonne trente-deux, l'Amérique latine vingt et l'Afrique noire quatre. Est-ce à dire que l'Europe occidentale et la Méditerranée possèdent presque les deux-tiers des attraits touristiques du monde?

Ces deux grands espaces touristiques sont riches de possibilités, sans qu'il soit nécessaire de les citer ici, mais ils ont l'avantage d'être proches des pays émetteurs. Leur succès est du aussi aux équipements (pour l'hébergement, la distraction, le sport) et à l'organisation (réseaux aériens, tours operators, agences etc.) dont ils ont du se doter et qui sont à la fois cause et conséquence de leur succès. La difficulté d'aller loin a souvent nécessité l'aménagement d'espaces touristiques, dont la qualité n'est pas la meilleure, et la fréquentation se limite à celle du voisinage: plages de la Mer du Nord ou de la Baltique, stations "alpines" de Norvège ou d'Ecosse, etc. C'est le résultat d'une demande forte et non la conséquence d'une offre naturelle de haut niveau.

b) ATTRAITS TOURISTIQUES ET CULTURES

Jusqu'ici, nous avons présenté les attraits touristiques comme s'ils étaient appréciés de la même façon par tous les hommes de la planète, quelle que soit leur civilisation ou leur catégorie socio-professionnelle. A première vue, on pourrait le croire, puisque les Européens ont des manières très semblables de passer leurs vacances. Mais, à y regarder de près, les différences apparaissent. Les grandes aires culturelles ont chacune leur relation avec la nature et avec l'homme. L'Américain ne pratique pas ces longues vacances, que nous aimons avoir en Europe, et morcelle ses congés, assistant à de nombreuses "conventions" dont nous n'avons pas l'équivalent. Le monde musulman, qui possède un tourisme national ancien que nous ne soupçonnions pas mais qui commence à être étudié, utilisait déjà les eaux thermales pour les bains et se déplaçait en pèlerinage vers les "marabouts" prier sur la tombe d'un grand saint; le Maroc traduit bien ces contrastes, avec un tourisme créé par les Français pendant le Protectorat (bord de mer; randonnée et ski en montagne), un tourisme pratiqué par les Européens aujourd'hui et peu suivi par les nationaux (grands circuits; bord der mer) et un tourisme marocain plus traditionnel.

Mais, c'est avec le Japon que l'influence culturelle apparaît le plus manifestement. Les habitants de ce pays (122 millions en 1987) vivent dans une société séculaire, très structurée et contraignante, aux principes bien affirmés; s'ils ont adopté les techniques et l'économie occidentales, ils sont restés eux-mêmes, limitant de fait les contacts avec l'étranger et voyageant peu à l'extérieur (en 1964, 127.500 et en 1984, 4,7 millions de

personnes seulement, dont 35% vers les USA et 10% vers l'Europe). C'est à propos de la place tenue par la mer que l'influence culturelle est la plus perceptible. Le Japonais se rend sur certains littoraux pour y "voir de beaux paysages", selon l'expression utilisée dans les enquêtes nationales. En effet, certaines baies, comme celle de Matsushima, près de Sendai, offrent un ensemble harmonieux de formes et de couleurs qui associent les bleus de la mer et du ciel, au blanc des rochers et îles calcaires et au vert des pins: l'Européen trouve ce paysage joli, mais le Japonais, formé par sa culture, y voit l'expression accomplie du beau. Bien sûr, le Japonais ne saurait voir dans ce bord de mer: un endroit pour se baigner; la plage peut être un lieu de court repos, en fin d'une après-midi chargée en vacances, mais la pratique du bain de mer, du bronzage, du *farniente* au soleil a à peine pénétré: le bain de mer a été interdit autrefois et c'est pour des raisons strictement médicales qu'il a été toléré vers la fin du XIX^e siècle. Il est significatif de noter que les annuaires statistiques japonais ne fournissent aucune donnée sur le tourisme littoral.

A l'intérieur d'une même aire culturelle, des distinctions sont à opérer. En Europe, même si l'on note la même propension à gagner les rives ensoleillées de mers chaudes, on constate que les Latins, les Britanniques, les Scandinaves, les Germaniques n'ont pas exactement le même usage des littoraux et des lieux de vacances. La relation avec la nature n'est pas la même: l'Allemand parle de naturisme là où le Français ne voit que du nudisme; les héritages cultures, quoique communs, ne pèsent pas de la même façon: les Latins, plus proches de l'héritage hellénique, sont, proportionnellement, plus nombreux que les autres à visiter les restes de la civilisation grecque ancienne: la répartition dans l'espace méditerranéen obéit aussi à des données historico-culturelles: les Français, à cause du passé colonial et de la francophonie, connaissent mieux (ou moins mal) que les autres le monde arabo-musulman et sont plus nombreux à visiter le Maghreb (1/3 des touristes en 1987). Le tourisme lié aux aires culturelles devient un objet de recherches, mais c'est récent.

A l'intérieur d'un même groupe national, il est certain que les divers attrait touristiques sont perçus différemment selon le niveau culturel ou la catégorie socio-professionnelle du visiteur: l'ingénieur, l'employé, le professeur, l'ouvrier n'ont sans doute pas toujours les mêmes préoccupations en voyage, même s'ils savent souvent communier ensemble dans le même culte du bronzage sur la plage.

Pour certains auteurs, il n'y pas d'attrait touristiques, il y a d'abord des cultures qui inspirent une vision de la nature et des hommes et qui commandent ce qu'il faut admirer et ressentir. L'influence culturelle d'une civilisation est considérable, nous venons de la montrer, mais il y a aussi des attrait auxquels l'homme est sensible, quelle que soit la civilisation qui l'a imprégné.

c) ATTRAITS TOURISTIQUES ET NATURE HUMAINE

Il est remarquable de noter que les Français en vacances d'été ont le même comportement depuis plus de quinze ans; malgré une élévation du taux de départ en vacances, qui amène au tourisme des catégories nouvelles et moins favorisées, on retrouve toujours la même répartition des séjours: 45% au bord de la mer, 25% à la campagne, 16% à la montagne: les modes peuvent changer, les attitudes évoluer, la répartition reste la même. L'attrait de la mer, qui se retrouve dans tous les pays européens, libéraux ou socialistes (comme le montre la répartition des équipements en Pologne, par exemple), est une donnée de base qu'il faut expliquer. L'attraction de l'eau est aussi forte chez les Américains.

La plage du bord de mer, avec son sable, son eau et son soleil, procure la joie physique, "naturelle", du repos (le *farniente*: ne rien faire), du contact du soleil sur la

peau nue, de l'exercice musculaire (nage; jeux de plage); c'est aussi la promiscuité et la rencontre facile; l'horizon marin est lointain et rien n'arrête la vue, ce qui serait désagréable à beaucoup. La montagne a aussi ses adeptes, parce que la contemplation des hauts sommets et des glaciers est sublime à beaucoup, parce que la simple promenade ou la longue randonnée donne une grande satisfaction par l'effort physique accompli, parce que la descente "schuss" sur une belle piste de ski procure une plaisante ivresse physique, parce que le séjour tranquille en moyenne montagne assure un bien être corporel que l'on recherche chaque année.

L'on objecte couramment que ces réactions dites naturelles ne le sont pas, puisque les hommes ont ignoré le bain de mer et la montagne jusqu'à il y a deux siècles et que, même, la montagne leur inspirait de la terreur. C'est que l'homme, n'ayant ni l'argent ni le loisir pour faire du tourisme, ne voyait dans la montagne ou la mer qu'un élément hostile à traverser obligatoirement; les conditions économico-sociales ayant changé, il a pu voir dans ces éléments naturels autre chose qu'un ennemi sévère et, peu-à-peu, y découvrir les agréments qu'ils contenaient: les virtualités qu'ils recelaient étaient en réserve.

Cependant, tout le monde n'est pas sensible aux mêmes attraits physiques: dans la même groupe social, dans la même famille, certaines préfèrent la mer et d'autres la montagne, parce que les hommes n'ont pas tous la même nature physique. Le degré d' "évolution" de la société est aussi un correctif à faire entrer en ligne de compte; le Japonais, dont la société reste encore très contraignante à l'encontre de l'occidentale, ne se baigne pas parce qu'il est encore en face d'un interdit culturel hérité, mais quelques uns d'entre eux, plus nombreux qu'il y a dix ans, apprécient le bain de mer et la plage: ne seront-ils pas très nombreux dans une ou deux générations à apprécier librement ce que d'autres auront déjà connu avant? De toute façon, la pratique du ski et ses joies sont les mêmes, qu'il s'agisse du Français à Val d'Isère, de l'Américain à Squaw-Valley, de l'Argentin à Bariloche ou du Japonais à Sapporo; ce dernier, qui ignorait l'utilisation de la montagne dans sa civilisation mais qui n'était arrêté là par aucun interdit, s'est tourné vers les sports d'hiver et a construit des stations de ski qui ressemblent aux autres et dont les spécificités tiennent à la nature physique de la montagne japonaise et non à la civilisation nationale. Il est remarquable que tous les citadins devenus alpinistes ou montagnards parlent de la montagne et la pratiquent de la même façon, quel que soit leur pays.

d) L'ATTRAIT TOURISTIQUE, MYTHE OU RÉALITÉ?

Il est certain que le touriste connaît mal le lieu qu'il vient visiter, même quand il s'y rend avec l'esprit curieux et qu'il s'est informé avant le départ, au lieu de voyager pour rechercher une simple détente: qui, se rendant à Prague, à Palma de Majorque ou à Djerba, est capable de bien comprendre la nature et la culture si riches de ces hauts-lieux considérés? Le visiteur partira, au mieux, avec un mélange de connaissances, d'ignorances, de clichés, d'espairs de bonheur. Son image ne peut être que différente de la réalité, au contact de laquelle il enrichira sa vision. Toute image d'un lieu touristique est un mélange de mythe et de réalité.

Mais, dans les Sciences humaines, tout un courant tend à affirmer que rien n'est "naturel": il n'y a d'attraits que dans l'esprit de l'homme, et l'aménagement du lieu historique n'est qu'une production sociale. Dans un article récent et très intéressant, Cl. Raffestin (1986) affirme ce point de vue; A. Berque (1986) a une position analogue. L'analyse, très fine, est enrichissante, mais nous pensons que l'affirmation est excessive. Le premier auteur montre que l'homme est mené par sa culture et que sa vision de la réalité en est occultée et artificielle: "le tourisme est une double évasion, ... échapper au lieu de départ par le voyage, ... échapper au lieu d'arrivée en lui substituant une image

produite avant le départ". D'ailleurs, les attraites touristiques n'existent pas et les stations de tourisme sont le fait d'une société et non la suite de valeurs touristiques qu'elles contiennent: "il n'y a de lieu touristique que parce qu'il y a un modèle culturel et des besoins en matière de paysage. Tous les lieux ne sont pas touristiques, mais tous peuvent le devenir". Le touriste n'est qu' "un voyeur qui, par la 'fenêtre' ouverte sur le temps de loisir, consomme la nature et la culture des lieux touristiques produits".

Loin de nous l'idée de nier l'apport de la psychologie et de la sociologie pour analyser et comprendre les attitudes de l'homme. Le façonnement de l'individu par sa famille, son milieu social, sa civilisation est certain, et nous en avons donné des exemples. Mais, l'on sait aussi, par la biologie, qu'il y a des réactions, des pulsions, des sensations naturelles qui animent le corps, indépendamment du cadre social; nous avons évoqué cela à propos du bord de mer ou du ski; même si les modes ou usages locaux y ajoutent une note particulière, même si la longue pratique du soleil et du bord de mer a pu créer une "culture" que les autochtones vivent et que les estivants apprennent, il n'y en a pas moins une réaction profondément naturelle à la base de nombreuses pratiques touristiques. En outre, l'individu est doué de réflexion et de volonté et il a une relative liberté de choix, qui lui permet de ne pas suivre son milieu ou ses propres penchants. Pulsions physiques, pression sociale, volonté individuelle sont les trois données qui se combinent et qui permettent de comprendre l'homme en face des attraites touristiques.

Le lieu touristique n'est pas non plus qu'une image idéalisée et découplée de la réalité. Il correspond, entre autres, à une réalité qui impose ses propres conditions. Nous avons vu que les domaines skiables, peu nombreux, localisaient précisément les stations, fixaient et limitaient le contour de leur exploitation et imposaient un type de tourisme.

Avec le temps, le tourisme s'étendra à toute la planète, sans que l'on puisse fixer une date. Parallèlement, l'évolution des sociétés, les échanges entre elles, pourront mener au recul des contraintes qu'elles opposent aujourd'hui à l'individu, comme cela s'est passé dans le monde occidental. S'achemine-t-on vers une certaine convergence des pratiques touristiques, de l'utilisation des divers attraites touristiques? Il est difficile d'y répondre, mais notre réponse serait plutôt affirmative.

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TOURISME EN SICILE

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1. MODÈLE DU DÉVELOPPEMENT TOURISTIQUE DE LA SICILE

Les activités touristiques en Sicile sont principalement limitées au littoral, même si les régions intérieures sont riches en beautés paysagères et architecturales et en villages intéressants qui, à présent, sont délabrés et en partie abandonnés mais qui, sans nécessiter de dépenses trop importantes, pourraient être aisément réaménagés. Le tourisme intérieur a abandonné la traditionnelle villégiature à la campagne, étant en quête d'espace à bâtir le long des côtes; le tourisme international demande lui aussi les 3 S, tandis que ceux qui pratiquent le tourisme vert préfèrent se rendre en d'autres pays et d'autres régions, mieux équipés à ces fins. D'autre part, même la politique économique de la Région de Sicile a toujours prévu des primes intéressantes pour l'hébergement hôtelier et extrahôtelier implantés au bord de la mer.

En effet, depuis longtemps on trouve sur les littoraux la majeure partie des activités industrielles, commerciales, agricoles, de la vie urbaine et de la voirie (voir carte); elles s'y sont implantées de façon spontanée ou, parfois, dans le cadre d'un aménagement. D'ailleurs, l'image de l'île que possèdent ses habitants et les étrangers et qui est répandue par la publicité et les mass-média, est la suivante: de belles côtes bien ensoleillées, une mer propre, des services de bon niveau, des gens aimables, à côté des régions intérieures, pauvres et peuplées de brigands. C'est pourquoi, l'activité touristique s'est principalement concentrée sur les littoraux, en les polluant et en détruisant ce qui était ses atouts majeurs. Pourtant, même si après les années 60, les structures touristiques et les infrastructures se sont améliorées, les démarrages du tourisme est lent.

Bien que la Sicile se trouve au centre du premier ensemble touristique du monde, c'est à dire de la Méditerranée, et qu'elle puisse jouir d'atouts physiques et humains favorables au développement touristique, pendant les années 1957 – 1986 elle a connu un mouvement touristique assez irrégulier. Des causes endogènes et exogènes ont joué un rôle dans ce phénomène. Une mise en valeur trop poussée des littoraux s'est ajoutée à la concurrence d'autres pays du Tiers Monde qui proposent le dépaysement recherché par les touristes, à meilleur marché et dans le cadre de programmes réalisés par des sociétés multinationales et bénéficiant de l'aide des gouvernements.

Le faible impact du tourisme est une conséquence des politiques nationale et régionales d'aménagement, tournées vers l'industrie lourde et polluante, localisée au bord de la mer; l'organisation de l'espace touristique a été confiée à des promoteurs privés qui, toutefois, on pu bénéficier de l'aide de la "Cassa del Mezzogiorno" et de la Région. Faute d'aménagements nécessaires, l'emprise spatiale de la résidence secondaire est devenue beaucoup plus importante que celle de l'hôtellerie et d'autres formes d'hébergement, tandis qu'on a vu se multiplier les villages touristiques intégrés, qui sont de véritables "ghettos", formant des enclaves dans un espace côtier, soit industriel, soit de loisirs, sans liaisons avec les anciens villages de paysans ou de pêcheurs ou les stations touristiques traditionnelles.

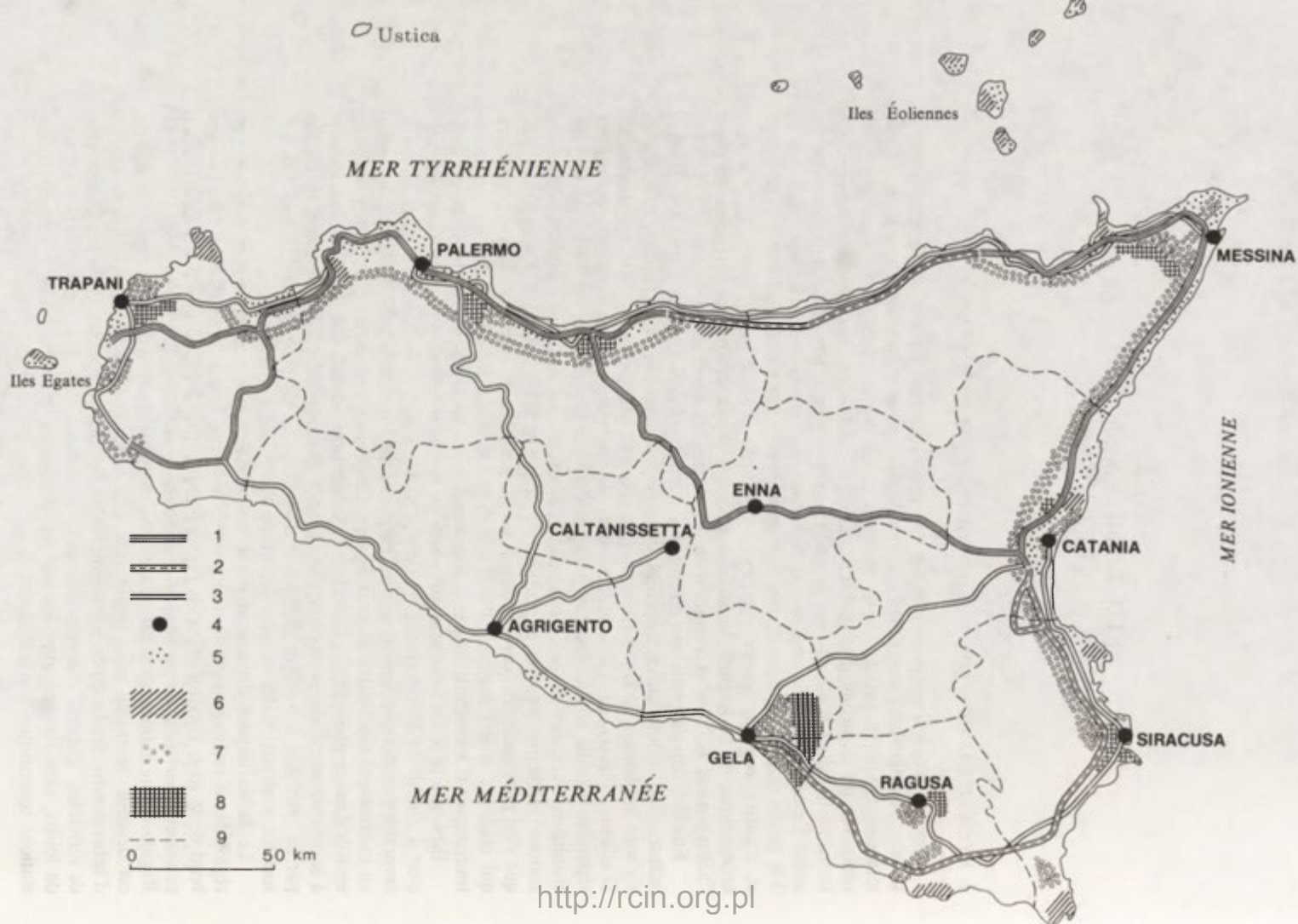


Fig. 1. Carte de la Sicile : 1 - autoroutes, 2 - autoroutes à construire, 3 - routes à grande trafic, 4 = villes principales, 5 - résidences secondaires, 6 - zones industrielles, 7 - zones agricoles, 8 - zones touristiques, 9 - zones résidentielles.

A partir des années 70, de grands complexes de récréation se sont implantés au bord de la mer, dans de riches espaces agricoles. Orientés vers le tourisme intérieur, ces complexes ont souvent éliminé l'agriculture. Cela revient à dire que d'un espace à dominante touristique hôtelière, étrangère et d'élite, la Sicile est devenue un espace à dominante vacancière, résidentielle, italienne et locale de masse. Naturellement, cette transformation a entraîné une structuration différente de l'espace touristique et même du réseau urbain côtier, puisque de véritables "new towns" touristiques ont été créés sur les littoraux.

Pour cette raison, la Sicile contemporaine ne joue pas le rôle qu'elle aurait pu jouer dans le cadre de la Méditerranée. Pendant 30 ans, de nombreuses lois n'ont pas réussi à structurer convenablement le secteur touristique qui, avec l'agriculture, aurait dû être le pivot de l'économie de la Sicile.¹

Aujourd'hui comme autrefois, les régions du littoral sont les plus dynamiques et peuplées car aux anciennes activités on a vu se joindre le tourisme et, surtout, les loisirs. Et si l'on peut plaindre les régions intérieures, de plus en plus vides, on ne doit pas oublier deux choses: 1) que l'économie plus nuancée des côtes a entraîné le phénomène de la déruralisation; 2) que, généralement, les espaces développés du point de vue touristique se calquent sur les espaces dynamiques du point de vue économique.

Par conséquent, la dichotomie socio-économique de l'île se reflète sur le tourisme. 90% du mouvement touristique, nationale et internationale, ainsi que de l'équipement touristique — y compris les résidences secondaires — sont concentrés sur les littoraux, qui connaissent toutefois une certaine évolution. En effet, à côté des espaces de vieux tourisme, à dominante hôtelière, étrangère, d'élite (Taormine, Acireale, Cerfalù), en déclin, il s'est amorcé un processus de mise en valeur de nouvelles régions (les côtes entre Messine et Palerme, les côtes de la Mer d'Afrique, les îles mineures).

En réalité, dans le cadre du développement touristique, un rôle très important est joué par le modèle des communications, comme le montre la localisation de nouvelles structures hôtelières, de nouveaux réseaux d'hébergement extrahôtelier, des nouveaux lotissements, tous situés près des sorties d'autoroutes, de voies rapides ou d'aéroports. Par contre, les espaces possédant des atouts remarquables ne sont pas mis en valeur parce qu'ils sont éloignés ou mal reliés au réseau autoroutier et aux autres infrastructures de transport, dont le réseau le plus dense est situé sur les littoraux.

Par conséquent, l'espace côtier, déjà réduit par sa morphologie souvent escarpée, s'est encore rétréci à cause des activités humaines. Malgré cela, l'urbanisation touristique se développe dans ses structures fixes et de grande envergure.²

Faute d'une loi de sauvegarde des littoraux ainsi que de la conservation qui devraient réglementer les aménagements, l'utilisation touristique de la lisière côtière est caractérisée par une hétérogénéité remarquable: non seulement on y bâtit des hôtels, des villages touristiques, des lotissements de grande envergure, mais on transforme également en résidences et en résidences secondaires les anciens thoniers, les hangars à bateaux, les maisons de paysans et de pêcheurs; de plus, on démolit les villas aristocratiques ou bourgeoises traditionnelles, avec leurs beaux parcs, afin de faire place à de grandes ruches. Le paysage côtier est donc menacé par le tourisme car l'urbanisation en front de mer gagne de plus en plus les espaces verts et agricoles non encore envahis par l'industrie et les autres activités urbaines ou encore par les infrastructures de communication.

Puisqu'un grand nombre de propriétés foncières ont été loties et transformées en aménagements touristiques qui sont une mauvaise copie des villes, faite à une échelle

¹ V. Ruggiero, Turismo e sviluppo regionale della Sicilia, *Annali del Mezzogiorno*, Catania 1975, 379 — 402.

² Le camping-caravaning n'est pas beaucoup répandu en Sicile, contrairement à la Calabre toute proche, nettement mieux équipée pour le tourisme en plein-air.

différente, mais sans en avoir les services du même niveau, et qui pourtant restent dans l'aire de rayonnement de l'agglomération la plus importante et la plus proche, l'espace agricole se rétrécit et la côte devient de plus en plus surchargée. L'urbanisation touristique littorale relie désormais les unes aux autres les agglomérations rurales, de pêcheurs, urbaines, les grands complexes industriels, surtout pétrochimiques, donnant lieu à une sorte de conurbation greffée sur le tourisme, qui est sans doute l'activité la plus importante sur le plan spatial.

De nos jours, l'espace côtier de l'île est donc structuré par le tourisme et les loisirs tandis que, jusqu'aux années 60 et, en partie, même 70, il était structuré par l'agriculture et la pêche. Par contre, l'impact de l'industrie a été moins rude car son emprise spatiale a été beaucoup plus restreinte.

Bien entendu, l'évolution de l'espace a entraîné le changement même des activités économiques: les retombées de l'agriculture et de la pêche ont considérablement baissé, malgré leur modernisation. Bien souvent, l'agriculture et la pêche se transformaient en loisirs pour les touristes et les vacanciers, tandis que les paysans et les pêcheurs devenaient promoteurs ou employés dans le secteur touristique. Il est à noter que le tourisme est la cause, mais également la conséquence de la décadence de l'agriculture et de la pêche.

Les côtes de la Sicile, renommées pour leur rude beauté, ont été détruites par le béton, sauf dans quelques endroits limités, où elles sont tellement escarpées que l'accès et la construction de bâtiments ou d'infrastructures y sont impossibles. Il n'existe pas de lois spécifiques pour la sauvegarde du paysage, qui est confiée à des organismes tels que Italia Nostra ou WWF. D'autre part, la plage n'est plus un bien commun à tous les citoyens car elle a été privatisée et cloisonnée par un réseau d'accueil public et privé. Enfin, le tourisme et l'industrie ont entraîné un taux très fort de pollution de la mer, des plages et même des côtes escarpées dont la végétation est en train de disparaître.

Pour développer le tourisme littoral, comme celui de la Sicile, il faudrait un système de ports de plaisance car la navigation de plaisance, malgré la crise économique, tend à augmenter d'autant plus que les formules de location de bateaux deviennent de plus en plus précises et moins onéreuses.³ Pour les plaisanciers, il y a uniquement des mouillages dans les ports urbains ou de pêche, à l'exception d'une "marina" privative — Portorosa — dans la région de Messine, sur la côte tyrrhénienne, réalisée il y a deux ans.

La Région de Sicile s'est rendue compte de l'importance d'une telle infrastructure pour le développement touristique et a affecté des sommes pour la construction de trois ports: un à Naxos, un dans la région de Messine et un dans la région de Palerme. De nombreux plans ont été dressés mais aucun d'entre eux n'a été réalisé car plusieurs ports devaient être localisés dans des lacs ce qui a suscité l'opposition de la population locale, ainsi que de Italia Nostra et de WWF, cela pour des raisons paysagères.

En effet, le port de plaisance est très important pour Naxos, station touristique la plus fréquentée en Sicile qui, jusqu'aux années 60, était une grande propriété foncière aristocratique et qui, par la suite, a été aménagée suivant le modèle des stations touristiques du Languedoc-Roussillon. Même pour les petites îles des environs de la Sicile, notamment pour les Eoliennes, les ports de plaisance est une infrastructure nécessaire car le nombre de plaisanciers y augmente chaque année. L'absence de ports de plaisance témoigne du manque de planification dans le domaine touristique. L'offre ne satisfait pas la demande ce qui justifie la crise des années 80, notamment dans la venue des étrangers.

Le boom touristique des années 70 est, en effet, en relation avec le bas prix de la lire

³ La "Cassa del Mezzogiorno", il y a quelques années, avait établi un projet gigantesque qui prévoyait un port de plaisance tous les 7 kilomètres de côtes; jusqu'à présent, la construction d'aucun d'entre eux n'a été commencée.

et la politique des tours operators plutôt qu'avec la politique touristique des autorités régionales. Si les collectivités locales, la Région de Sicile et la "Cassa del Mezzogiorno" avaient adopté une politique de développement touristique ou, mieux encore, une politique touristique dans le cadre du développement général, le secteur en question aurait pu jouer un rôle important, tout en créant, grâce à ses retombées économiques, de nouveaux emplois et freinant l'exode rural.

Au contraire, comme on était d'avis que l'essor du tourisme ne nécessitait qu'un bel environnement non pollué, on s'est borné à planifier le développement industriel, en confiant l'aménagement touristique à des promoteurs privés ce qui a eu pour conséquence la déstructuration d'un espace, qui pendant des siècles, avait été organisé par l'agriculture. A présent, le modèle du développement touristique de la Sicile peut être décrit de la façon suivante: concentration des flux touristiques, des structures et des infrastructures sur les littoraux, désormais surchargés, un grand nombre de centres touristiques sans liaison organique, organisation de l'espace en fonction d'un tourisme aisé, vieux et assez fluide, hébergement de haut standing, base extrahôtelière très faible, expansion florissante des résidences secondaires, tourisme proche et de loisirs plutôt que tourisme véritable.

Quelles sont les conséquences du tourisme pour la population locale? Des retombées économiques assez variables, la création de nouveaux services et infrastructures sur la côte, car les collectivités locales se préoccupent beaucoup plus de la qualité de la vie des touristes qui ne passent que quelques jours ou quelques semaines dans un endroit donné que de la population locale qui y habite toute l'année.

Les habitants des littoraux ont toutefois accepté le développement touristique, en surestimant les bénéfices et en sous-estimant les dommages. Sans nul doute, le marché foncier est devenu plus actif, les échanges commerciaux du niveau élémentaire ont augmenté, les paysans ont trouvé de nouveaux emplois, même à temps réduit, les services et les infrastructures se sont améliorés; mais il est à noter un fonctionnement mauvais des services et des infrastructures, surtout pendant l'été, le paysage physique et humain bouleversé, les populations qui ont toutes adopté le modèle de vie urbaine, perdant ainsi leurs identité et originalité, des conflits naissant entre les utilisateurs de sol et des faibles ressources en eau, conflits entre le tourisme et l'agriculture⁴ et, parfois, entre le tourisme, l'industrie et l'agriculture.⁵ D'autre part, la logique et les objectifs de ces trois types d'activité sont très différents. Dans ce conflit, l'agriculture est toujours la grande perdante car la population des littoraux a vu dans le tourisme le débouché le plus facile et le plus profitable, au détriment de l'agriculture en crise.

Cette attitude de la population est liée à sa perception urbaine de l'espace étant donné que, depuis longtemps, les littoraux de l'île étaient fréquentés par les marchands, les touristes, les vacanciers et les contacts avec des cultures différentes ont affaibli les traditions rurales. En conséquence, contrairement à l'intérieur de l'île, l'environnement n'y est pas considéré comme un bien économique qui peut et doit être mis en valeur uniquement par l'agriculture.

Néanmoins, sur les côtes, la transformation du sol agricole en terrains à bâtir a bien été acceptée. Le phénomène en question peut être expliqué non seulement par la perception de l'espace mais également par la structure de la propriété foncière car, sur la côte, les cadres urbains qui ont investi dans l'agriculture sont plus nombreux que les exploitants en faire-valoir direct. En conséquence, l'agriculture n'étant pas rentable, les représentants de professions libérales ont orienté leurs investissements vers l'industrie du bâtiment, et une fois le marché urbain saturé, vers les foyers touristiques. Puisque les

⁴ C. Campagnoli Ciccio, Sviluppo turistico e agricoltura in Sicilia, *Annali Fac. Economia e Commercio*, Messina, 1, 1979, 151–176.

⁵ C. Campagnoli Ciccio, Il recente sviluppo industriale e turistico della Sicilia, *Annali Fac. Economia e Commercio*, Messina, 1, 1975, 205–257.

touristes et vacanciers réclamaient la possibilité d'avoir "les pieds dans l'eau", et faute de plans directeurs ou de résultats de schémas d'aménagement, un mur de béton longe à présent les littoraux de la Sicile.

2. L'ORGANISATION DE L'ESPACE TOURISTIQUE EN SICILE

Le découpage de l'espace touristique de la Sicile peut s'opérer de deux façons: par provinces ou par bandes altimétriques.

Dans le premier des deux cas, on peut délimiter la plus grande concentration des foyers touristiques dans les provinces de Palerme et de Messine où le pourcentage du mouvement touristique et des lieux d'hébergement est le plus élevé, tandis que les littoraux des provinces de Catania, Siracusa, Caltanissetta, Agrigento et Trapani commencent à être aménagés surtout en ce qui concerne les résidences secondaires et les villages de vacances. La province d'Enna, toute intérieure et la moins développée de l'île, n'a pas de telles structures car elle n'est concernée que par un tourisme de transit ou par un petit tourisme estival de rapatriés.

Le déséquilibre socio-économique ainsi que le réseau routier jouent leur rôle dans le développement touristique, la seule exception étant la province de Catania, la plus dynamique du point de vue économique mais pas du tout sous l'aspect touristique. En effet, Catane, plus tournée vers des activités industrielles et commerciales, avec son aéroport, est seulement un pôle de redistribution des flux touristiques, surtout vers la province de Messine où l'on trouve les stations et les foyers touristiques les plus réputés et la seule "marina" de l'île. Alors que sur les littoraux le développement touristique revêt une forme linéaire, au fur et à mesure qu'on progresse vers l'intérieur de l'île, il devient de plus en plus ponctuel.

Par conséquent, le tourisme a rendu encore plus aigus les déséquilibres socio-économiques, spatiaux et historiques de la Sicile. Si les littoraux ont atteint le seuil de la capacité de charge touristique, la montagne est nettement moins fréquentée, notamment en hiver, car le faible enneigement n'autorise pas l'aménagement de bons domaines skiables. Quant aux collines, les plus touchées par l'exode et le sous-développement, elles connaissent seulement les loisirs et un pauvre tourisme familial d'été. De plus, les collines ne sont pas du tout équipées, excepté quelques vieilles résidences secondaires réaménagées.

Par contre, la montagne est équipée d'un nombre limité d'hôtels et de villages de vacances, ainsi que de plusieurs résidences secondaires dont on peut dresser une typologie très simple: les résidences secondaires spontanées, individuelles, bâties par des particuliers, à proximité des villages; les résidences secondaires aménagées par des sociétés immobilières, groupées, loin des villages mais à proximité des grandes villes (Catania, Messine, Palerme).

Comme les collines et la montagne sont des zones de loisirs plutôt que des foyers touristiques, excepté l'Etna, qui est le but de nombreuses excursions pour des touristes locaux, nationaux et étrangers, notamment pendant la période d'éruption, l'équipement en remontées mécaniques est lui-aussi très pauvre. En conclusion, la montagne est un lieu de loisirs de week-end sur la neige, de janvier à mars; de plus, elle accueille des vacanciers en juillet et en août. Le reste de l'année, elle accueille des touristes de dimanche pour des randonnées, des pique-niques, la cueillette de champignons ou de fruits.

Abstraction faite du taux différent de fréquentation touristique et d'urbanisation par provinces ou par bandes altimétriques, on remarque que l'espace touristique de la Sicile est surtout marqué par la résidence secondaire. Que ce soit sur les littoraux ou en montagne, cette dernière s'est greffée sur l'espace agricole, souvent en l'éliminant. Elle

n'a pas apporté à l'économie locale de bénéfices importants, sauf la création de quelques emplois pendant la période de construction, ainsi que de nouveaux services et infrastructures. Même les villages ruraux et de pêcheurs avoisinants n'ont pas bénéficié des avantages des résidences secondaires car elles restent toujours dans l'aire de rayonnement de la ville la plus proche.

Comme on le voit des relations entre l'agriculture et le tourisme, l'agritourisme n'est pas répandu en Sicile. Il y a là quelques expériences mises sur pied par des capitaux urbains ce qui a pour conséquence que là campagne et l'agriculture ne jouent que le rôle "d'espace décor" et l'habitat rural est entièrement réaménagé et équipé de piscines, terrains de golf ou de tennis, manèges etc.

Même si la bourgeoisie et l'aristocratie de la Sicile ont une ancienne tradition de vacances à la campagne, les nouvelles couches sociales, de même que les vieilles, qui font du tourisme, préfèrent la mer ou, en nombre beaucoup plus réduit, la montagne, aménagées avec un habitat moderne. Cela revient à dire que la campagne reste avant tout un espace de loisirs; entre le tourisme et l'agriculture on voit naître un conflit, même sur le plan spatial alors que l'agritourisme aurait pu empêcher le gaspillage de l'agriculture sur les côtes et dans la montagne et raviver l'agriculture sur les collines.

Dans ce processus de changements dans l'utilisation du sol, les campagnes concernées n'étaient pas celles de l'intérieur mais les campagnes ouvertes, proches du grand réseau de communication et des villes les plus dynamiques, riches en capitaux et en promoteurs qui ont pu aisément s'en procurer les terrains agricoles, faute de petits exploitants en faire-valoir direct. Les petits exploitants sont en effet très liés à leur propriété foncière dont l'affectation ne peut être changée qu'avec difficulté. Etant donné que les rapports entre le tourisme et l'agriculture étaient réglés par trois paramètres (niveau de l'agriculture, types de structures sociales, échelle du développement touristique), les campagnes de l'intérieur, pauvres et repliées sur elles-mêmes, n'ont pu créer de conditions complémentaires du tourisme, pour lequel, d'ailleurs, la demande manquait.

En conclusion, les campagnes de l'intérieur n'ont pas ressenti les grands conflits classiques entre l'agriculture et le tourisme (conflits pour l'utilisation du sol, de l'eau, des travailleurs), et n'ont pas même bénéficié du nouveau dynamisme de marché de consommation, du marché foncier, du marché du travail, conditionnés par le tourisme. Néanmoins, si le tourisme a amorcé un processus de renouveau socio-économique, il a dégradé l'agriculture, notamment sur les littoraux où il occupe de vastes espaces à cultures riches, souvent implantées récemment, avec d'importants investissements privés et primes publiques, notamment de la Région de Sicile et de la "Cassa del Mezzogiorno". Cela incite à la réflexion sur le manque de planification car ces deux derniers organismes sont des collectivités qui font le découpage de l'espace ainsi que les interventions financières dans tous les domaines économiques.

En outre, l'agriculture qui était la première activité économique de l'île, a sensiblement fléchi, tant pour ce qui est du niveau d'emplois que de celui des revenus. En réalité, les emplois et revenus en agriculture ont baissé de beaucoup plus que ne le montrent les statistiques car le revenu est influencé en grande mesure par les subventions de chômage et les pensions tandis que l'emploi par l'habitude de maintenir le status d'exploitant en faire-valoir direct, même si l'on travaille dans d'autres secteurs, comme entrepreneur ou travailleur à temps réduit, afin de maintenir les subventions de la sécurité sociale ainsi que les primes régionales.

Enfin, le tourisme a repris des investissements à l'agriculture, étant plus rentable, car l'agriculture sicilienne s'ouvre difficilement aux innovations, les structures agraires étant trop dispersées et les "vrais" agricultures manquant de capitaux. En effet, la ville a toujours dominé; elle a créé la grande agriculture capitaliste et à présent, elle structure l'espace touristique. Les cadres et les professions libérales qui, il y a quelques années,

investissaient dans l'agriculture, se sont aujourd'hui tournés vers le tourisme ce qui a pour conséquence que les professionnels du tourisme et de l'agriculture ne sont que des "sous-traitants". C'est justement dans la prédominance des capitaux sur le travail dans l'organisation de l'espace agricole et touristique qu'on peut envisager la raison de la faiblesse de ces deux secteurs.

TOWARDS A NEW GEOGRAPHY OF ITALIAN INDUSTRIAL ENTREPRENEURSHIP

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1. SPREAD OF ENTREPRENEURSHIP. THE DATA¹

Between 1971 and 1981 the number of production units in Italy rose from 652 000 to 958 000, for industry, and from 1 247 000 to 1 437 000 for commerce. The balance of vital statistics between production unit "births" and "deaths" is therefore of the order of 47% for industry and 15% for commerce, with a further reduction in the already low ratio of employees/unit in industry (from 9.4 to 7.4) and a very limited rise (from 2.2 to 2.3) in the ratio for commerce. This numerical growth of entrepreneurship — already forecast, but not to the extent it actually achieved — is confirmed from other sources, such as data on the number of self-employed, or on the number of "entrepreneurs and professional persons" in industry (Censis, 1984).

The rise in the number of production units is mainly due to very small companies (fewer than 10 employees) and small companies (10 to 100 employees). For industry in the strict sense the increase in very small companies is 50%, with absolute numerical growth of 280 000 units, and in small companies 34%, to be compared to the substantially stable state of the medium-sized companies (100 to 500 employees) and large companies (over 500 employees) — the number of the latter decreasing from 972 to 944. For commerce in the strict sense the leaders in absolute growth are the very small companies, but the relative growth in the number of small companies is greater (+53% against the +16% of the very small, and +8% of the medium-sized or large). In employment terms, 1 100 000 new jobs were created in artisan and small industrial activities over the year period, whereas numbers employed in medium-sized industry were stationary, and large companies actually shed 100 000 jobs. By 1981 more than 83% of Italian industrial workplaces were in units with fewer than 500 employees, as compared to less than 79% in 1971. In commerce the figures are 600 000 new jobs in very small and small companies, 6000 in medium-sized companies, and 2500 fewer in large companies. The latter in fact decrease their already tiny impact on commercial employment figures with a percentage of 0.53% reducing to 0.36%.

This proliferation process seems to have continued throughout the 1980s, though with occasional interruptions, especially in industry. The Italian figures for the number of production units, and for the employee/unit ratio, are markedly dissimilar to those of other, comparable societies: in other Western industrial countries the ratio is always greater, often much greater, than 10.

¹ This research was made possible thanks to a grant from ASSEFOR, of Florence, an association which promotes small business enterprises, and provides support and training.

2. THE INTERPRETATIONS

Several interpretations, or "readings" of this phenomenon have been offered.

a) The "submerged" economy has re-emerged, a number of factors having worked together to induce many entrepreneurs to regularize their status, so that, for instance, they encourage their homebased pieceworkers to set up their own artisan workshops. General confirmation of this is the obvious rise in those making tax returns showing income from entrepreneurial activities — a rise which is greater than the increase in actual economic activity (Censis 1984). Local confirmation of moves to regularize the submerged economy come both from areas where small business has long been established and from those where it is a recent development.

b) Decentralization of the production facilities of larger companies. This is the theory of industrial "restructuring" (Garofoli 1978; Varaldo 1979), the process of expansion not only on a local scale, but also into regions beyond its own (to the east and to the south) on the part of an industrial nucleus solidly rooted in the North-west of the country and interested in deconstructing or deverticalizing its production cycles and changing their territorial location. In broader terms, the breaking up of the production effort of large companies (including those originating in the North-east and Centre) seeking a better balance in terms of size. The large "central" companies would tend to hive off entire stages of the production process and transfer them to smaller firms, to which important financial and technical support might be offered. This would essentially be in order to get round the problem of the rigidity of the labour market (Del Monte 1982). The strategic phases of design, assembly and marketing would remain under central control, while wide responsibilities for the production phases, even in a cascade structure, could be delegated.

c) Independent and local developments — in the North-east, the Centre and limited strips of the South — due to favourable conditions which may arise or be present on the spot (local traditions, fixed capital stock, double working, etc) or due to more general changes (technological innovation favouring decentralization, reexamination of economies of scale, a better "environment" for the smaller company, and so on). This is the "re-improvement" theory, with its self-energizing explosion of local entrepreneurship (Becattini and Bianchi, 1982), its development of particular forms of production, its area specialization, its increase of social mobility. It goes in parallel with the re-improvement, in spatial and demographic terms, of vast areas of Italy, including the most remote and unlikely (Dematteis 1983), leading to appreciations which approach the metaphysical (the industrialization "without fracture" of which Fua and Zacchia write, 1983). When conditions are favourable, growth within a given sector is not achieved by growth in size of the companies themselves, but rather by a process of gemmation and multiplication, and, at the spatial level, by intensifying or enlarging the area's productive network.

3. A VALUE JUDGEMENT

These, and indeed other, interpretations of the spread of entrepreneurship can of course coexist and become and integrated whole. In any event it is to be stressed that the phenomenon is beneficial from the employment point of view — the drop in the employee/company or employee/production unit ratio is not the result of a simple redistribution of the places of work: it represents an increase in the number of jobs. Moreover, the phenomenon is certainly beneficial from the point of view of environmental and geographical equilibrium, undoubtedly correlating with the drop in migration, the halt to rural depopulation and to metropolitan growth, and the spread of better, and better distributed, living conditions.

There can be no doubt, then, that this is a phenomenon to be encouraged on account of its overall usefulness to society. Now this overall usefulness is the result of a certain number of "failure stories" and of a (fortunately greater) number of "success stories" — it must always be borne in mind that the positive balance of the vital statistics is the difference between the number of companies born and the number of those dying. If we wish to follow overall social usefulness and at the same time promote usefulness for the largest possible number of individuals, our objective shall not be so much the proliferation of new companies per se, as ensuring the birth and growth of companies which are healthy and prosperous.

4. THE PHENOMENON SEEN IN TERMS OF SPACE AND SECTOR

At this point a spatial-sectoral interpretation, or reading, can usefully be proposed. All companies share a common range of problems, but different locations in space and different production sectors present their own particular ranges. It must at once be allowed that the range common to all is the better known and better dealt with, simply because it represents shared entrepreneurial experience and can be approached by all entrepreneurs with the same weapons, whereas the second range of problems calls for a variety of solutions, depending on a variety of requirements.

Then again, the range of specific problems includes an unclassifiable set which is totally local and individual, involving the unique, unrepeatable industrial centre, or the even more unrepeatable individual entrepreneur. These call for consideration, but cannot obviously be dealt with in an investigation which, by its nature, tends to generalize and classify.

The present investigation aims therefore at an intermediate level, leaving aside the problems of "the entrepreneur" — in the abstract or as known individual — in order to concentrate on the problems of "entrepreneurs" as groups or as categories associated by their common spatial and/or productive status, an event which sets in motion economic and social mechanisms peculiar to them, and not assimilable to abstract categories or meaningfully dealt with by rough generalizations.

This investigation is not theoretical but essentially descriptive, the description being directed however towards planning (Dematteis 1985) or at least towards use by planners. (Reference is made principally to industry, despite the growing importance of services, and particularly that area of services which is directed towards the entrepreneurial companies, and which is itself largely made up of companies of small size).

It is worth repeating that the planning must be specific, region-oriented, and adaptable. As Bianchi points out (1983), given the less than glorious results of the global approaches typical of the 1960s, and equally of the exclusively sector-oriented ones of the mid 1970s, "the prospect of making intervention spatially specific is one of the few approaches undamaged by hit-or-miss application in the past: one of the few to retain credibility". Even the Mezzogiorno, where a "wholesale" geographically specific policy has indeed been tried, in fact has an economy which is highly differentiated within itself, and which would therefore presuppose "flexible policies, especially in spatial terms" (Latella 1982).

Even more so in so far as:

a) This is a time of great entrepreneurial mobility. According to Istat's figures for the workforce in the years 1981 to 1983, the annual rate of continuity for the self-employed — that is, entrepreneurs and artisans — was only 63% to 64%. This means that of 724 000 entrepreneurs recorded in 1982 only 458 000 had been so described a year previously: 264 000 of those recorded in 1981 had left the category, while 266 000 new entrepreneurs had started up their activity.

The latter tend to have a background worth analyzing. Approximately two-

-fifths have already been self-employed, usually in the commercial area (73 000) with fewer in building and agriculture. The number coming from the employed category is practically equal: these are principally workers setting up on their own (77 000), but also include employees from services. The remaining 20% come from the non-active population (housewives, students and pensioners) or from those not practising professionally (the unemployed) — there being some unusual ways of approaching the status of entrepreneur. We will return to these ways later on: what is of principal interest here is to emphasize their variety and the high level of mobility which they allow.

b) No-one can guarantee that entrepreneurship, on its own, is going to continue to grow and expand over space. In other European countries, where endogeneous development occurred earlier, areas of entrepreneurial proliferation entered at certain points into crises which led to a halt to innovation, “decomposition” of the areas themselves and “emigration” of the companies to less developed areas (Garofoli 1983). At least in part, these crises can be interpreted as resulting from wrong strategic choices, where specific local characteristics, capable of providing an underpinning function were ignored.

5. A SPATIAL-SECTORAL X-RAY

As is known, the thirty years from 1951 to 1981 represented a period of overall industrial expansion in Italy. It is always an act of over-simplification — but it is often inevitable — to take industrial employment as the most useful parameter for level of industrialization. The well-known industrialization index (given by number of industrial workers per 1000 of the population) increases at great speed in the 1950s (from 90 to 111), at a good pace in the 1960s (from 111 to 121), and less quickly in the 1970s (from 121 to 126). Along with this development there is a progressive spatial expansion of industry, which, while it may not completely cancel the dichotomy between heavily industrialized areas and the under-industrialized, certainly modifies the situation, with a strikingly visible extension of the areas occupied by the former.

By comparing four cartograms based on the four censuses, but which share the same caption based on the two key values represented by the average index for 1951 and that for 1981, the stages of this spatial evolution become clear.

The title for the 1951 map (Fig 1a) could well be: “There was once an industrial Triangle”. Apart from the three north-western regions, only the provinces of Vicenza and Gorizia qualify as highly industrialized areas. Below the already fairly modest national average at the time we find not only the whole of the Mezzogiorno and all of the Centre except for northern Tuscany, but also nearly all of Emilia Romagna and Veneto, and even certain depressed provinces in Piedmont and Lombardy.

The map for 1961 (Fig. 1b) shows an industrial Triangle which is at once more compact and more extensive, but it also shows that “Middle” (i.e. North-eastern and Central) Italy has emerged, with large areas of industrialization in Veneto, Emilia and Tuscany. Industry is still absent from the Mezzogiorno, but it has to be remembered that the policy of industrialization was only then beginning.

By 1971 (Fig 1c) the industrial Triangle has spread eastwards and southwards to form a vast, continuous industrial area taking in seven regions. While Liguria may be allowed to escape towards a “post-industrial” tertiary and residential future, the Marches and Umbria are designated prey. The only clear result of industrial policy in the South is the case of Latina, where incentives have been supported by a frontier effect and by the area’s closeness to the markets of Rome, and by new communications infrastructures.

In 1981 (Fig. 1d) the industrialized area can clearly be seen to have expanded

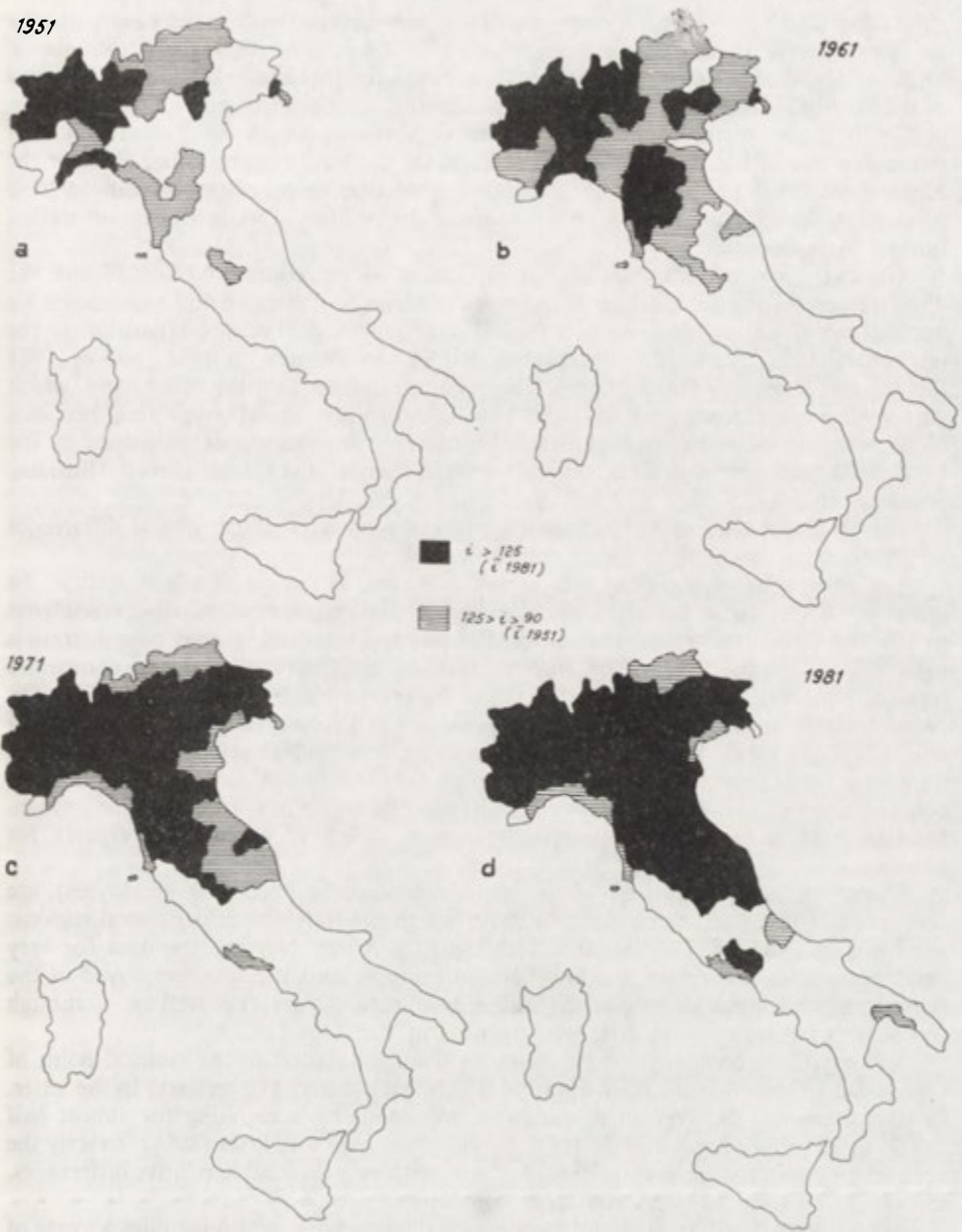


Fig. 1

massively towards the east, taking in Romagna, Umbria, the Marches, and the northern part of the Abruzzi. The developments on the Adriatic side of the country during these ten years have turned industrialized Italy into the quadrilateral Aosta-Gorizia-Teramo-Pisa, with some areas emerging in the South (Frosinone, Chieti, Taranto). But in the deep South and in the Islands industrialization does not reach even the average national level for 1951.

Taken together, the four maps inevitably suggest continuous spread, with the industrialization frontier moving progressively out from the Triangle, across classic Middle Italy, then down the Adriatic-Marches axis, finally to embrace the border areas of the historical Mezzogiorno. The policy of creating development poles must appear in part a disappointment, being able to point only to the success of Taranto and the particular case of Latina-Frosinone. The hope for the future is that other areas of the Mezzogiorno will be affected by gradual spread: it is in no sense utopian to look forward to the 1991 map and expect it to show the frontier of industrialization shifted further to the south.

The two types of industrial spatial expansion — the continuous spread and the discontinuous establishment of artificial poles can best be illustrated and explained if we make sectoral distinctions. Thus a typical example of continuous expansion is the mechanical industry, highly concentrated within the Triangle in 1951, but by 1981 flowing out at least as far as Naples. The chemical industry, on the other hand, which was itself fairly fragmented in 1951 but unknown in the Mezzogiorno, becomes a leopard skin of spots in 1981 after the enforced implanting of industries in the Ferrara-Ravenna area and in several outer edges of the Mezzogiorno (Brindisi, Siracusa, etc.).

The spatial spread of industrialization has not removed those spatial differences which concern the dimensions of companies themselves.

The geography of company size is not, however, as simple as might at first be imagined. If we look at the whole arc of industrial and commercial activities considered in the last census (covering, that is, all the tertiary activities, public administration included), the region with the highest rate of employment in large companies (production units with more than 500 employed) turns out to be Lazio (20.7%). The North-west in the strict sense (Piedmont, Liguria, Val d'Aosta) follows, with Campania next (15.9%). While the presence of central units of public administration — the ministries — accounts for the average size of the “companies” in Lazio, the greater concentration of metropolitan services must also be taken into consideration, which, together with industry implanted from outside, helps to explain the figures for Campania.

There are fewer surprises where small companies (10 to 100 employees) are concerned. The highest rates (35% to 38%) are in the four classic peripheral regions: the Marches, Veneto, Tuscany and Trentino-Alto Adige. Nor are the data for very small companies a surprise, reaching levels of almost half the total employed in the poorest regions of the Mezzogiorno (Molise, Basilicata, Calabria) as well as — though for different reasons — in the small regions in the Alps.

Still regarding company size, if we move from the spatial to the sectoral point of view it can be seen that the main contrast is between industry and tertiary. In the latter, as is well known, the very small company predominates, accounting for almost half (49%) of all jobs, whereas in industry it provides just over a quarter (28%). Exactly the reverse applies to the other three classes of size, with very noticeable relative differences, especially for medium-sized and large companies.

But the term “tertiary” is simply a common denominator, which includes a range of very different activities. For example the very small company dominates the “commercial” sector (80% of the total employed) and, less massively, the “credit sector (48%). On the other hand “public administration” has dimensional structuring similar to that of industry, with a relative majority of the employed being in the small “companies”, and with the medium-sized and large ones playing an important part. The “transport” sector is even more concentrated than industry itself, with large companies accounting for almost 30% of those employed.

Then again “industry” too, once the data are analyzed for its various branches and

classes, reveals a great variety of structural forms. Thus the size structure of the building industry somewhat resembles that of services, with the very small (57%) and small (36%) companies in absolute control. Mining and quarrying, and, especially, manufacturing, and the energy, gas and water industries, so called, display a more appropriately industrial structure. Then again, if we split manufacturing industry up into its nine classic product areas we discover a very wide range of dimensional situations. Small size is the predominant characteristic of the wood-and-furniture sector (50% very small, 41% small companies), whose structure is similar to that of the building industry (with which indeed it has close links), and of the leather sector, though in different proportions. The classic small and medium-sized company is the norm in the typical clothing and footwear, textile, and nonmetal materials working (46% small, 27% medium-sized) sectors. Iron and steel working has a clearly industrial structure, with a dimensional profile resembling the not too far-removed tertiary transport sector. Even more clearly industrial is the structure of the chemical industry (29% medium-sized, 41% large companies).

At the beginning, we established the direction in which the system is moving in dimensional terms. But, clearly, spatial and sectoral differences will also emerge as the system is evolving. Whereas growth in the employment rate in small companies between 1971 and 1981 is general throughout Italy, the behaviour of very small and of large companies shows a typical north/south gradient. Employment in very small companies increases particularly in the North-west and the more highly developed regions of Middle Italy, making more limited gains, or relative losses, in the rest of the country. The behaviour of large companies (to be seen in the context of overall contraction) is the reverse, with the employment rate falling much more in the North than in the South.

It almost looks as though, while the South imports large companies from the North, the North is seeking to imitate the dimensional model already existing in the South. But any explanation must, as always, take into account sectoral interplay. Whereas in 1981 commerce shows more or less the same dimensional structure as in 1971, industry suffers a marked reduction in size. Taking employee total of 100 as the threshold, over the decade the industrial employment rate in production units below this level rises from under 57% to over 64%, and there are even higher increases in sectors such as wood-and-furniture, textiles, clothing, leather and footwear, which in 1971 had already seemed very fragmented.

6. FEATURES OF THE X-RAY

So far the spatial-sectoral analysis has been conducted exclusively in quantitative terms and based on statistical data. But any examination of the development of Italy's entrepreneurial system must take account of the qualitative aspects of entrepreneurship, aspects which cannot be "read" in the censuses but emerge only as a result of direct investigation. How does the entrepreneur start up, and how does he behave within the established contexts of product sector and spatial environment? In an attempt to answer those questions local case studies have been carried out since the 1960s by economists, management consultants, statisticians, sociologists, geographers, and so on, in a great variety of environments throughout the country. Independent scholars and complex research programmes have produced what is by this time a huge mass of material: it now seems appropriate to attempt to produce a synthesis.

One such attempt is the concern of the second part of the present work. It is proposed to construct a qualitative spatial-sectoral typology of companies and entrepreneurial figures — particularly the smaller ones — in terms of their origins, behaviour

and lines of development. The basic idea in this typology² is that the tripartite divisions of Italy's economy (central, peripheral and marginal) and space (industrial Triangle, Middle Italy, Mezzogiorno) can be roughly paralleled in three fundamentally different entrepreneurial structures — the "satellite", the "independent" and the "residual". We are talking obviously, about models, and hence about sometimes fairly rough generalizations which lead to non sequiturs, staggered effects, large-scale exceptions and evident overlappings, and which above all suggest that a better drawing of the characteristics and further specifications of the entrepreneurial phenomenon should be attempted. The three sections which follow set about to achieve this.

7. "SATELLITE" ENTREPRENEURSHIP

The first basic type of entrepreneurship is that formed by the subcontractors, satellites and suppliers to large companies. Its basic economic logic is vertical integration of the "informal" type, linked to flexibility as regards economies of scale to take account of the different phases of production.

The "relative" location of these small companies is within reasonable distance of the large companies, and is generally within a metropolitan area. The "absolute" location is mainly in the industrial Triangle, but may also be within the islands of large scale industry to be found in Middle Italy and around the industrial poles set up in the Mezzogiorno, or at least around those which have turned out to be prosperous.

For example, according to data made available by Fiat, no fewer than 4000 smaller companies in the province of Turin alone are to be considered "Fiat-induced suppliers", and the jobs they represent are about as many as those in the large company itself. Piaggio-induced enterprises are important in the Pontedera area, and it is noticeable how many small companies in the Spezia area are involved with large companies operating in the ship-building, electromechanical and mechanical sectors. In the Mezzogiorno the case of Taranto is well known, the Italsider complex having caused a whole series of enterprises to emerge both upstream and downstream of its steel production, and engendering yet others to provide supporting services. In Caserta's industrial area, too, similar effects have followed the implanting of large companies operating in the fields of telecommunications and mechanical instruments (Unioncamere-Censis, 1983, pp. 158–171, 296–309).

However, such a propulsive effect following the implantation or transplantation of large companies into the Mezzogiorno cannot be taken as the general rule: in many cases it has not occurred, or has not come up to expectations, or has been limited to the supply of components with low technological content and low added value (Frattali 1979; Latella 1982). Lack of locally emerging subcontractors and suppliers has been a permanent factor in the Mezzogiorno, impeding the desired promotion of industrialization through the establishment of industrial development areas, and setting up that vicious circle which understandably discourages fresh input of industry from outside: „on the one hand the companies with the greatest capacity to create spin-off businesses find it difficult to locate, on account of the lack of small auxiliary companies; on the other hand, it is just because of the lack of the market demand more reliable customers would represent that such small companies cannot emerge and develop" (Frattali 1979, p. 220).

² I had already put forward this idea during the work on the project entitled "The Italian entrepreneurial system", promoted by the Agnelli Foundation and directed by Roberto Artioli (Cori 1979, pp. 17–29). Among later work pointing in the same direction, that done by Censis (1984, pp. 50–55) is noteworthy for its coherency. In the sections which follow I have taken up some of the suggestions to be found there.

Sectoral choices on the part of satellite entrepreneurs obviously follow those of the large companies — metal working, mechanical, transport, chemical and so on.

Two typical entrepreneurial figures emerge:

a) The worker in the large company who, partly as a matter of his own initiative, partly because of difficult circumstances within the factory where he works, removes his work in order to set up as a supplier to his ex-employer. Not infrequently the company itself helps him in this operation of separation as part of its own strategy of restructuring and destructuring, as already described.

b) The technician within the large company who, more or less for the same reasons but above all for his own betterment, sets up a small technologically efficient company, often tertiary rather than industrial — for example a technical design studio — with his ex-employer again being the main client.

8. "INDEPENDENT" ENTREPRENEURSHIP

The second basic type, which is more numerous and visible, and has been the object of fuller study, is the category of small "independent" companies — independent in the sense that they are not linked to large companies by any explicit, direct, relationship. Their basic economic logic is division of labour, specialization of production phases, horizontal integration, externalities.

"Relative" location is mainly in areas where there is a concentration of similar sectors, situated in medium-sized and small towns, villages and the urbanized countryside. "Absolute" location is in the less metropolitan parts of Piedmont and Lombardy, in the whole of Middle Italy, in limited areas of the Mezzogiorno outside the "deep" South. Mainly light and traditional sectors are chosen, which can be entered with little or no technological and financial difficulty, but not for this reason necessarily backward. Examples are textiles, clothing, leather, footwear, furniture, certain branches of the mechanical industry, and the working of non-metal minerals.

For this type Garofoli (1986) finds three sub-types: areas in which small and medium-sized industries are "parallel" and in competition, tending to develop by imitation and to spread rapidly throughout the territory (as in the few basins of manufacturing industry in the Mezzogiorno); areas in which a system of integration within the sector has been set up (advanced decentralization of the Bologna motorcycle industry, for example); areas where integration has reached intersector level (tanning and the tanning machinery industry centering on Santa Croce, for example.)

The typical entrepreneurial figures appear to be:

a) The heir, of the second or third generation, to an already established enterprise, who expands it and develops its function of strategic control and gives it a certain coordinating role in the area. This figure is typical of the longer established areas, but is now beginning to appear in less structured areas as well, such as the Solofra tannery area (Biondi 1984, p. 75), and this is a good indication of evolution. On the other hand there are examples, say in the furniture industry, of heirs allowing the family tradition to die out and turning to self-employment or at least to activities which are purely commercial (Marchi 1985).

b) The industrial worker, artisan, trader or farmer who takes up industrial activity. The first by "setting up on his own" on the basis of experience gained in a company in the sector; the second by extending his original activities; the third and fourth by transferring experience as independent workers, together with their savings, to an industrial activity, usually of basic technology. These first generation entrepreneurs usually behave passively within the process of decentralization, but they cover such a wide range of sector and space that it is worth distinguishing at least two sub-types:

b') The industrial worker who sets up on his own appears to be the most ubiquitous figure, one of the key figures in the rapid increase of small companies. From furniture makers in Friuli to those in Tuscany and in the Pesaro area, from shoemakers in Veneto and the Udine area to those in the Marches, from the knitwear producers around Carpi to the tanners of Campania, by way of all the small and medium-scale mechanical workshops of Middle Italy, the industrial worker who learns by doing, and then leaves the company he has worked for in order to do better for himself — this is a person who can now be met with every day. It is worth noting that the persons involved in this continuing process of gemmation are often ex-commuters or home-based workers, so that, by becoming entrepreneurs, they encourage the spatial spread of industry, locating new companies in places which had previously been mere reservoirs of labour. Indeed, in some extreme cases the ex-worker sets up his new activities hundreds or even thousands of kilometres from the factory he has left. This has happened in the Como area (emigrants returning from Switzerland) and in Irpinia (emigrant tanners returning with enough technical know-how and finance to move into the local industrial system).

b'') Other “new entrepreneurs” are actually people who have already had entrepreneurial experience, or have at least worked independently — but in sectors other than industry, or on a smaller scale.

First among these are the artisans, ranging from the most obvious sectors to the artistic. “From shoemaker to entrepreneur” is a Vigevano saying, but it could well be repeated in the Fermo area, and one could add “from tailor to entrepreneur” and “from woodsman to entrepreneur” for the north of Abruzzi or for Veneto. The Civita-castellana potter, born with an artistic bent, sets up as artist-entrepreneur, and similarly the furniture restorer near Verona, suddenly realizing that the activities he has been carrying out on commission for small medium-sized art-furniture makers can be organized by himself, for his own benefit (Macaluso 1986). The artisan may of course himself have started out as an industrial worker, and so represents the second stage of the typical career rise: from worker to artisan, to small entrepreneur.

Immediately next come the entrepreneurs and self-employed workers in services. There is the ex-delivery driver for a furniture company in Pesaro who has started to produce the furniture on his own account, but for the most part these entrepreneurs start from trading — at all levels, from the itinerant textile seller around Como who becomes a producer of household linen, to the furniture agency men at Poggibonsi, in the province of Siena, who end up buying out the companies they represented. We find the same phenomenon at Teramo, at Solofra, and at Barletta, and we see it accentuated in those marginal areas or southern exclaves of Middle Italy where the lack of any other tradition of entrepreneurship has given the trader the role of leader, in a sense, of the growth process.

Primary producers must not be forgotten, however. Small independent farmers, sharecroppers and tenant farmers, whether technically classifiable as “entrepreneurs” or not, have effectively represented a reservoir of latent entrepreneurship — in Tuscany, the Marches, Veneto and to a lesser extent in other regions — whose accumulated experience and capital has found an outlet in a long list of specialized industrial areas, well described in the extensive literature now in existence.

c) The worker in the mechanical sector who takes up his activity in mechanical areas complementing the major local sector. This combination of extraordinarily widespread (even if empirical) mechanical capability in certain social strata with the specific manufacturing tradition deriving from their environment, leads to the emergence of a footwear machinery industry in the Vigevano area, companies making furniture machinery in the Pesaro area and at Poggibonsi, textile machinery in Prato and even ceramic machinery at Sassuolo, and at Calangianus machinery for working cork. In the more developed areas this sort of activity is already into the second generation.

d) The tenant entrepreneur who takes on the running of a company and pays the owner a rent for buildings and machinery. Such cases exist in the lower Valdarno tanning industry and the Poggibonsi furniture industry.

9. "RESIDUAL" AND SUBSIDIZED ENTREPRENEURSHIP

This third type includes the other small companies, whose basic economic logic is to provide employment for the rest of the workforce.

In its original, outdated, version this is marginal or residual entrepreneurship, to be found in the Centre and North of the country also, but present everywhere throughout the Mezzogiorno, especially in the cities and more populous areas. It is present in such sectors as foodstuffs, brick making, mechanical workshops, and so on. These companies often use antiquated techniques in obsolete plants, producing low quality goods principally for the local market; they are managed in a rudimentary manner, and above all they generally lack the horizontal integration which stimulates development and gemmation, and the formation of self-energizing specialized areas.

There is widespread pessimism about the chances of evolution for such companies. "In the Mezzogiorno there are no signs of models of development to ensure the emergence from below of a southern entrepreneurship" is the categorical statement of Latella (1982, p. 281), which in substance expresses the view of the "structuralists" — those who see the only possibility of development of the Mezzogiorno depending on the inducement effect of large groups, subsidized with publicly funded incentives. Yet it cannot be denied that certain fairly promising entrepreneurial figures do emerge, even if only from time to time:

a) The "residual who improves", the second generation entrepreneur who develops and diversifies his activity towards more progress-likely sectors — for example the builder who takes to producing construction parts in cement (examples are to be found in the province of Reggio Calabria).

b) The trader, already indicated as the necessary agent in any process of development in the South. His new industrial activity may simply be an appendix to his commercial activity, but may just as easily have no connection with it. Commercial experience is important in any event, since in the Mezzogiorno: "many entrepreneurial capabilities fail to achieve their potential, not for lack of ideas on what and how to produce, but rather on how and to whom to sell" (Mura 1986).

c) The returning emigrant who sets up, mainly in services or in building, but sometimes also in manufacturing industry.

The other version is subsidized entrepreneurship, situated in already allocated spaces within the "agglomerations" of industrial development areas and in the industrialization nuclei set up and equipped by the ex *Cassa per il Mezzogiorno*. As is known, there are some 150 ready equipped industrial areas throughout the Mezzogiorno as legally defined, and at the beginning of the 1980s they accounted for some 2500 companies giving employment to over 300 000 people—rather high average size, be it noted — mainly in the mechanical, chemical and metalworking sectors.

These entrepreneurs do not generally meet with approval, especially on the part of the "spontaneity" advocates — those who see possible development of the Mezzogiorno only through the mechanisms of decentralizing and self-energizing (Biondi 1984, p. 11). Setting aside the question of certain pathological cases, the overall accusations are: investing, not on the basis of normal estimates of the project's return, but rather of its "subsidizability" (Cassese and Graziosi 1980), thus distorting any healthy company logic; and not leading, as mentioned in chapter 7, above, to processes of independent and cumulative growth. In fact, in the majority of cases the experiment of subsidizing

entrepreneurship seems to have worked well enough: whatever the extent of the Mezzogiorno's industrial development so far may be, a large part is due to this approach. In any event, it is necessary to distinguish three categories:

a) Local units which have simply been hived-off from companies in the Centre and North, on which they still depend, within that more general process of spatial restructuring which has been mentioned above.

b) Small entrepreneurs of local origin, partly classifiable as "independents", but too often differing from these because of clearly limited organizational and management capability.

c) Technicians, brought to the Mezzogiorno by the large incoming companies, and who see entrepreneurial self-improvement as quality suppliers to their original employers.

10. ANOMALOUS FORMS OF ENTREPRENEURSHIP

Outside the typologies described up to now we find the following raw material waiting to be categorized:

a) Dual entrepreneurs — those, that is, who in addition to their entrepreneurial activity have another job, as employee or self-employed, or who actually conduct two entrepreneurial activities at the same time.

According to Censis surveys (1982, p. 400), the first type would cover an eighth of the entrepreneurs in industry and a fifth of those in services. The typical figure is the worker-artisan or worker-trader, frequently to be met with in Piedmont. Into this category may come the person known as the metal-sharecropper (sharecropping and other independent agricultural work being a sort of pre-entrepreneurship). Met with for the first time among Italsider's employees at Taranto, this steelworker of rural origin who continues to prosecute a part-time agricultural activity is now commonly to be found, for example in the workforce of the Merloni group in the Marches. An example of the entrepreneur who is at the same time a self-employed worker would be the technical professional man who becomes a "technology entrepreneur" and keeps his studio and his company going as organically complementary activities; there are numerous cases in plant design and in the building industry.

The second form of duality seems to be less frequent, overall. But the furniture makers *cum* hoteliers in the Pesaro area "brought to light" by the 1980 Censis Report (Censis, 1982) should be remembered, and we note that certain small entrepreneurs in Bari's mechanical industry who started out as traders have kept up their original commercial activities.

b) So-called "group entrepreneurship". This also is a term coined by Censis (1984), but it in fact disguises a number of very different situations:

b') Employers associations have in many cases moved beyond their traditional "union" role to start providing collective services to their member companies, including a whole range of promotional and training schemes — from exhibitions to specialized schools to experimental centres.

b'') Informal cooperative practice developing in specialized areas following the rationale: more innovation leads to more specialization, leads to greater requirement for integration (Varaldo 1979 and Censis, 1984).

b''') Consortiums, which are the most common form. Thanks to contingency legislation which has provided incentives, their number is rapidly growing. In 1981 there was a total of 19 284 companies belonging to 83 credit consortiums, against 5776 only seven years before. There are also many export consortiums while there are fewer of the type intended to establish a common brand mark, since this often clashes with the proverbial individualism of the small entrepreneur.

11. CONCLUSION

Stated in brief, the phenomenon of the spread and continuous emergence of entrepreneurship, particularly of the industrial variety, which has occurred in recent years in Italy, and which continues even as we watch, involves a large number of individuals and is achieved by a great variety of routes and processes (Fig. 2).

Smaller companies are created out of large ones as a result of restructuring and deverticalization, and the new companies often maintain close links with the mother company in the role of satellites or suppliers. From the submerged economy other companies emerge as a result of regularization, and marginal companies, to survive, maintain a relationship with it. The State and the major companies are responsible for creating a new sort of geo-economic production unit — the subsidized company set up in a predetermined location. But most entrepreneurs, especially of the “independent” sort, operating in specialized areas and tending to more and more sophisticated forms of integration, up to the formation of the group company, emerge from a great hotbed of self-improvement and personal drive, from individuals who are already entrepreneurs (artisans, traders, marginal entrepreneurs) or semi-entrepreneurs (independent agricultural workers) or employed persons (industrial workers, technicians) or indeed from the most heterogeneous types — the self-employed professional, the returning emigrant, the housewife, or the pensioner.

All the data presented so far, and all the immense statistical and research documentation on which they are based, point to small entrepreneurship as a fundamental element within the Italian economy and Italian society at large. An element whose role, and consequent responsibility, are undeniably on the increase. It seems very important, therefore, to research the critical factors in its development, roughly identified in most field enquiries as weakness in the marketing sector (a certain passivity *vis-à-vis* market demand and overdependence on established agency networks or import-export companies) but also in the low standard of organization, information services, consultancy, support services — all problems which are still with us despite the emergence of specialized units setting out to provide such services (financial, marketing, training, and so on) for the entrepreneur.

The development of such units, providing advanced services as a national infrastructure which is genuinely decentralized and capillary (just as was the development of the industry it sets out to serve) and which will have its effect on the figure of the entrepreneur, the environment in which he works, and his relationships with others of his kind — this will probably be the crucial development if the small entrepreneurial company is to enjoy some of the advantages of the large company, without incurring the latter's typical drawbacks.

PRIVATE ECONOMIC ACTIVITY AND REGIONAL DEVELOPMENT IN HUNGARY

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Hungary, as well as other European socialist countries have worked out different regional development policies since the introduction of the central planning system. Generally speaking, these policies aimed at the diminishment of differences existing in industrialization, in the general economic level and in the living conditions of the population among the different territorial units of the given countries. This general aim was supported by changing strategies and methods during the past decades. In Hungary, the 1960s were characterized by industrial decentralization, the 1970s by an accelerated infrastructural development of the backward areas. Industrial structural changes and creation of new employment in the depressed industrial areas has been the focus of the regional policy during the 1980s. The financing and management of the regional development have gradually shifted from central government subsidies and plans toward local (regional and settlement) resources and decision-making (Enyedi 1987). Regional planning measures have never taken into consideration the private economic activity. They always dealt with the state and the co-operative sectors.

Statistically, the traditional private sector is significant in Hungary. Less than 4 per cent of the total agricultural area is cultivated by private farmers, whose main profession is agriculture. The private economic sector (agriculture, service industry, retail trade and catering) contributed 7 per cent of the GNP in 1982. Actually, the private economic activity is much more important than the private sector in the statistics. Different types of private activities put together (i.e., the official private sector, the auxiliary part-time farming, private trade and industry operating by means of production leased from the state, the "black economy" in the service and the construction industries let alone now bribes and tipping) make up 25 to 30 per cent of the GNP of the country. According to different sources 70 to 75 per cent of Hungarian families participate in private economic activities. Private economy gave 1/6 of the average gross family income in 1978 and 1/4 in 1982 (Falusi 1984).

We can draw two conclusions from these facts. First, the private economy is an integrated part of the Hungarian socialist economic system. Second, that we cannot neglect a sector producing at least 1/4 of the gross national product while planning or analyzing regional development. In this paper we are going to discuss the forms, the importance and the geographical distribution of the private economy in Hungary. We are looking for answers for the following questions:

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- does private economy play a role in the regional levelling (or differentiating) of the economy and the living conditions?
- are there any backward areas, which could be able to diminish its handicap with the help of private economy?
- is private economy a general, or rather rural (or urban) phenomenon in the country?

Although our data has more estimation than official statistical data, and it wouldn't be adequate for a detailed regional analysis, we can give a proper answer for our questions. There is an abundance of literature discussing the problems of the private (or second or black) economy in Hungary (Galasi 1984, 1985; Gabor 1979; Gabor and Galasi 1981). As far as I know this paper is the first attempt to put the problem into a regional framework.

THE ROLE OF THE PRIVATE ECONOMY IN A SOCIALIST ECONOMIC SYSTEM

It is a delicate task to define the place of the private economy within the socialist economic system. Collective ownership has always been an ideological cornerstone for the socialism. The establishment of socialist regimes in East-Central Europe started by massive nationalization of the means of production. The household plots of the collective farm members were the most generally and legally accepted form of the private economy. Their size was strongly limited and there were intentions for the abolishment (as it happened in Czechoslovakia). Nevertheless, private economy did not disappear during the 1950s. It has remained dominant in the Polish and Yugoslav agriculture. Private handicraft industry and retail trade began to develop again in Hungary after 1953. In the GDR the industry was not subject to any general nationalization in the postwar period. In 1971, private and semi-private enterprises still employed 15 per cent of the industrial workforce. Only the 1972 mass socialization eliminated the buld of the private industry (Åslund 1986). In those socialist countries where the rigid system of central planning directives was abandoned (Yugoslavia 1965, Hungary 1968, Poland 1981), private economy gained importance in certain sectors of the national economy.

Private economic activity remained widespread in its illegal forms. It was officially labelled as immoral and from time to time it was persecuted, but finally its existence was tolerated by the governments. It was supposed officially, that, with the development of the socialist economy, shortages would disappear, and large scale enterprises would fulfill all the services performed now by the black economy. Western observers, who started to analyze more deeply the black (or second) economy in the socialist countries also put the emphasis on shortages, and they assumed that the existence of al large second economy proved the inability of the socialist economy to function properly (Åslund 1986).

Second economy became widespread in the advanced market countries too (Gaertner and Wenig 1985). It has common features with the socialist second economy: both are illegal, both are hidden from state control. There is an important difference: capitalist second economy participates in the same way in the formal market economy as the official does, while socialist second economy introduces an element of market economy into a centrally planned economy. But how can the extension of the second economy in the capitalist countries be explained? The challenge of tax evasion is not an adequate explanation. I assume that there is a general need for small scale economic units in the modern economy. The concentration process of the economy typical to the late 19th and 20th century has slowed down. We witness a real renaissance of small private enterprises both in industry and in the rapidly expanding tertiary sector. Second economy might be the first, embryonic form of small enterprises. If this is true, modern

socialist economy equally needed the presence of (private and semi-private) small scale enterprises. I. T. Berend, the President of the Hungarian Academy of Sciences, recently put in a theoretical framework, how large scale state enterprises and small scale private enterprises fit each other in a modern socialist economy. Ideology is not my field, so I cannot judge the validity of his statements. I only know that private economic activity is a massive phenomenon in the socialist countries. A massive phenomenon — cannot be — *per definitione* — a deviation; it should be a rule (Berend 1986). From the second half of the 1970s the growth of the private economic activity has speeded up in Hungary. A large part of the second economy became legal, and entered into the formal economy. The government repeatedly declared the importance of the private economy. But the ideological puzzle was not solved in Hungary either. There is no clear and long term policy concerning the role of private economy in the Hungarian economic model; hence its instability and frequent fluctuations. Political leadership still has a certain guilty feeling for promoting private economy. Because of the uneven treatment of this economy, it has yielded fewer economic results, than had been expected.

We call “private economy” in this paper the following activities:

- private farming;
- household and auxiliary farming;
- handicraft industry;
- private retail trade, catering and hotel industry;
- private transportation;
- private associations (they were mostly formed in high level services, e.g., private foreign language schools);
- workers’ business associations; and
- small cooperatives (which differ from the cooperatives established in the handicraft and service industry in the 1950s).

These all are legal forms of private economy; the latter three are the new forms introduced in 1982. We won’t discuss black economy, because we cannot make a geographical breakdown from the estimations developed on a national level.

We use the term “private economy” instead of “private sector” or “private enterprise”. The “clear” private sector is just the smaller part of the private economy; most people who are engaged in private economy, are employed in the state or cooperative sector too. An important part of the workers’ business associations operate within the state enterprises, after the normal work-hours are performed. An even smaller fragment of the private economy is functioning as an enterprise.

PRIVATE ECONOMY IN AGRICULTURE

Agriculture has been the most generally accepted and most traditional field of the private economy in the socialist countries. The classical Soviet model of collective agriculture tolerated household plots and the marketing of their products. By the end of the 1970s, 1/3 of the total pork meat output, and the majority of the poultry was produced by the household plots in the collectivized agriculture of the COMECON countries (Wädekin 1973). The first measures for reforming the centrally planned directive economic management has also been taken in agriculture. (The abolishment of the compulsory delivery and the mandatory sowing plans in Hungary in 1957, and the introduction of the responsibility system in the Chinese agriculture in 1981 opened the way for more substantial reforms).

Hungarian agriculture was collectivized in 1962. During the 1970s small scale activity (household and auxiliary farms) became very important. Since the New Economic Mechanism has been introduced, Hungarian agriculture has developed

a peculiar dual organization. Large scale (state and cooperative) farms became specialized in the production of well mechanized, capital-intensive crops (as corn, wheat, industrial crops) and large scale animal husbandry (as feeding lots). Small scale operation concentrated on labour-intensive crops and livestock raising. Small scale farms integrated their production and marketing activity with collective farms (e.g., they hire the collective farms for mechanized works and for transport). They have also developed their own marketing chains (Dohrs 1978; Lazar 1976). Auxiliary farms are privately owned, with a few exceptions (e.g., land allotment of state farm employees, which is in state ownership). Household plots belong to the collective ownership of the producers' cooperatives. Livestock and fixed assets are privately owned.

One third of the gross agricultural output was produced by small farms in 1985, while they had but 13 per cent of the cultivated land and 16.5 per cent of the total fixed assets of agriculture. Small farmers owned 41 per cent of the vineyards, 22 per cent of the orchards, 72 per cent of the poultry and half of the pig stock. They marketed 80 per cent of the early vegetables.

Hungarians participate extensively in small scale farming. In 1986, 1.5 million households, 40 per cent of all the households, had auxiliary farms. They invested a great amount of work — and little capital — in their farms. The total amount of work (expressed in manyear) performed on the small farms was 86 per cent greater than the work performed in the main (large scale) sector of agriculture.

Industrial workers represent the largest group of the small farm owners, followed by retired people and tertiary employees. (Their shares in the total number of holdings are 30, 20 and 25 per cent, respectively.) For most of the owners, farming is but a source of complementary income. They can diminish or abandon their activity in the case of serious income deterioration. Small farms produce valuable goods for the home and the export markets — but their production is very unstable. Small farms are very small, indeed, their average size being 0.54 hectare. Their sizeable livestock is fed by the fodder produced on large scale farms. This fodder is either marketed through the state and cooperative trade chains, or it is sold directly by the large farms to local small farmers.

Since the late 1970s, there have been signs, that the first phase of the post-collectivization private farming is coming to an end. This first phase was characterized by an enormous amount of human work-input and family subsistence. It was a continuation of the peasant working ethics and farming traditions, which were dismantled in the large scale farms. Former peasant families, of which adult members became skilled workers in their large farms, or became a first generation (mostly unskilled) commuter-worker, were able to conserve a part of the complexity of the traditional farming. They could use the total manpower-pool of the family — including school children and housewives — in household plots or in auxiliary farms. Income was not the only concern for continuing or abandoning farming. The second phase has been connected to the generation changes. Younger people are not willing to continue traditional farming. There is a growing interest to develop a well-invested, market — and profit — oriented small farming.

The government assures support for the first-phase type farming, but it is not ready to recognize the development of the second phase. There are a number of constraints for modern small scale farming. The Land Act still maximizes the size of the private farm land in 3 hectares. Modern technologies suitable for small operations are not easily available. Few people are willing to invest for uncertain future. Consequently, great numbers of young people are leaving small scale farming. The number of small farms diminished by 11 per cent between 1972 and 1985; those which were run by owners under 30, dropped by 30 per cent. Two thirds of the small farm owners are over 50. Either the way will be open for an entrepreneurial private family, or, small farming will be diminishing rapidly in not very distant future.

The problem is rather important for the Hungarian economy. Thirty per cent of the

hard currency is earned by agricultural exports. The mass produced goods of the large scale farms — such as wheat, maize, beef — have a deteriorating market position. High quality, specialized products of small scale operations have a much better marketing outlook. Small farmers have no well organized interest groups, trade chains, etc.

Concerning the territorial distribution of small farming, it is evident that 80 per cent of small farms are in rural communes. Even the fact that as much as 1/5 of the small farms are owned by urban households might be surprising. It can be explained by the special type of urban development of the Great Plain, where the former rural market places comprise the majority of the cities. They were traditionally settled by farmer-citizens. Although the share of the farming population in the main employment structure became insignificant, there are still abundant possibilities in these overbounded urban settlements for part-time farming. Almost 30 per cent of the urban households have auxiliary farms on the Great Plain.

The large rural communes in the central part of the Great Plain have several thousand inhabitants. In these communes, the frequency of small farming is not particularly high (50 to 60 per cent of the households are engaged in small farming). In the hilly counties of Western and Southwestern Hungary, and in a portion of Northern Hungary where small villages dominate, 86 per cent of the households have small farming activity. Small farming has stronger relative importance in the marginal, than in the agricultural areas. The hilly counties are mostly underdeveloped in Hungary. Small farming gives there the only possibility for additional income. The active male population commutes to the close — sometimes distant — cities, and housewives run the small farms. Small farming slowed down rural depopulation of these zones up to the present (Fig. 1).

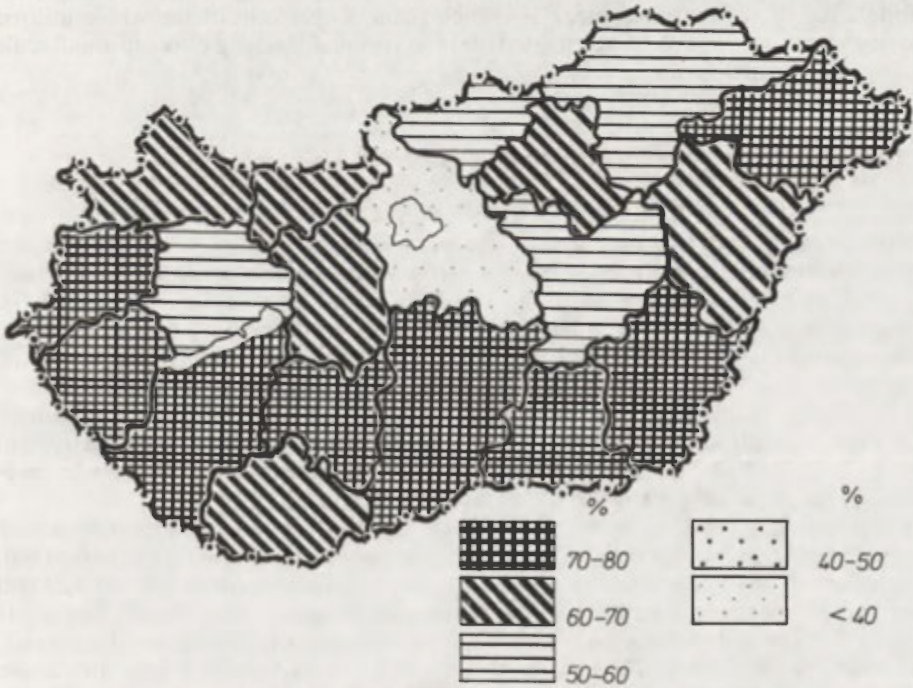


Fig. 1. The proportion of small farm-holders in the total population engaged in private economy, 1985 by counties

Large rural communes attracted a number of industrial and service activities during the 1970s. Thus, small farming is more selective here. It is a possibility, rather than a necessity. Small farms in the main agricultural zones are more specialized and more market oriented than elsewhere. Small farms in the hilly counties have stronger self-sufficiency. Their size is much larger here than the national average. Their self-sufficiency has been stimulated by the declining number of small village food stores. The size of the livestock in small farms — expressed in gross animal units — diminished by 20 per cent between 1972 and 1985. The decline in the hilly counties was even faster (30 per cent), but the density of the livestock (i.e., gross animal units/farm) is still the highest there. The strong diminishment was due to the near disappearance of horses, and the decline of the number of cattle. Pig population decreased but by 3 per cent. In the Great Plain, quite a few small farms have sizeable pig feeding lots. Small scale farming contributed to the regional leveling of the family income. The income gained in small farming (including the value of self-consumption), was modest. Calculated for one hour, small farming income was less than a half of the industrial wage. Nevertheless, small farming raised the family income in rural workers households by 10–15 per cent, and in the cooperative farmers households by 25–30 per cent. One third of the food consumption of the rural population is still assured by their small farms.

The government stimulates small farming mostly in the marginal areas, where large scale farming has been unsuccessful and has needed large state subsidies. Will the new generation of private farmers be satisfied with the modest income — and very low capital return — offered by the marginal areas? They cannot reach good quality land on the plains, since there is practically no agricultural land market in Hungary. Will small agricultural entrepreneurs be able to introduce new specialities in the marginal areas (which, after all, have no poorer ecological conditions than the large hilly areas typical in Central Europe)? There is a possibility that, after the generation change, the depopulation of the marginal areas — which cover 30 per cent of the whole utilized land of the nation — will be accelerated and the regional levelling effect of small scale farming will be reversed.

PRIVATE ECONOMY IN THE INDUSTRY AND SERVICES

In 1982, new legal forms were introduced into the Hungarian economy: private enterprises in the new industry and in the service sector. Earlier (since the massive nationalization of the industry and the tertiary sector between 1946 and 1949), handicraft industry, repair industry and retail shops, run by families, represented the non-agricultural private sector in Hungary. The government intended to legalize a part of the already existing second economy, to mobilize the private capital for economic development and to introduce fruitful competition between the large state enterprises and the small, more elastic private organizations. Efforts were made for establishing small state enterprises, too. It was a very important step in the Hungarian reform process, but since — similar to many other reform steps — it was made half-heartedly, its results didn't meet the expectations (Fig. 2).

The data are impressive. By the end of 1986, small private economy employed half a million people, i.e., 10 per cent of the total active population. Between 1982 and 1986, the number of small economic units grew by 1/3, and their number totalled 129 000 (there were 196 newly established small state enterprises among them). The great majority of these units belongs to the traditional forms of the private sector (handicraft, retail trade and the like). There were only 12 000 new enterprise forms. In certain tertiary areas private economy became very important. Nearly 80 per cent of the new housing units are built yearly by private economy (including black economy). There are 250 000 tourist beds in private homes and family hotels from the total of 403 000.

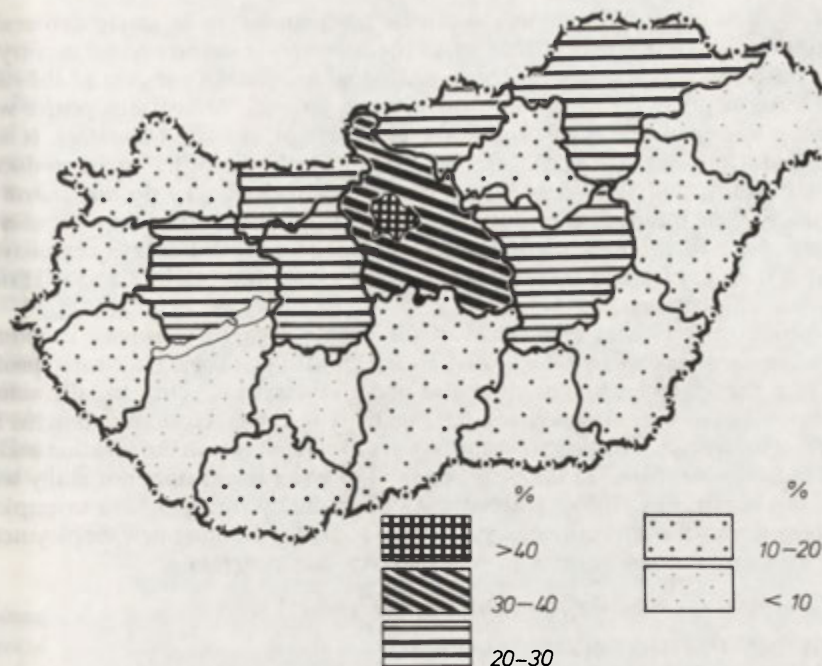


Fig. 2. The proportion of the participants of the new (post-1982) forms of private economy in the total population engaged in private economy, 1985 by counties

Generally speaking, the effect of the private economy on the whole economic life remains limited. Private economic units didn't become real enterprises. Their main aim is a short-term profit maximization. They became widespread in those fields, in which there is no need for heavy investments. They consume much of their income: they have a stronger effect on the consumer, than on the investment market.

The size of the employment in the private economy is lagging far behind the legal possibilities. Small cooperatives have 45 members as an average — the legal maximum is 100. A repair shop can hire 13 employees — the actual average is 2.9. The size of the private associations is not limited; their average size is 5.9 members. Ninety per cent of the repair shops and 70 per cent of the shopkeepers employ no manpower besides their family members. Thus private economic units are much smaller, than would have been accepted by the government, and they do not show any tendency for growth. It is also significant, that half of the owners and employees in the private economy work on a part-time basis, and they keep their employment in the state sector, too. They are not entrepreneurs, they simply utilize their free time for additional earnings. Nevertheless, they have other conditions of work than in the state sector: they have to learn certain entrepreneurial skills.

One can distinguish three types of organizations in the private economy (Laky 1987). The *first* type is based on the work and the expertise of their participants. It employs 80 per cent of the people engaged in private economy. Its basic aim is to assure additional income for the participants, who mostly work on a part-time basis. They do not invest; they consume their earnings. Their capacity is defined by the free time and the ambitions of the participants. They work often for contracts of large enterprises, which give them a stable market, and assure them the necessary technical facilities. The participants of the *second* type are small producers. The main aim of the small

producers — who work full-time in the private economy — is to assure favourable living conditions for their families. They make the necessary investments and they try to grow cautiously. Sometimes they also have additional income: 70 per cent of the rural craftsmen have auxiliary farms. Small producers are generally industrious people who live modestly and they save strongly for the enlargement of their businesses. It was characteristic for pre-war Hungary, too. Nowadays a small part of the small producers have a high profits, and since they do not invest heavily and they do not intend to enlarge rapidly their business, they have a luxury consumption. After four decades of egalitarian politics, their life-style irritates the public. The rich producers are excessively concentrated in Budapest, and in a few larger cities, where they produce and sell fancy goods for an affluent market.

Small producers represent almost $1/5$ of the people engaged in private economy. Just a few hundred *real enterprises* belong to the *third* type. They are clearly profit-oriented and they take long term risks and make investments. They usually satisfy personal ambitions of the entrepreneurs, because there is no real economic stimulus for having such a behaviour. The private sector suffers disadvantages in the taxation and in the credit facilities compared to the state sector. The government does not really wish its substantial expansion. This way, when the state industry starts to have unemployment problems, and the government spends large sums for creating new employment, the private sector was not invited to take part in this program.

THE LOCATION OF THE PRIVATE ECONOMY

In the 1980s, the regional levelling effect of the agricultural private economy has ended. Between 1980 and 1985, the share of the legal private economy in the net national product rose from 10 per cent to 15 per cent. This growth was due to the new forms of the private economy, which have a strong urban character.

The new forms of the private economy had their innovation centre in Budapest. The waves of innovations showed a certain territorial regularity. Budapest was followed by the largest cities and by the traditionally developed Northern Transdanubia, while the backward Southwestern and Northeastern territories were the last ones. In 1981, $1/3$ of the state restaurants were leased for private entrepreneurs — but only 1 per cent in Szabolcs-Szatmar County. In 1984, already $3/4$ of the Budapest state restaurants were managed privately, but in certain counties this ratio remained under 40 per cent. Since private economy is market-oriented, its territorial distribution reflects the spatial differences existing in the market potential. We can use it as a certain political geography. There were counties, where local political leadership resisted accepting such a “deviation” as private economy. The geographical distribution of the private economy is concentrated. In 1983, 50 per cent of all private economic units were registered in Budapest, and a further 25 per cent in the cities over 50 000 inhabitants. (These settlements housed $1/3$ of the total population only). In the rural settlements, where 43 per cent of the total population live, only 6 per cent of the new private enterprises were registered. According to the 1984 Micro-Census, mostly young, educated urban men participated in the new forms of non-agricultural private economy.

The geographical dominance of Budapest comes from different factors. The city has always been pioneering all types of social innovations in the country. Forty per cent of the state industry has its headquarters in Budapest, and state industrial enterprises have attracted the workers' business associations. The city offers the largest and most affluent consumer market in the country. The city almost monopolizes the economic and political information which was necessary for getting into business; finally, partly because of the size of the city, the control of the political leadership over the economy has been less direct than in any other settlements. The non-agricultural forms of the

private economy reinforced the economic advantages of the northern, more developed regions of the country, especially that of Budapest.

Between 1980 and 1983, incomes from the state sector rose much slower (by 22.6 per cent), than incomes derived from private economy (50.6 per cent). The differences were especially sharp in the Budapest agglomeration, where incomes from the state sector rose by 21.6 per cent and from the private economy — by 72.7 per cent! The propagation of the non-agricultural private economy launched a new type of income polarization, where first of all the capital city and, to a lesser extent, the other larger urban agglomeration (especially their outer zone, where there is a possibility for combining private farming and other private economy) took advantage.

It is possible that a further propagation of this innovation will lead to a less polarized geographical distribution. Under the worsening of general economic conditions it will be less and less possible to find and to mobilize private capital in the less developed southern half of the country for promoting private economy. One thing is certain: if we intend to continue to put any type of regional policy and planning into practice, we have to incorporate private economy into it.

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LES "RELATIONS EXTÉRIEURES" D'UNE AGRICULTURE: L'EXEMPLE DE L'AGRICULTURE BRETONNE

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Dans la ligne des grands travaux sur la typologie agricole dont le Professeur Kostrowicki a été l'initiateur et le réalisateur, je voudrais proposer quelques réflexions sur un point dont l'étude, à certains égards très classique, est sur d'autres particulièrement délicate, et que j'appellerai "les relations extérieures d'une agriculture". L'occasion de cette note est l'évolution récente de l'agriculture bretonne, longtemps restée assez renfermée sur elle-même et qui connaît depuis une ou deux décennies une extraordinaire ouverture sur le monde. La méthodologie de cette modeste contribution a dû rester pour le moment purement qualitative, peut-être même, à certains égards, impressionniste. Il s'agissait de préciser certains problèmes que des chercheurs ultérieurs devraient permettre de quantifier.

L'examen de la situation de la Bretagne rend plus compréhensible l'évolution contrastée de son agriculture. Cette région, en effet, forme une péninsule, constitue un bout du monde, un "finistère" du continent européen. Par là elle se trouve en situation périphérique par rapport aux centres majeurs de la France et de l'Europe occidentale: Paris, Bruxelles, la Rhénanie. Mais elle se trouve aussi sur les "voies des mers de l'ouest" ("western sea-ways" des auteurs britanniques) qui peuvent permettre des relations actives entre toutes les péninsules et les îles de l'Europe Atlantique, de l'Ibérie aux Îles Britanniques et à la Scandinavie. Projetée à l'Ouest, en plein Atlantique, la Bretagne voit même s'ouvrir devant elle toutes les routes de l'océan mondial.

Lorsque, pour des raisons diverses, les voies de mer sont fermées, impraticables, la Bretagne pâtit de sa situation périphérique, a tendance à s'enfoncer dans la routine, l'arriération économique. Lorsque ces voies sont ouvertes, et que les Bretons peuvent — et veulent — les utiliser, tous les horizons, et tous les développements leur sont ouverts.

La Bretagne a ainsi connu à travers la préhistoire et l'histoire plusieurs cycles d'ouverture-fermeture relationnelles. A l'origine du dernier cycle se place la longue période des guerres franco-anglaises entre la fin du XVII^e siècle et 1815, dont la Bretagne a mis très longtemps à se relever, et, jusqu'à une période toute récente, seulement de façon partielle. Au début du XX^e siècle la Bretagne se trouvait donc surtout marquée par sa situation périphérique et les relations maritimes, qui avaient certes repris, comme on le verra, restaient d'importance secondaire.

Pour comprendre l'évolution de dernier demi-siècle et certaines persistances de comportement, il convient de retracer l'évolution de l'espace économique où s'est trouvée l'agriculture bretonne. Jusqu'à la grande crise de 1929—1930, la Bretagne a vécu dans un contexte français protectionniste, particulièrement en matière agricole,

auquel Méline, ministre de l'agriculture de 1883 à 1885 a laissé son nom: le mélinisme. Mais, en face de notre petite Bretagne, la Grande Bretagne avait conservé une politique libre-échangiste qui permit à certains secteurs de l'agriculture bretonne d'y développer d'intéressants débouchés. Mais la crise entraîna en Grande-Bretagne un retour au protectionnisme qui, en matière agricole, se manifesta par les "décrets Balfour" qui générèrent fort les exportations bretonnes. La Bretagne se retrouva donc plus que jamais en situation périphérique, aggravée par une tendance nationale au protectionnisme, puis par la guerre. Après la Libération il fallut attendre la Traité de Rome de 1957 pour que le contexte change. Mais si l'Europe à 6 ouvrit à la Bretagne des débouchés en Allemagne et au Benelux (l'importance de l'Italie comme marché éventuel se développa plus tard), la région du bout du Monde se retrouva plus périphérique que jamais. Il ne faut pas s'étonner que les Bretons furent parmi les partisans de l'adhésion de la Grande-Bretagne au Marché commun. Il fallut attendre 1973 pour que cette adhésion se réalisa, et que la Bretagne retrouve des facilités dans sa plus ancienne et plus proche région d'exportation. L'adhésion de la Grèce n'eut pas de conséquences visibles sur le développement agricole breton, mais l'adhésion de l'Espagne et du Portugal en 1986, soulevèrent des inquiétudes, mais aussi des réactions finalement positives.

Dans ce cadre chronologique nous examinerons trois aspects des relations extérieures de l'agriculture bretonne.

1. AUTOCONSOMMATION ET COMMERCIALISATION

C'est l'aspect le plus classique, le plus anciennement et précisément étudié. Il ne peut être question ici que de présenter quelques aspects, notamment chronologiques du passage en Bretagne d'une agriculture à autoconsommation importante à une agriculture devenue, à très peu de chose près, exclusivement commerciale.

Dans ce domaine, la proportion de la production vendue, ou cédée à titre de redevance n'est sans doute pas, pour les agricultures européennes des derniers siècles, l'élément fondamental. Il y a toujours eu dans ces agricultures vente d'une partie notable de la production.

Plus frappant, plus significatif est l'examen de deux autres points: ceux de l'autosuffisance alimentaire et de l'autosuffisance dans le domaine des inputs, des consommations intermédiaires.

Jusque vers 1950 le degré d'autosuffisance alimentaire dans les exploitations agricoles bretonnes resta élevé, ce qui s'explique par les difficultés pendant la guerre et la pénurie persistante dans les années immédiatement postérieures. La plupart des exploitations n'achetaient guère à l'extérieur que le sel, le café, le vin, pour les grandes occasions, voire une bouteille d'apéritif, peu de viande de boucherie. Le pain venait de la boulangerie, mais était obtenu le plus souvent par l'échange blé-pain. A partir des années cinquante de nouvelles consommations imposèrent très rapidement des achats extérieurs supplémentaires: le fait parut notamment frappant pour les tomates et les fromages. Le développement de grandes organisations agro-alimentaires coopératives ou privées amena rapidement l'achat de tous les produits laitiers, dont le beurre, dans un nombre croissant d'exploitations. La vogue des congélateurs familiaux prolongea, voire développa parfois, l'autoconsommation de viande: volailles ou viande de veau. Finalement sans que l'autoconsommation ait totalement disparu elle arrive souvent à être aussi réduite qu'elle pouvait l'être pour les possesseurs d'un jardin familial ou d'un jardin ouvrier banlieusard. En même temps le régime alimentaire s'est calqué sur le régime urbain, qui a d'ailleurs lui-même en Bretagne conservé ou retrouvé certains traits de l'ancienne alimentation paysanne. Pour prendre un exemple particulièrement breton, les crêpes, autrefois surtout consommées à la campagne où les patronnes des fermes les confectionnaient, sont aujourd'hui fabriquées artisanalement ou industrielle-

ment et sont également achetées dans les magasins de grande surface par les citadins et les ruraux, y compris les agriculteurs.

Plus frappante encore au point de vue de l'économie agricole est la disparition de la quasi-autosuffisance de jadis dans le domaine des "inputs", des biens intermédiaires. Jusqu'à vers 1950 les achats des biens intermédiaires étaient presque limités aux engrais chimiques, et aux machines agricoles tractées par des chevaux, dont l'usage était des lors très répandu. Déjà aussi des moteurs à essence, puis, plus récemment, électriques avaient remplacé les vieux manèges à chevaux pour les battages. Mais après 1950 les tracteurs se multiplient très vite, rendant tout à fait exceptionnel l'emploi du cheval de trait. A la motorisation de la traction la "seconde révolution agricole" a joint la "chemicalisation", c'est-à-dire l'emploi généralisé des herbicides et pesticides. Pour les cultures, les diverses semences ou plants sont renouvelés, et donc achetés, de plus souvent. Le renouvellement annuel est nécessaire pour les maïs hybrides qui ont pris une énorme extension. Pour les élevages les transformations sont encore plus profondes. Les races bovines ont été presque totalement renouvelées. L'insémination artificielle généralisée est devenue un poste de dépense notable. Surtout, et c'est sans doute la transformation la plus spectaculaire, les élevages industriels se sont multipliés et achètent à l'extérieur la plus grande partie des aliments du bétail qu'ils utilisent. Pour les élevages traditionnels eux-mêmes, les aliments de complément achetés constituent un poste non négligeable. Si l'autosuffisance en matière d'aliments du bétail a disparu au niveau de la plupart des exploitations, il en est de même au niveau de la région elle-même, qui importe la plus grande partie des matières premières nécessaires à ses usines de fabrication d'aliments du bétail.

2. LA DISTANCE DE COMMERCIALISATION

La distance des marchés finaux des productions vendues et des fournisseurs de biens intermédiaires est un trait important des relations extérieures d'une agriculture. Selon que l'on vend ou achète à l'intérieur de la communauté rurale locale, ou dans le milieu proche (disons, pour simplifier, à l'intérieur de la région), ou aux autres régions françaises, ou que, passant à l'exportation, on vende aux autres états de la CEE, ou enfin que l'on commerce hors CEE, l'impact, la signification, les conséquences de l'ouverture sur l'extérieur seront fort différentes. Dans cet essai l'on ne considérera que les relations extérieures à la région de Bretagne.

Dans ce domaine les nouveautés des dernières décennies ne sont pas tant les distances des marchés acheteurs et fournisseurs, que la diversification des partenaires commerciaux, et l'extension à des exploitations de plus en plus nombreuses des relations, directes ou indirectes, avec des pays fort lointains.

Dans la période d'entre deux guerres une partie importante de la production de nombreuses exploitations trouvait un débouché à Paris ou dans diverses régions françaises hors-Bretagne: les légumes (et les conserves de paté de porc), des bovins de boucherie, des chevaux, etc... Mais seules quelques exploitations appartenant à certains districts limités fournissaient le commerce international. C'était le cas des exploitations des "rayons" légumiers du littoral nord, fournissant l'Angleterre, surtout avant les décrets Balfour, mais aussi, dans une moindre mesure après. Des régions de Quimperlé-Lorient portaient aussi des trains de pommes à cidre pour l'Allemagne. Les plants de pomme de terre de certaines communes du Finistère se vendaient au Maghreb. Les chevaux produits par les éleveurs du Nord-Finistère et de quelques districts des Côtes-du-Nord atteignaient des débouchés plus lointains: l'Italie, l'Espagne, l'Amérique du Sud et même le Japon.

Après le Traité de Rome l'agriculture bretonne, qui était entrée dans une phase de développement très dynamique, s'efforça de profiter du nouveau cadre élargi en

réorientant une partie de ses exportations de légumes vers l'Allemagne et le Bénélux. Surtout l'Italie, enrichie par le "miracle italien", fournit un vaste marché pour les veaux et jeunes bovins. Depuis lors les marchands italiens jouent un rôle important dans les principaux marchés de bovins bretons. Des compagnies de transport assurent des services de camions réguliers Bretagne — Italie.

L'adhésion de la Grande-Bretagne à la CEE contribua à relancer les liens commerciaux traditionnels avec ce pays. Aux légumes se sont ajoutés, au moins certaines années, des volailles, notamment des dindes. Le plus dynamique des leaders agricoles bretons: A. Gourvennec, pour favoriser ces échanges, obtint la création à Roscoff d'un nouveau port en eau profonde et fonda, pour l'utiliser, la compagnie de navigation dite "Brittany ferries" (noter l'appellation anglaise). Cette ligne transporte aussi des camions venant du sud-ouest de la France et d'Espagne.

Les limites de la CEE sont franchies par les producteurs de plants de pommes de terre, qui fournissaient déjà traditionnellement le Maghreb et exportent aussi dans l'Orient méditerranéen, et surtout par les grands abattoirs de volailles qui par Brest ou Lorient expédient des bateaux entiers de poulets congelés en Arabie Saoudite ou en Turquie (dans ce cas l'abattoir a dû, pour obtenir la marchandise, faire venir des ouvriers turcs pour préparer les poulets).

Enfin les derniers développements sont les plus surprenants: A. Gourvennec, au cours de plusieurs conférences a incité les légumiers bretons à choisir comme objectif... New-York, la Bretagne étant aussi près de New-York que ne l'est la Californie. Déjà ont eu lieu des expéditions d'échalottes et de tomates de première qualité, par mer ou par air, vers la grande ville américaine.

Si les ventes de l'agriculture bretonne se sont étendues à travers le Monde, il en est de même de ses achats. Pour les semences on a recours aux autres régions françaises. Mais pour les reproducteurs bovins on s'est adressé aux Pays-Bas, pour les porcs, à la Grande-Bretagne. Dans les dernières années on a fait venir des reproducteurs bovins de race Holstein des USA et du Canada. C'est surtout pour les matières premières des aliments du bétail que l'élargissement de l'aire relationnelle paraît prodigieux. Si pour les hydrates de carbone on a surtout recours aux céréales du Bassin parisien, l'on importe aussi beaucoup de manioc de Thaïlande, et l'on explore actuellement la possibilité d'en faire venir de Chine. Pour les protéagineux, malgré le développement du pois fourrager en France, le soja demeure essentiel. On le fait venir des USA et du Brésil. Une volaille bretonne ayant consommé dans sa ration du manioc thaïlandais et du soja brésilien peut fort bien être consommée en Turquie ou en Arabie saoudite.

3. LES MODALITÉS DES RELATIONS EXTÉRIEURES: CONNAISSANCE ET ACTION

Ces modalités constituent sans doute l'élément le plus important des relations extérieures d'une agriculture, l'indice, le révélateur essentiel de l'état d'avancement d'une agriculture. En effet, ce qui importe surtout c'est la connaissance que le producteur a du milieu extérieur sa capacité d'adaptation et d'action induite par cette connaissance.

Les produits de "traite" des régions tropicales aux XVIII^e et XIX^e siècles avaient en Europe des débouchés très lointains, mais que les producteurs, à l'exception du milieu très étroit des dirigeants, ignoraient totalement, et sur lequel ils n'avaient aucun pouvoir d'action. En Europe même, et au moins jusqu'en 1939, bien des agricultures paysannes avaient depuis longtemps des débouchés extra-régionaux. Les bovins de boucherie notamment, avant même les chemins de fer, conduits sur les routes par des "toucheurs de bestiaux" ("drovers" en Grande-Bretagne), pouvaient atteindre à pied des capitales situées à 500 km et plus. Mais, dans ce cas, les producteurs eux-mêmes ne connaissaient que le premier maillon de la chaîne d'intermédiaires multiples qui assuraient le passage

jusqu'au consommateur final. Le producteur se sentait à la merci des "marchands" et devait accepter le prix qui lui était proposé.

En Bretagne la commercialisation de la plupart des produits en était restée presque à ce stade au lendemain de la guerre: passage par les foires locales pour les animaux vivants, ou par des commerçants locaux, collecteurs pour les beurres et les oeufs. Les coopératives qui commençaient à se développer étaient surtout des coopératives d'approvisionnement. Cependant, dans quelques cas, il en allait autrement. Certains éleveurs de bestiaux suivaient leurs produits jusqu'à foires hors-Bretagne. En Bretagne même ils avaient des contacts directs avec des commissions d'achat étrangères. Pour les légumes bien que la situation ne fut pas entièrement satisfaisante, les négociants locaux traitaient directement avec les Halles de Paris ou avec les importateurs étrangers. Pour le plant de pomme de terre, le début de la production fut dû à une initiative néerlandaise; les producteurs et leurs syndicats furent des l'origine au fait des conditions de production et de concurrence des Pays-Bas.

Au début de la grande mutation agricole des années 50—60, dans le but d'améliorer le niveau technique de certains secteurs de l'agriculture française, un gros effort fut fait pour promouvoir des voyages d'études à l'étranger pour des groupes d'exploitants. Les Bretons en profitèrent largement. On rapporte qu'une année le département du Finistère à lui seul absorba la moitié des crédits affectés à ce chapitre pour toute la France. Des exploitants dynamiques, surtout des jeunes purent ainsi connaître de visu des agricultures avancées: aux Pays-Bas, en Allemagne, en Grande-Bretagne, en Israël. Après cette phase initiale, patronnée par le Ministère de l'Agriculture, la pratique des voyages et des missions d'étude continua, organisée désormais par des organismes ou des groupes sectoriels divers. Cette année encore A. Gourvennec organisa, en deux charters Airbus la visite de 500 légumiers bretons en Andalousie.

Un autre facteur de la nouvelle agriculture bretonne est la croissance de puissants organismes professionnels, fédérant des coopératives d'exploitants, tels COOPAGRI (siège à Landerneau), UNICOPA (siège à Morlaix), disposant de ressources financières considérables, et qui ont pu s'assurer les services d'économistes de haut niveau connaissant bien les marchés internationaux.

L'une des conséquences de cette meilleure connaissance de l'étranger fut, des les années 1960, l'adoption d'une méthode de vente néerlandaise: celle de *veiling*, marchés à cadran à enchères descendantes, qui mettent le producteur-vendeur dans une position bien plus forte que dans les marchés classiques. Les premiers marchés au cadran furent créés pour les légumes dans les "rayons" légumiers du littoral nord (St. Pol de Léon, Paimpol, St. Méloir près de St. Malo), puis, innovation, pour le bétail (tout d'abord dans une petite localité du nord-Finistère: Guerlesquin).

Une autre conséquence de ces nouvelles conditions fut le changement d'état d'esprit, de réaction au contexte économique, des producteurs. Après le Traité de Rome les agriculteurs bretons, comme la plupart de leurs collègues des autres régions, transposèrent purement et simplement l'attitude méliniste traditionnelle du plan français à celui de l'Europe à 6, qu'ils imaginaient comme un ensemble protégé, fermé autant que possible aux importations en provenance des pays tiers. L'accession de la Grande-Bretagne, beaucoup plus ouverte au commerce international change les données du problème. Surtout l'augmentation rapide de la production européenne tendit vite à limiter les débouchés intraeuropéens. Plus encore, la surproduction agricole, que l'adoption des quotas laitiers a imposée à l'attention, et la tendance de certains dirigeants de l'agriculture européenne, surtout hors de France, à préconiser une diminution de la production agricole par extensification, ont contribué à pousser certains leaders bretons à attribuer moins d'importance au cadre européen, à vouloir le dépasser. Tous ces projets allaient en effet à l'encontre du dynamisme toujours vif des leaders paysans.

C'est ce qui explique l'attitude de A. Gourvennec montrant aux légumiers bretons le marché de New-York comme objectif à conquérir. Un économiste agricole de grande

valeur: J. Le Bihan a aussi préconisé la recherche à travers le monde de marchés solvables, citant notamment l'Asie du sud-est et l'URSS. Dans la période récente, de divers cotés, des efforts ont été faits pour "attaquer" divers marchés potentiels depuis l'Afrique tropicale jusqu'à la Chine. Les autorités régionales bretonnes ont ainsi noué des liens avec la province chinoise de Shandong — péninsule au socle primaire elle aussi, mais 15 fois plus peuplée. Mais il semble que ces pays soient surtout intéressés par des transferts de technologie, par le savoir-faire que les Bretons ont développé dans le domaine de l'agro-alimentaire.

Cette ouverture sur le monde, cette volonté d'intensification et de conquête de nouveaux marchés témoigne d'un très fort dynamisme. Mais, à certains égards la formation, l'information et l'organisation n'ont pas encore tout-à-fait suivi l'élan du dynamisme. Par exemple seules quelques personnalités, quelques groupes ont conscience de la somme de compétence, de patience et de rigueur nécessaires à l'ouverture de certains marchés. De même la présence sur des marchés lointains expose à toutes les incertitudes économiques, et en premier lieu aux variations des cours. Beaucoup de Bretons ne sont pas encore préparés, ni armés, pour accepter et parer ces chocs, à la différence notamment des Néerlandais qui, en ce domaine, aussi restent en tête.

La mutation qui a affecté les relations extérieures de l'agriculture bretonne n'est donc pas encore parvenue à son terme. Le chemin parcouru depuis la période traditionnelle, "méliniste" n'en demeure pas moins impressionnant.

THE REGIONALIZATION OF RATIONALIZATION IN US AGRICULTURAL PRODUCTION*

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From the very beginning of modern agricultural geography in the United States, macroscale studies of U.S. agricultural regionalization have concentrated almost exclusively on land use types and farming systems. Smith, Baker, and Hainsworth first set the pattern with their map of the "agricultural provinces" (1916), while one of the most recent presentations, though covering just the seventeen conterminous western states, has carried the effort to a new level by using a detailed farming classification devised by the past IGU Agricultural Typology Commission under the leadership of Prof. J. Kostrowicki (Gregor 1975).¹ Yet during all this time and particularly since the last world war, another set of regional patterns has been developing, one outside the traditional geographic view but reflecting an aspect of farming with many more implications for economic and social welfare: the rationalization of productivity. In no other country has the use of capital to enhance the productivity of land and labor in farming been more influential, or fateful. Productivity has reached levels hitherto unknown, but this has been bought at the expense of physical and human resources, particularly the smaller and capital-poor farmers who no longer can resist the "price-cost squeeze" and hence become victims of a growing contradiction in the American rural ethic: freedom of enterprise vs. equality of opportunity (Gregor 1982). A survey of the basic regional patterns of rationalization of agricultural production therefore seems more than due.

MEASURING THE REGIONALIZATION OF RATIONALIZATION

Regionalization in geography is not simply a parceling of territory, but a division based on the structure of a complex of variables. Determining these structures thus becomes a major objective, and one particularly receptive to multivariate statistical analysis. Two principal component models of production rationalization were construc-

* I owe special recognition to Floyd Hickok for writing the computer mapping programs for this study, Mike Gerardo for coding the data, and the Division of Environmental Studies and University Computer Center of the University of California, Davis, for providing processing facilities.

¹ Although J. Kostrowicki (1970, pp. 14–16) rightly points out that types and regions are different in concept, he also notes that "regional units ...[can]... be formed on the basis of dominance, co-dominance or coexistence of particular agricultural types in a given territory." On the methodological aspects of economic regionalization, the writings of K. Dziewoński (1964) and others also remain authoritative.

ted and applied to county census data. One model was based on the intensity of expenditures and outputs for the chief forms of farm capital — land, labor, machinery, crops, livestock — as related to farmland; and the other on these intensities as related to agricultural workers. Principal components was chosen over other factor analytic methods because it is more appropriate to an empirical than theoretical approach in that it requires no prior assumption about the structure. Principal components also has the ability to present exact, rather than estimated, spatial patterns, a particular advantage where extensive and detailed distributions are the product. Although the advantage is lost if the incorporated unique variance seriously distorts the variable structures, the structure produced by both component and common factor analyses of the variables in this study proved essentially similar.

Base information was extracted from the 1969 Census of Agriculture on farms selling at least \$2500 worth of products annually (1969). This was the first census in which all county data were made available on computer tape, and it was also more accurate than previous censuses because the enumeration was conducted at the end of the year instead of in the fall. The 1969 census was selected over later reports because weather distorted the regional agricultural picture in 1974 and several volumes of later censuses were unavailable during the critical stages of model formulation. Also, some information was not presented in more recent census reports. Of the 3048 reporting units (counties) in 1969, twelve were not considered because pertinent material was deleted in the census or because farms were too few to be representative.

THE REGIONALIZATION OF LAND-PRODUCTIVITY RATIONALIZATION

Despite the characteristic abundance of land and paucity of labor in U.S. farming, it is land that has been the principal focus of rationalization of agricultural productivity.

TABLE 1. Principal rationalization components

Variables	Land (... per farm acre)			Labor (... per worker)		
	L	r ²	JP	L	r ²	JP
1. Machine hire, customwork, and fuel expenditures per ...	.96	.92	.15	.90	.81	.27
2. Labor expenditures per ...	.95	.90	<u>.15</u>	.56	.32	<u>.10</u>
3. Machinery and equipment investments per ...	.94	.89	.15	.81	.65	.21
4. Crop expenditures per ...	.91	.83	<u>.14</u>	.40	.16	<u>.05</u>
5. Land and building investments per ...	.91	.83	.14	.70	.49	.16
6. Value of crops harvested per...	.85	.71	.12	.57	.32	.10
7. Livestock expenditures per ...	.69	.48	.08	.29	.08	.03
8. Value of livestock per ...	.61	.37	<u>.06</u>	.46	.21	<u>.07</u>
Sum of joint products			<u>1.00</u>			<u>1.00</u>
Eigenvalue		5.93			3.04	
Pct. of variance		74.1			38.1	

Source: Computed principally from data in the 1969 *Census of Agriculture, Vol. 1, Section 2: County Data*. Computer program was *Subprogram Factor, Statistical Package for the Social Sciences (SPSS)*. L = loading, r² = loading squared, JP = joint product. One acre = 0.4 ha.

Twice as much of the areal variation of capital inputs and outputs is accounted for by rationalization of land productivity as by rationalization of labor productivity (Table 1). Both labor and mechanization, however, heavily condition the structure of the land component, contributing both directly and indirectly to almost half of the component variance (Variables 1, 2, 3; JP in Table 1).

Land-related rationalization characteristics are no less definite in their spatial distributions. Component scores show that despite the historic prominence of agricultural production in areas such as the wheat belts of the Plains, the speciality crop centers of the lower Mississippi Valley and Gulf Coast, and the winter fruit and vegetable centers of Florida and California, it is the northeastern quarter of the nation where production rationalization is most intensive (Fig. 1). Moreover, even within this area of concentration, it is not so much the fabled Corn Belt that stands out, but the areas of the lower Great Lakes and particularly the Mid-Atlantic Seaboard. Both of these locational characteristics are reminders that the northeastern section, when compared with the South and West in the production factor combination, ranks first in wealth of capital but last in amount of agricultural land. Capital therefore is generously expended relative to land, and particularly so near the urban agglomerations, where the ratio of capital to land wealth is the greatest. However, when viewed in terms of the structure of land-productivity rationalization, particularly with its emphasis on both mechanization and labor, the explanation for the high level of rationalization in the Northeast and Middle West is more involved.

On the face of it, heavy expenditures for both labor and mechanization in this traditional area of family farmers would seem to be contradictory. Falling back on the cheaper and readily available labor supply of the family has been the traditional defense of the smaller operator faced with insufficient non-farm capital.² But although labor may be the cheapest production factor for the smaller farm operator, there is a threshold up to which most farmers can continue to employ machinery and other nonfarm inputs profitably in order to increase labor productivity. Thus even the average farm in the heart of the Dairy Belt, eastern Wisconsin, now has a lengthy complement of equipment: two tractors, probably also a truck or combine, pickup baler or forage harvester, an extensive range of tillage-cultivation implements, grain drill, corn planter, manure spreader, conveyor, and milking machines; many farms also have bulk milk tanks, barn cleaners, and silo unloaders (Korb 1969, pp. 25, 380). Northeastern farmers who are expanding their properties also are finding it expedient to rent labor as well. High farm densities make it difficult to add contiguous units, so as more distant units are acquired, it becomes increasingly advantageous for both expanding operators and those adjacent to those tracts to contract with each other to work the land. Neighboring farmers can then secure additional employment and spread machinery over more land.

The high ranking of both mechanization and labor in the Middle West and Northeast also can be traced to the extensive raising of fruit, vegetables, and poultry products, which often bring to mind other parts of the nation instead. These commodities enable dairy and other commercial farmers to capitalize more fully on their labor supply and to gain the maximum yield from their land. The intensity of this kind of rationalization increases nearer the larger urban centers, for here not only greater market attraction, but the negative stimulants of wage competition with urban jobs and higher land costs, are more prominent. Vegetables in particular, with their

² Labor expenditures in this study include not only those reported by the Census for "hired farm labor" and "contract labor," but those "expended" for the operator. This last figure was estimated by using the index of "man-equivalent" values provided by the Census, and multiplying the result by an annual income based on a composite hourly wage rate projected to a 6 day week and 53-week year.

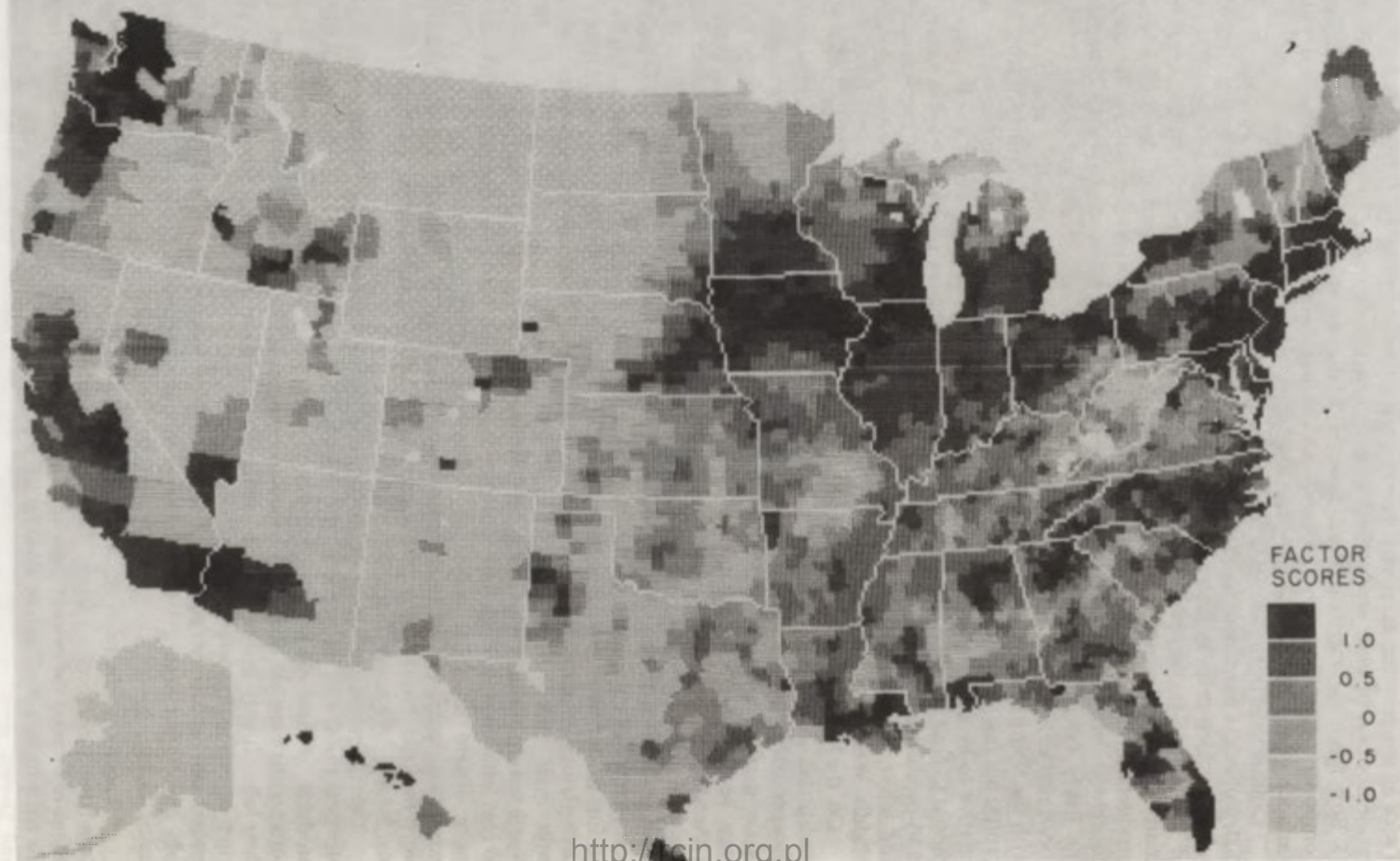


Fig. 1. Rationalization of land productivity. US mean = 0.0 st. d.

heavy demand and short-term adaptability to changing markets and land ownership situations, become increasingly the favorite land use choice as urban concentrations are approached. Labor demands of such crops have always been high, with large expenditures for both hand labor and mechanized (custom) workers. On the other hand, mechanization advances have also begun to reduce the rate of expenditure increase. Tractors and tractor-drawn equipment such as plows, harrows, listers, bedders, precision planters, cultivators, and high concentration sprayers and dusters, have materially cut labor inputs. Harvesting requirements have also been lessened, particularly through flash freezing.

Despite its many advantages, mechanization in its pressures for even greater application has serious implications for the smaller farmers in this region. In no other US area of comparable size are so many farmers heavily mechanized and yet critically vulnerable to the dictates of machinery. Operators with more need for multiple-type operations, so as to utilize fully the family labor supply, are not as capable as the larger and more flexible operator in meeting specialization demands of machinery.

Further, smaller machinery does not provide the same labor productivity as the larger equipment, so more machine capital must be invested per acre to achieve the same productivity obtained by the larger operator. However, such equality assumes machines would be operating with higher acre-yields, and this is often not the case.

To these basic problems confronting the smaller farmer must be added one of self commission, overmechanization. The desire to "keep up" with the neighbors and just to "make things easier" has undoubtedly contributed heavily to this type of diseconomy. The phenomenon is widespread, and especially so on the smaller farms, an aspect that may be contributing significantly to the high land rationalization intensity of this region, especially nearer the cities and in the Northeast.

With less capital available relative to acreage than in the northeast quarter, the less intensive rationalization of land productivity in the South is understandable. But, as with the North, such a generalization conceals a more complex situation. First, despite the lower overall ranking of the South in land capitalization, almost all its major agricultural areas rank above the national average (O.O standard deviation). Second, its single most prominent region ranks at the same high levels (over 0.5 st. d.) of many leading areas in the North, yet embraces areas where the mechanization-labor thrust in land-productivity rationalization would seem to have less favoring circumstances; this is a belt encompassing the Piedmont and Appalachian valleys of Alabama and Georgia and almost all of North Carolina. Mechanization would seem to be the very antithesis of two major economies of this "belt", poultry and tobacco farming, and indeed, the large amount of fuel used for heating chicken houses and curing tobacco rather than operating farm machinery exaggerates the importance of the combination mechanization-labor variable as offered by the census (Var.1: machine hire, customwork, and fuel expenditures). The other mechanization variable (Var. 3), however, dealing directly with investments in machinery and equipment, has a firmer base. Newer poultry enterprises have been using increasingly more feeding and handling equipment. Poultry farming has also not been regarded as a preferred occupation, and this view has helped to hasten mechanization. Mechanization is also beginning to make significant advances in tobacco farming, ranging from machines that have drastically reduced the labor needed to transplant the seedlings, to mechanical harvesters employing only the operator. The harvester is spreading rapidly among the larger tobacco farms in North Carolina. Great numbers of blacks, the predominant labor force there, have left the fields, though fortunately most have found jobs in nearby new industries (Hart and Chestang 1978, pp. 457-458).

The high intensity of machinery and equipment inputs in the poultry and tobacco areas also can be traced to other enterprises, some of which are combined with poultry or tobacco raising, and others pursued independently. Cultivation of cotton, soybeans,

and corn is especially favored by larger operators because they can more easily mechanize. Some of the most expensive machines used in agriculture are employed to harvest these crops: combines, corn pickers, and cotton pickers. Poultry, cattle, and dairy operations are also becoming income favorites, and therefore additional mechanization stimulants, on the larger farms.

The equally high ranking of the poultry-tobacco-mixed crops belt in labor inputs can be attributed to a variety of needs. Labor employment in this area of high farm population density is critical, and in the tobacco areas labor demands remain some of the highest anywhere. Not even the advances of mechanization have entirely eliminated work crews in the tobacco fields; even the latest four-row transplanter carries eight workers (Hart and Chestang 1978, pp. 456–457). Besides the great amount of family labor expended, there are also heavy contributions of customwork and hired labor, much of the latter composed of former share croppers who have shifted to cash wages. The larger farms, with their important additional enterprises, have added still more to the labor forces. Already as early as the 1950s, farms in southeastern US with annual sales of at least \$25 000 were using almost four times as much labor as the smaller units, and their proportion of the total farms continues to grow (US Bureau of the Census 1954a, p. 26; 1954b, p. 26).

The only other areas in the South comparing with the high levels of land-productivity rationalization in the poultry-tobacco-mixed crops belt are scattered through central and southern Florida and the Mississippi delta. Both mechanization and labor inputs figure strongly in all these places except in central Florida, where the lesser machinery requirements of the dominant orchardists and a marked seasonality in labor demands reduce mechanization intensity. Urban influence may also be recognized in the Gulf Coast-Florida Peninsula locational patterns (New Orleans, Orlando-St. Petersburg, Miami and the “Gold Coast”), just as in the larger area farther north (Birmingham, Atlanta, North Carolina’s “Urban Crescent”) and the heavily urbanized northeastern quarter. But, as in all these areas, how much of this influence is due to stimulation of the market and encouragement of farming intensity through pressure on land prices, and not just to effect of land speculation on the land investment variable (Var. 5: value of land and buildings), remains a question.

Rationalization of land productivity reaches its nadir in the drier western half of the country, for here working capital is at its scarcest and land its cheapest. The region includes even the highly productive Spring and Winter wheat belts, roughly outlined on the map but below the national average. Only the middle and lower Platte Valley of Nebraska on the east and the Pacific coastal valleys on the west significantly interrupt this emptiness, although a few scattered oases, such as along the Snake River in Idaho, the South Plate in Colorado, and in the Texas Panhandle southwest of Amarillo, dot the interior. In such places it is only irrigation that has raised the ratio of capital to land to a level similar to that of leading eastern areas.

It is not until the Pacific areas is reached, however, that this higher ratio claims the extent of territory characteristic of many eastern sections. All the major valleys—from the Puget Sound-Willamette Valley complex in the Pacific Northwest to the Central Valley, southern California lowlands, southwestern Arizona corner, and Hawaiian Islands in the Pacific Southwest—are well above the national mean in land-productivity rationalization. In the Southwest, the convergence of men and machines on the irrigated land has been remarkable; vast amounts and a bewildering variety of machinery are both owned and hired, and huge expenditures are made for fuel and for hiring both customwork and field laborers. Perhaps nowhere else, too, is the line between large and small operators in these respects drawn more sharply. Small farmers are definitely in the majority, but it is the larger ones that own, and lease, the majority of the arable land, and thus are able to use machinery most extensively and economically. But not even this group is immune to the constant pressure for ever

greater scale, as the larger and more specialized machines used in the larger operations exact their price. Even the largest and most mechanized of farm operators, such as those raising cotton, now are finding it increasingly profitable to rent machinery or to contract with a firm specializing in mechanized work. Smaller growers also use these services to some extent, a practice that partly explains the high rationalization rankings in metropolitan counties, where the small farm sizes and sharp seasonality of many of the crops discourage large machine inventories. None of this is comfort to the traditionally large numbers of field workers, who now find themselves in the ironic but unsurprising position of receiving the highest agricultural wages in the nation in the face of increasing mechanization of manual tasks. Whether the growing number of "tractored off" workers can ultimately be satisfactorily absorbed into the urban economies is still unanswered.

THE REGIONALIZATION OF LABOR-PRODUCTIVITY RATIONALIZATION

Why labor is less a regionalizing force than land in agricultural rationalization is clearly evident in its principal component structure (Table 1). Labor is much less representative of the variable complex, with almost half of the areal variation accounted for by just the two mechanization variables (Vars. 1 and 3); if the size of the production area, here defined as the ratio of land building investments to farm workers (Var. 5)³ is also taken into consideration, the proportion of the variance increases to two-thirds. Efficient use of machinery depends on sufficient cropping area, while farms become increasingly dependent on machinery as they are enlarged. Although this mutual reinforcement is most pronounced in the labor-poor West, it is by no means as clear cut as commonly assumed. In the East, most of the Corn Belt, the most important parts of the western Dairy Belt, and smaller and scattered areas such as the Texas Gulf Coast, portions of the Lower Mississippi Valley, southwestern Georgia, and the Delmarva Peninsula rank above the national average in labor-productivity rationalization; in contrast, in the West large sections of the Colorado Plateaus and Pacific Southwest lowlands and scattered counties in the Rocky Mountains fall below the national mean (Fig. 2). When the highest category of labor rationalization is considered (over 1.0 st. d.), the East-West differentiation becomes more marked, with the Great Plains and western Corn Belt now forming the dominant concentration.

It is a tribute to the mechanizing capabilities of Corn Belt farmers that despite their smaller properties they are able to use machinery as extensively as many of the large mechanized operators do on the Plains. Besides the usual trucks and tractors, often of enormous size and diesel-powered, there is a wide variety of more specialized machinery to be found on the typical Illinois and Iowa farm, ranging from large and expensive pieces like corn pickers and combines to smaller but no less vital equipment like plows, cultivators, and seeders. Although a highly favorable cropping environment explains in a major way the ability of Corn Belt farmers to use machinery extensively on their comparatively smaller farms, farm management practices have also helped greatly. Custom farming, as already noted, is widespread, as is tenancy, which allows operators to use large amounts of machinery where any other arrangement would simply be too expensive.

Extensive mechanization is an old story on the Plains, but its growth in variety and application is an event of only the last few decades. Corn pickers, field forage

³ The number of farm workers is based on the computation of "man-equivalent" values (Note 2). County census figures on land and building investments are combined; for the period studied, building investments averaged less than 20 per cent of the combined national total (US Department of Agriculture 1971, pp. 11-12).

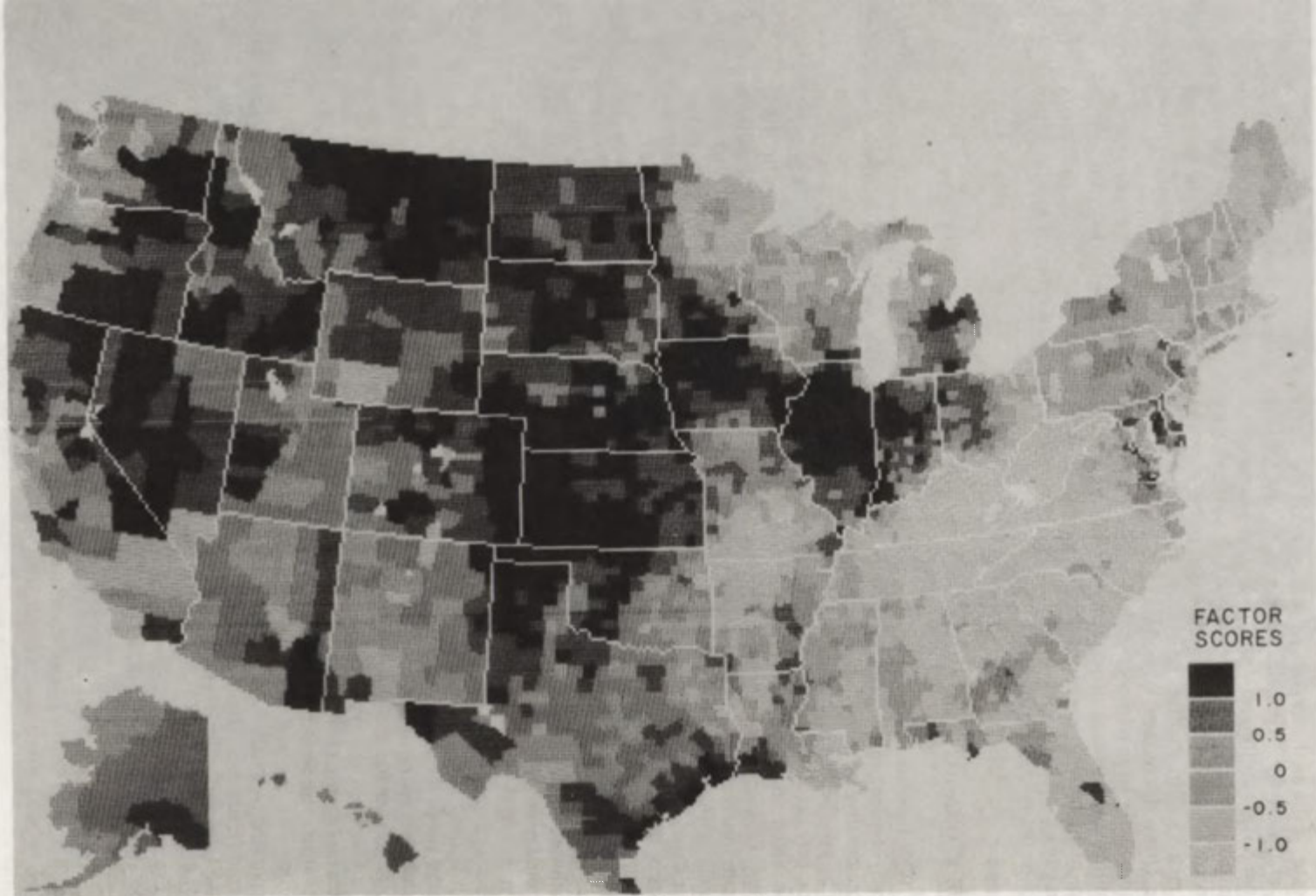


Fig. 2. Rationalization of labor productivity. US mean = 0.0 st. d.

harvesters, and pick-up balers capable of producing a bale of one to several tons are now some of the more powerful rivals of the traditional combine in size and investment, while custom hiring is important in all machinery applications, from combining to trucking. The combine is still the key machine in saving labor, for it is not only larger now and self-propelled, but capable, with adjustments, of harvesting grain and sorghums in addition to wheat and other small grains. Corn picker headers can also be attached to some models. But the combine also remains the single most expensive piece of machinery, so custom combining has also greatly increased. This trend has reversed an earlier shift toward addition of combines to farm inventories, when, after the Second World War, farmers acquired enough land and money to make such purchase possible. Hiring workers and machines has been especially attractive to the larger operator, with his greater supply of capital but also higher sensitivity to labor peaks because of particularly heavy specialization on one crop. More machinery can be hired and usually the custom operator furnishes operators for the machines. Custom operators originated and still locate in greatest numbers in the Winter Wheat Belt, but they are extending their operations to other parts of the Plains, most notably to the north. This move is at least partly associated with a similar pattern for winter wheat, as it is being increasingly substituted for spring wheat. The higher yields of winter wheat especially enhance the profitability of large-scale machine harvesting. More than 16 000 custom cutters and 8000 combines and grain trucks now work their way from Texas to Canada every summer (Sosnick 1978, p. 5).

It would be a mistake to ascribe the noticeably westward bias of the highest class of labor rationalization on the Plains simply to a very low labor supply. Undoubtedly it is on the drier western margins of the Plains that one finds more the classic example of extremely extensive farming, where, in relation to the area farmed, inventories remain as small as labor investments. But irrigation has long made possible much more intensive operations along streams, and, in more recent decades, has spread well beyond the valley bottoms. This expansion also evidences increasing labor economization as centrifugal high speed pumps and new means of distribution water have proliferated. The development of siphon tubes in the 1940s reduced some of the need for shovelling open and closing off furrows, and more recently the introduction of gated pipe (pipe with multiple, controllable outlets along its length) further reduced the labor needed for applying water to the individual furrows. The main advance, though, has come with rotating sprinkler nozzles and aluminum pipe. At first, the entire system had to be dismantled and moved by hand from field to field, but now pipes and attached sprinklers can be moved automatically on wheels, either linearly or in a circle around a fixed pivot. Center pivot irrigation had had its greatest success on the southern Plains, and its growth rate during the 1970s was more than ten times the national rate (McKnight 1979a, p. 77; 1979b, pp. 119, 121). But this prodigious increase has been achieved by paying heavy charges for fuel for pumping as natural prices have risen and groundwater levels fallen. Costs of a complete center pivot system for 133 acres (54ha), the standard individual irrigated unit, have also ballooned. Meanwhile, too, the increased yields from irrigation have made mandatory corespondingly larger investments in machinery. Irrigation expansion therefore has become less and less a function and favorite of small farm settlement, as technology has reduced the need for labor and put a premium on on capital equipment. Where physical conditions pose even greater initial handicaps, this kind of irrigation development is even more obvious, as illustrated by the rise of the big cotton farms on the drier West Side of the San Joaquin Valley (Gregor 1974, pp. 60–67) and the potato “superfarms” on the arid benchlands of the Snake Plains in Idaho (Smith, D. L. 1970; Smith, Jr., E. G. 1980, pp. 538–539).

Irrigation and mechanization have also made strong, though not as spectacular, progress on farms along parts of the rivers flowing eastward across Montana, Wyoming, and the Dakotas. Federal water projects have increased access to water,

and this has generated demands for a greater number and variety of machines, usually quite specialized. Potato and sugar beet harvesters are important examples. Hay production on both irrigated and unirrigated land also sparked a large increase in hay balers and associated equipment. Where specialty crop joins with feed crop, the amount of machine use on a farm can increase substantially.

FUTURE RATIONALIZATION PATTERNS

The conclusion of this summary paper on US agricultural rationalization and its regionalization requires at least a note on future patterns. There seems little doubt that rationalization of production will continue in most agricultural areas, and that the greatest growth, as indicated in current distributions, will concentrate on increasingly fewer acres. Not as clear is whether this narrowing focus will continue to occur more on the best farmland or nearer the major urban centres, as the best land becomes more expensive and capital continues to increase. The premier position of the northeastern quarter of the country in the most important rationalization component, land, suggests that while premium farmland will continue to be a strong locational attraction, urban areas could become a strong counterforce. It also suggests that this area will become an increasing center for assessing the ultimate impact of rationalization on productivity and resources, for here farmers, prime farmland, and cities locate on a scale unequalled elsewhere in the nation. How these three elements interrelate with continuing rationalization promises to have profound consequences for the social and economic condition of American agriculture.

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CHANGE WITHOUT CHANGE: THE SUBURBANIZATION OF HONG KONG'S RURAL VILLAGES

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The suburbanization of rural villages leads to the final stage in their transformation from agriculturally-oriented nodes of settlement and social units to their incorporation into cities functionally or formally or both. It thus represents a convergence of two major processes of geographical significance – the transformation of rural society and economy on one hand and urbanization on the other. The latter process has many facets but scholarship discerns these with rather varying degrees of clarity. Thus much more is known about the dimension of population growth than about spatial expansion of the city where basic problems of definition, not to mention difficulties of data sources, have hindered the precise delimitation of successive stages of growth. Even here, rather more is known of the spread of suburbs into hitherto rural areas than the less-obvious process by which small towns and villages on the metropolitan fringe are drawn into the functional fabric of the city, often while still remaining spatially separate.

The incorporation of such settlement units is by no means a new phenomenon. In the 1820s, a village called Brooklyn became a dormitory for Manhattan. In West London, the British one, Acton was incorporated into the growing conurbation in 1861. But generally in the nineteenth century suburbs were essentially of two kinds: the detached villas of the very wealthy and the working-class “faubourgs” (Thorns 1972, 59). This distinction has remained to some degree despite the rise of the “mas suburb” based upon rapid transit of one kind or another, for some of the relatively-wealthy still seek the perceived benefits of a semi-rural life. Such people may be the harbingers of further change to mass suburbia which ultimately submerges, even obliterates the former rural settlement node as Dobriner's minor classic has indicated (summarized in Dobriner, 1972). Just how many such “invaded villages” there may be globally, and to what degree they are part of an overall suburban assault there is no knowing. In Japan, for example, Allinson (1979, 17) has suggested that few if any suburbs have developed on virgin soil for there has nearly always been a rural hamlet, often of considerable age, in the vicinity acting as the focus of settlement growth and itself being transformed by the invasion of “outsiders”.

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FORMS AND PHASES OF TRANSFORMATION IN HONG KONG

This situation certainly typifies many parts of Hong Kong's New Territories where many villages and hamlets are experiencing suburbanization as "outsiders" come to settle in them, transforming them spatially, architecturally, and socially. This transformative process takes two basic forms and represents the latest in a series of phases beginning in the 1950s.

Government in Hong Kong, while operating within a basically *laissez-faire* capitalist system, has nevertheless long retained extremely tight control of land use and land alienation. In general, suburban development has been deliberately planned with the aims of housing a growing population, preferably with the provision of employment in the suburbs, and of reducing residential population densities in sometimes-deteriorated inner city zones. Such planned development has led to the transformation of once-rural service centres such as Tuen Mun and Yuen Long in the west together with Sha Tin, Tai Po, Sheung Shui, located along the territory's central rail axis into New Towns, each occupied by several hundred thousand persons at densities somewhat but not markedly below those of the existing urban core (see Fig. 1).

A less-obvious form of transformation typifies many of the 600 or so "rural" villages in the New Territories. In these much land has remained under the control of "indigenous" villagers, descendants of residents and landowners at the time of Cession in 1897. In recent times many of these have seen the opportunity to generate income from city-dwellers seeking permanent residence or a second, recreational home in villages which in many cases have lost their former function as the place of residence of farmers and rural artisans.

Until the late 1940s and early 1950s, most villages were largely or entirely agricultural, relying upon the double-cropping of rice, fishing where location permitted and likewise some intensive market-gardening, usually integrated with pig and poultry production, where road or rail access to urban markets permitted. The 1950s saw substantial immigration from the north and the stream of migrants included significant numbers of experienced farmers who either rented or bought land for farming. With rapid growth of both population and wealth the market for vegetables, pigs and poultry expanded together with the area required to provide them. This expansion favoured those areas which were quickly accessible to the city. Here rice-growing was quickly replaced by more intensive forms of cultivation. Elsewhere, rice-growing was steadily abandoned to be replaced, if at all, by haphazard, low-intensity cattle-rearing. In the 1960s and the early 1970s these developments were paralleled by and strongly influenced by migration from the villages, not merely to urban Hong Kong and Kowloon, but abroad, to Britain especially. Ng Pui Suk (1977, 39) has noted that from 1972 to 1975 65 000 people emigrated overseas from Hong Kong, a substantial but unknown proportion from the New Territories.

The result of such changes in remoter areas, especially to the east, was widespread depopulation, even village abandonment, as people in the working age-group moved abroad, often leaving the elderly behind, people who were in no position to work the village lands even if it had been economically worthwhile to do so. These vicissitudes have been documented in a number of field studies, with the exception of that by McGee and Drakakis-Smith (1972) on the Sap Say Heung, mostly unpublished. Yue (1981), for example, traced change in three villages in the eastern Sai Kung district, Tai Mong Tsai, Sha Kok Mei and Ho Chung. In 1958 these were occupied by 1149 people comprising 235 households. By 1971 the population had declined slightly despite the fact that Hong Kong's total population had roughly doubled, and eight per cent of the dwellings lay empty. A field survey in 1981 showed that the number of "indigenous" households (i.e. those extant ten years earlier) had fallen to only 63 while a new group of 36 households had come in. Forty-four per cent of dwellings were intact



Fig. 1. Hong Kong: major built-up areas and places named in the text

but vacant or in ruins. Another study showed that in 1971 in 11 villages in a valley west of Tai Po on the central axis, 17 per cent of the dwellings were vacant (Ho 1978, 7). More recently, surveys by Ng Pui Suk (1977) and by the senior author (this study) of 39 settlement nodes in the Sai Kung district showed that in 1977 of 637 dwellings enumerated 34 per cent were unoccupied compared with 44 per cent of 776 dwellings in the same villages in 1987. In the same years, a further 7 and 17 per cent respectively were only periodically occupied. In the same district, Yeung's study of the Sap Say Heung (14 villages) showed that in 1980 only 29 per cent of 234 persons surveyed were in full-time employment (Yeung 1980, 28). Many of the remoter villages were, and some remain, little more than decaying homes for the elderly who could not or would not move.

By contrast, villages near the urban core or with good access to it, had long become suburban in character. Poon (1968, 18–19) spoke of Sha Tin as a “semi-town” characterized by the presence of more than two social groups differing in historical origin and “mentality”, the co-existence of two different groups with great differences in income levels and architecturally, a mixture of traditional grey-brick village houses and modern dwellings of which the latter already comprised 70 per cent. By 1975, in the same area, Wai (1975, 20) reported that only a quarter of the household heads surveyed in eight villages worked in their home village or in a neighbouring one. Across to the west, in Lo Wai, a village close to Tsuen Wan, only half of the household heads worked in the village in 1968 (Cheng 1968). Even in villages on the far west coast, suburbanization, again as measured by work-place, had substantially penetrated by 1976 with 43 per cent of villagers at Ha Pak and Nim Wan and a two-thirds of villagers at Wong Nai Tun commuting daily to Yuen Long, the destination of the sole bus service (Ng Hon Ying 1976). Suburbanization, as measured by the presence of “non-indigenous” residents in the villages, has even spread to the out-lying islands where Yip (1980, 44) reported that they comprised 8.0 per cent of the residents of South Lantau and that there was a sprinkling of “non-indigenous” commuters even in Tai O, a two-hour (one-way) journey from Hong Kong's CBD.

The suburbanization process in Hong Kong has thus varied greatly depending largely upon accessibility but also in some areas, the Sap Say Heung is one, upon the degree to which indigenous villagers have been willing to tolerate the presence of “outsiders”. Where villages are accessible by road, and especially, where regular bus services developed, they tended to remain economically viable as employment, especially for young women, became possible through commuting. Economic viability was sometimes maintained despite significant out-migration of indigenous villagers. The latter point has been emphasised by Sin (1971) whose study of the Man-clan village of San Tin showed that the migration of Man clansfolk to Britain was compensated by an influx of non-Man Chiuchow and Shanghainese migrants newly-resident as tenants. About half of these worked locally, mainly in agriculture. By contrast only a third of the indigenous Man people worked in the village (Sin 1971, 52).

Broadly speaking, this pattern of maintenance, or expansion has applied to villages in the west and centre of the New Territories. To the east, however, the pattern was rather different. Accessibility was often difficult. The small market town of Tai Po was accessible from villages on the southern shores of Tolo Harbour by a once-daily ferry and long walks to piers were the norm. Sai Kung town was connected to Kowloon by road only in the late 1940s and it was not until the early 1970s that a road reached the Sap Say Heung. Further eastwards, roads were constructed only after substantial depopulation had occurred and even today traffic beyond Pak Tam Chung is confined to buses, residents' and other specifically-permitted vehicles, for much of the area forms part of a Country Park and is thus designated for recreational purposes. Nevertheless this eastern zone is experiencing suburban development. Along the Clearwater Bay Road and along Hiram's Highway to the vicinity of Tai Mong Tsai this takes the dual

form of internal transformation of pre-existing settlement nodes plus small-scale suburban housing developments. Elsewhere, where change has taken place at all during the last 10 years, it has been mainly by internal transformation, suburban development being represented only by individual villas constructed for rent adjacent to older village cores or by the renovation or reconstruction of individual village houses.

CASES IN THE EASTERN NEW TERRITORIES

The remainder of this paper is focussed on the second zone where suburbanization is just beginning in the more accessible villages thus reversing a trend of depopulation and abandonment which, however, substantially continues in villages not accessible by road. The discussion draws largely on recent studies by Tse (1986), whose study is confined to a single village on the Clearwater Bay Road and by Kathy Ng (1986) who focussed upon the distance factor as related to suburbanization in her study of five villages near Sai Kung. The Sai Kung area totals about 100 km² of steep, broken terrain with small valleys, once used for rice cultivation, earlier extended upslope by terracing. The settlements on the islands had some orientation towards fishing, especially Tap Mun, the island to the north which remains an active centre for this activity. The Clearwater Bay area is topographically similar but being long since linked by road with Kowloon and closer to it, was less agriculturally-oriented 20 years ago and today shows substantially greater suburban development.

In the eastern Sai Kung area the overall pattern of change has been to some degree measured by this author's replication in 1987 of a study by Ng Pui Suk (1977). Her study was based upon a census of living quarters in the villages, classifying intact dwellings into those permanently occupied, those periodically occupied and those unoccupied. This measure gives an indication of abandonment and also suburbanization since periodical use, as holiday homes, may be regarded as a "suburban" characteristic in the Hong Kong context. Increases in the proportion of permanently-occupied homes from 1977 to 1987 also indicate suburbanization since such have not been occupied by agriculturalists but, as Kathy Ng's more detailed study shows, by suburbanies. The results of the surveys of 39 villages are set out in Table 1 and graphically in Figs 2A and B which shows the degree to which village-by-village the proportion of dwellings in the permanently-occupied category has fallen to be compensated by increases in the proportion in the periodically-occupied and unoccupied categories.

More detail is given in Figs 3A, B and C showing the proportion of dwellings in each category in each village. A comparison shows that in 1970 depopulation had already begun mainly in villages along the line which the road was soon to take and in isolated island and coastal locations. By 1977, in most villages dwellings were either

TABLE 1 Occupance status of dwellings in 39 eastern Sai Kung villages, 1977 and 1987

	1977	%	1987	%	% change
Permanently occupied	374	58.7	301	38.8	- 20
Periodically occupied	44	6.9	131	16.9	+ 198
Unoccupied	219	34.4	344	44.3	+ 57
Total	637	100.0	776	100.0	

Source: Ng Pui Suk, 1977 and a survey by N. L. Hill, R. K. Hill and R. D. Hill, 1987.

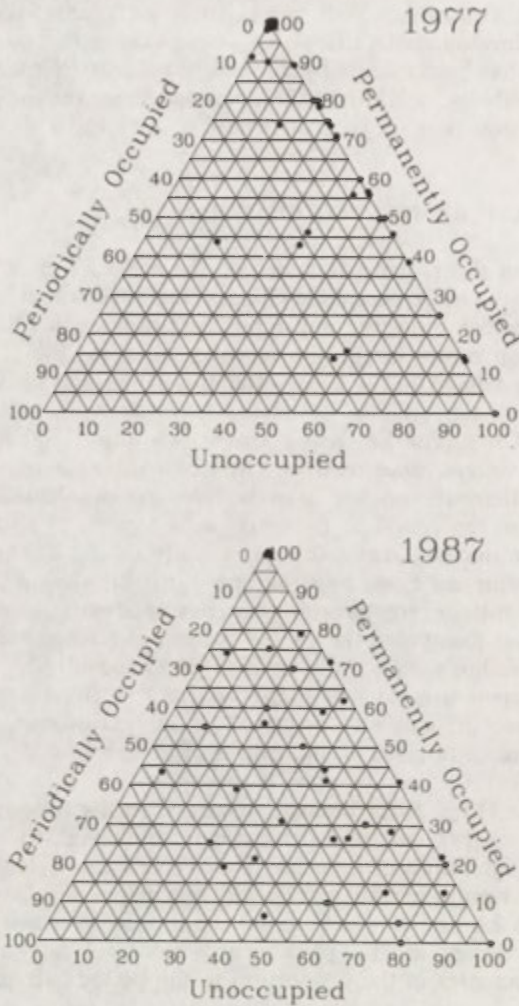


Fig. 2. Proportional triangular graphs showing occupance status of dwellings in 38 eastern Sai Kung villages

permanently-occupied or not occupied at all. By 1987, while villages had rather more unoccupied houses (because 48 were actually newly constructed or under construction) in many villages a higher proportion of houses was periodically occupied, usually at week-ends, some by members of owners' families, others by unrelated recreationists. A further new development has been the penetration of purpose-built holiday camps and bungalow complexes, some operated at commercial concerns, others by charitable organizations. These cluster particularly in the vicinity of Tai Mong Tsai which has seven, the largest, near Pak Tam Chung, holding close to 300 holiday-makers.

Although the proportion of permanently-occupied dwellings has fallen overall in the eastern Sai Kung area, this disguises stability, even some rise, especially in villages accessible by road where village houses have been renovated or reconstructed, where new dwellings have been erected close to the village core for rent to outsiders. (Sale is, by law, usually possible only to members of families with land rights in the same village). This is shown in Fig. 4 (for 1987) which clearly shows the continued decline of

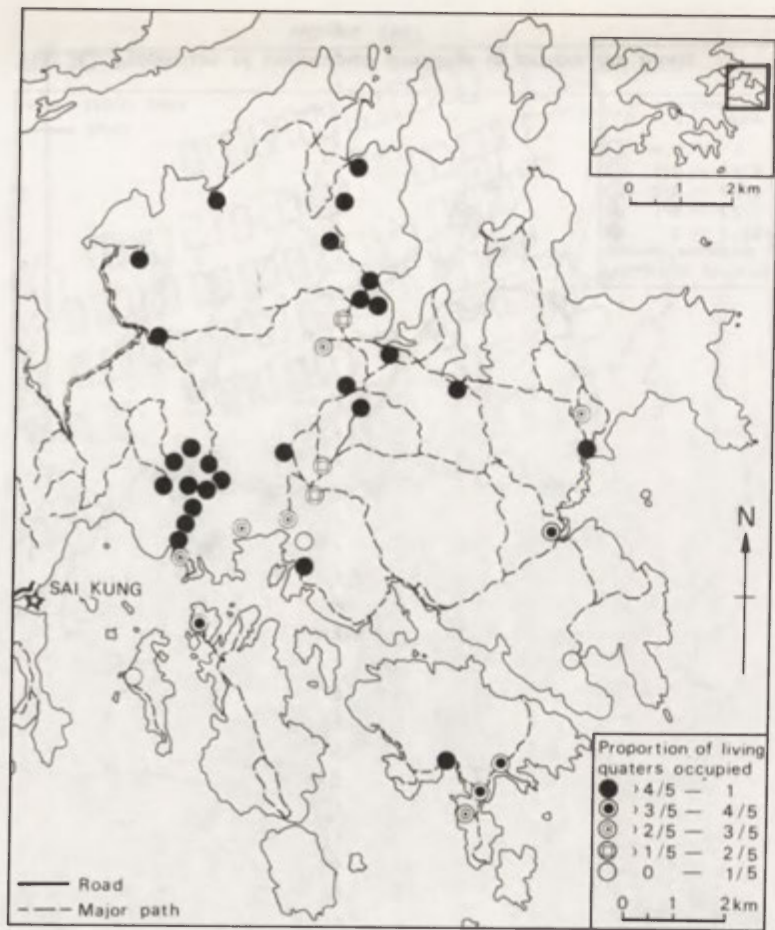


Fig. 3A. Proportion of unoccupied dwellings in eastern Sai Kung villages, 1970

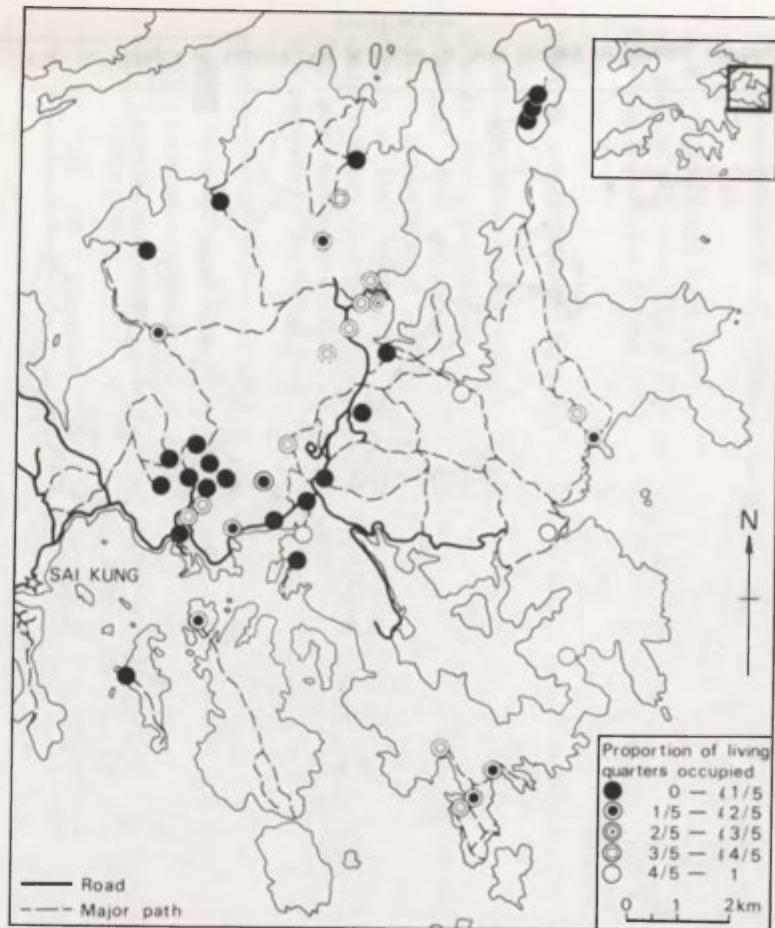


Fig. 3B. Proportion of unoccupied dwellings in eastern Sai Kung villages, 1977

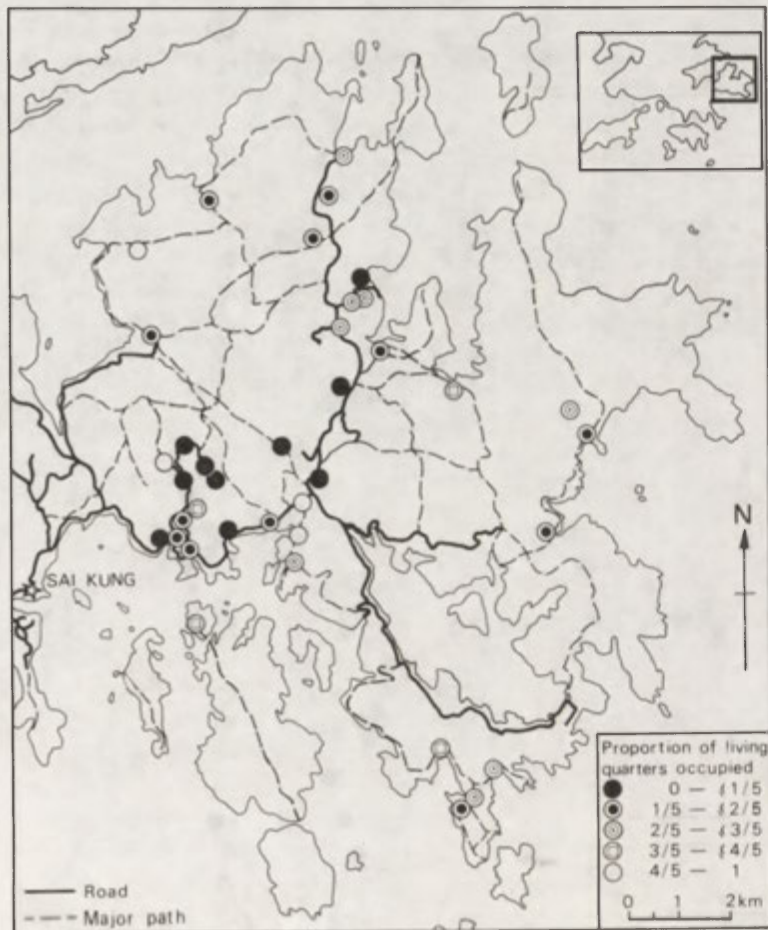


Fig. 3C. Proportion of unoccupied dwellings in eastern Sai Kung villages, 1987

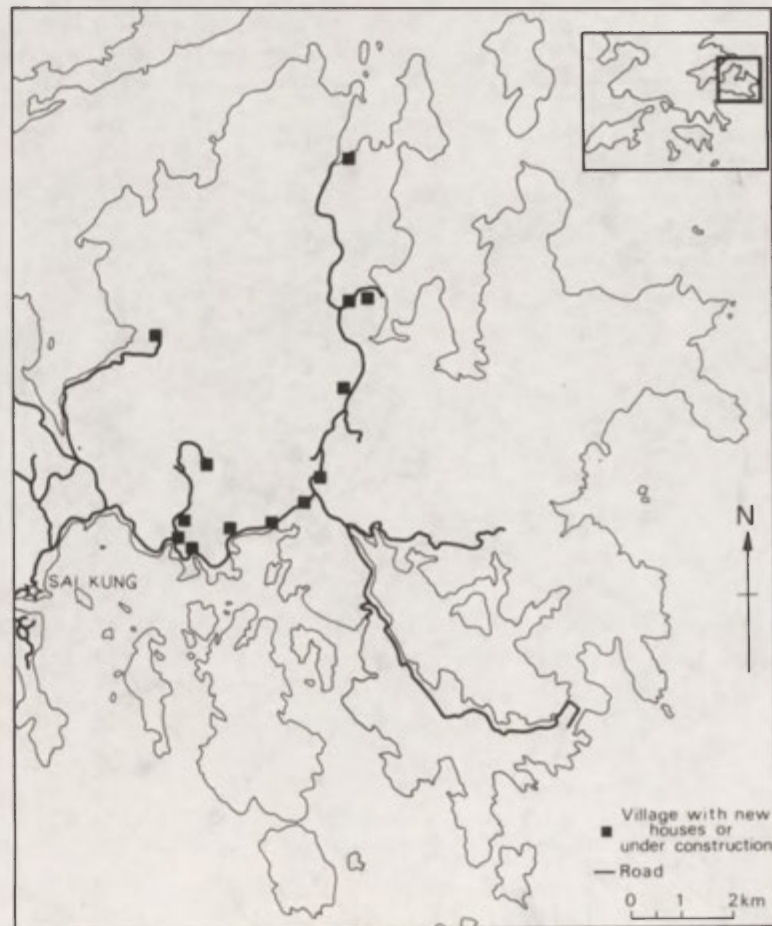


Fig. 4. Villages in eastern Sai Kung with new houses or houses under construction

most villages distant from road access as well as the decline of a few along roads which are not likely to be attractive to outsiders either by reason of location and amenities (sewerage notably) or because villagers do not wish to have outsiders living near them.

SPATIAL, DEMOGRAPHIC, SOCIO-ECONOMIC AND MOBILITY PATTERN CONTRASTS

Villages in the region generally possess a simple form. Very small ones comprise a single row of dwellings, some detached, others not, frequently located at the piedmont. With greater size further rows are added to form a loosely-rectangular pattern. Modernization has generally not greatly altered this form for it reflects the pattern of land ownership. With reconstruction row-houses often give way two- or three storey detached houses which remain closely-packed. In the village of Tai Po Tsai Tsuen studied in detail by Tse (1986) this layout is very clear even in the relatively-new extension of the village to the west (Fig. 5). There may be some tendency to greater

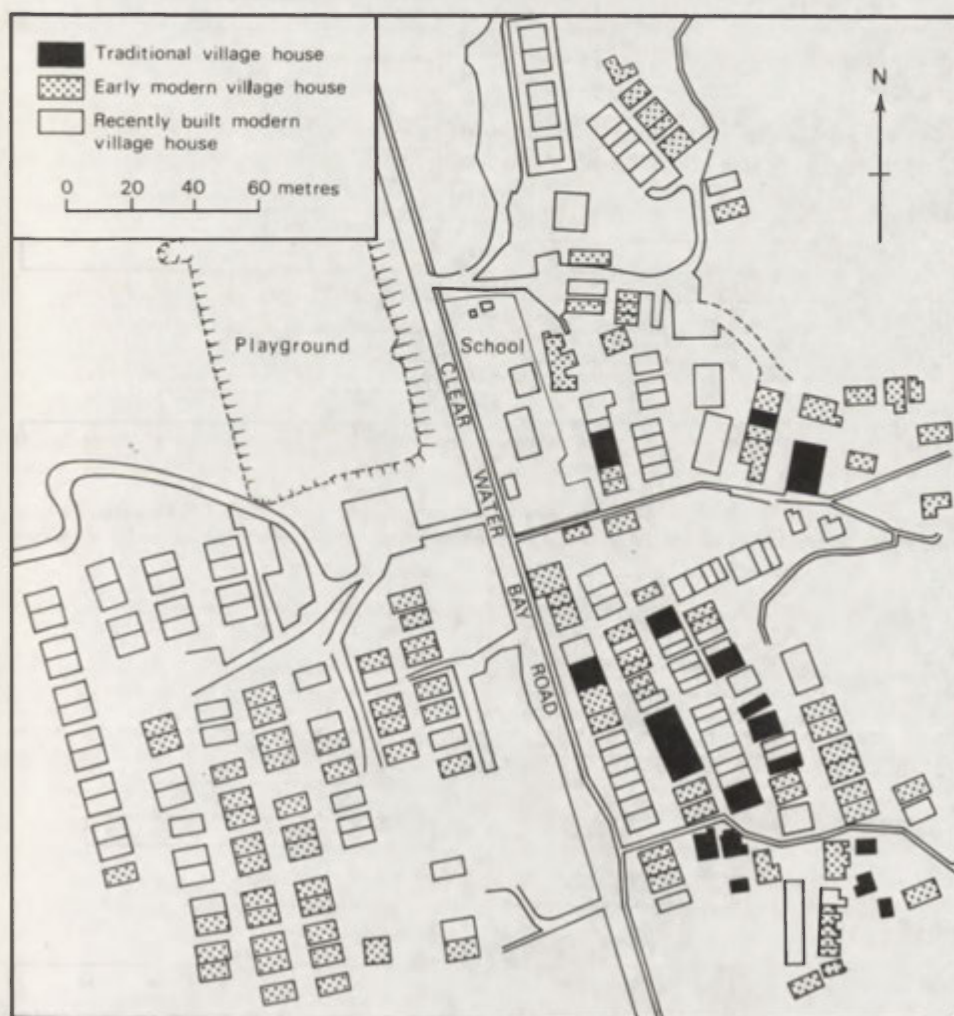


Fig. 5. Spatial pattern of house-types at Tai Po Tsai Tsuen, 1986

dispersal and varying orientation of residential units outside the village core in other villages. In Tai Wan and Tseng Tau the particularities of land subdivision and land ownership have permitted some variation from the row pattern characteristic of the old core. Nearest-neighbour analysis applied to data from Tai Wan, Wong Chuk Wan and Tseng Tau showed that in every village villagers' and suburbanites' homes were significantly clustered (Kathy Ng 1986, 99–104).

This spatial segregation is paralleled by a whole host of other differences — demographic, socio-economic and behavioural. At Tai Po Tsai Tsuen differences in the age/sex structure are not particularly marked (Fig. 6) probably because the indigenous

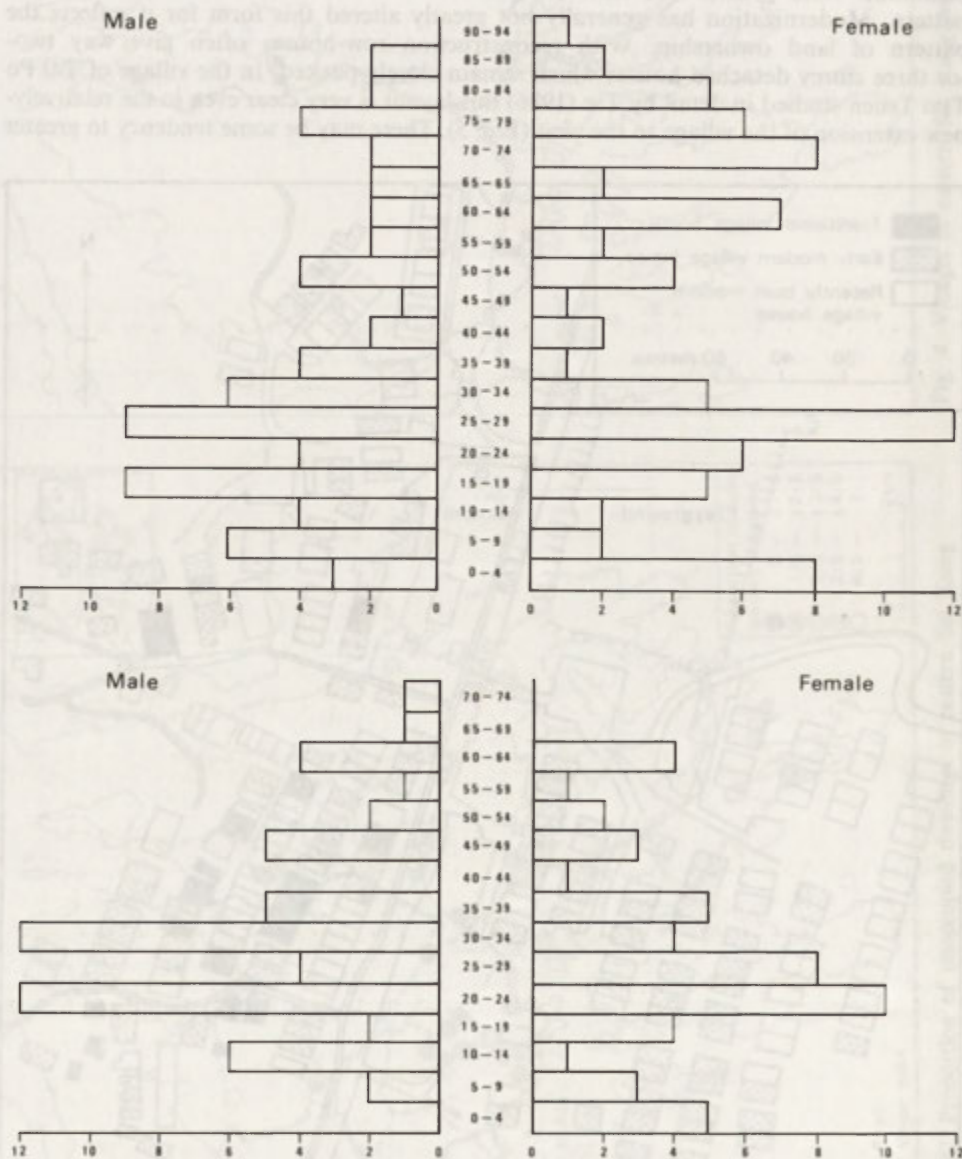


Fig. 6. Age/sex pyramids of "indigenous" (A) and "non-indigenous" (B) persons at three eastern Sai Kung villages, 1986

villagers have themselves to a degree been drawn into the urban economy and the village has not suffered emigration and depopulation. In the three eastern Sai Kung villages containing significant numbers of suburbanites, however, the age/sex pyramids are strikingly different with a much higher proportion of elderly persons amongst indigenous villagers (Kathy Ng, 1986). Both groups share the characteristic of few children, the suburbanites because many are young married couples yet to reproduce and the elderly for obvious reasons.

If at Tai Po Tsai Tsuen the age/sex pyramids do not show major differences between indigenes and newcomers, the age of household heads certainly does for here the modal value is 66 years or above for indigenes compared with the 36–40 age-group for the non-indigenous people who in moving into the village have in many cases, either left members of the older generation behind or, as likely, do not consider such to be household heads (see Fig. 7). Similar analysis was not carried out by Kathy Ng who gives data on functional age groups, however. These indicate that at Tai Wan and Wong Chuk Wan where there are significant numbers of suburbanites, the mean number of dependants (ages 14 and below plus 65 and above) per person in the working age-group was only 0.4. At Ma Kwu Lam and Cheung Muk Tau, where there were

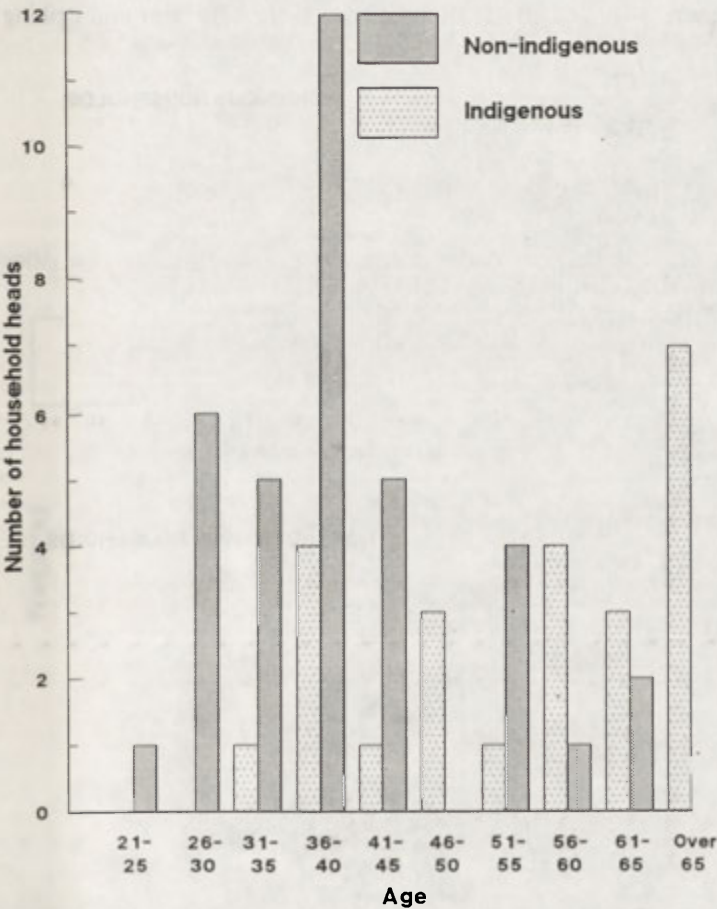


Fig. 7. Age distribution of “indigenous” and “non-indigenous” household heads at Tai Po Tsai Tsuen, 1986

virtually no suburbanites, the dependency ratios were well over 1.0, still not a high figure admittedly (Kathy Ng, 1986, 59).

Household size is another common social indicator and again differences emerge. At Tai Po Tsai Tsuen, “indigenous” households tended to be larger than the “non-indigenous” families amongst whom very large families were notably lacking (See Fig. 8). According to Tse (1986, 28) half of the indigenous families here were three-generational whereas two-thirds of the non-indigenous families comprised only two generations. In the eastern Sai Kung villages large families were absent but there too significant differences emerged. In Tai Wan and Wong Chuk Wan, the “suburbanite-dominant” villages, the modal family size was only two persons with averages of 3.3 and 3.6 persons respectively, with one-person households dominant at Tseng Tau which is also dominated by outsiders, quite a few of whom are not permanently resident, however. (Half of the dwellings are second homes or are for recreational rental). By contrast, one-person households were commonest in the remaining “indigenous-dominant” villages with average family sizes of 2.4 persons (Kathy Ng 1986, 63, 65).

While the reporting of income amongst Hong Kong households is probably unreliable there is no reason to believe that the degree of unreliability is any greater amongst villagers or by suburbanites though it may be suspected that the latter may be more attuned to the objectives of social enquiry. Both at Tai Po Tsai Tsuen and in the three suburbanite-dominated Sai Kung villages there were clear and striking differences

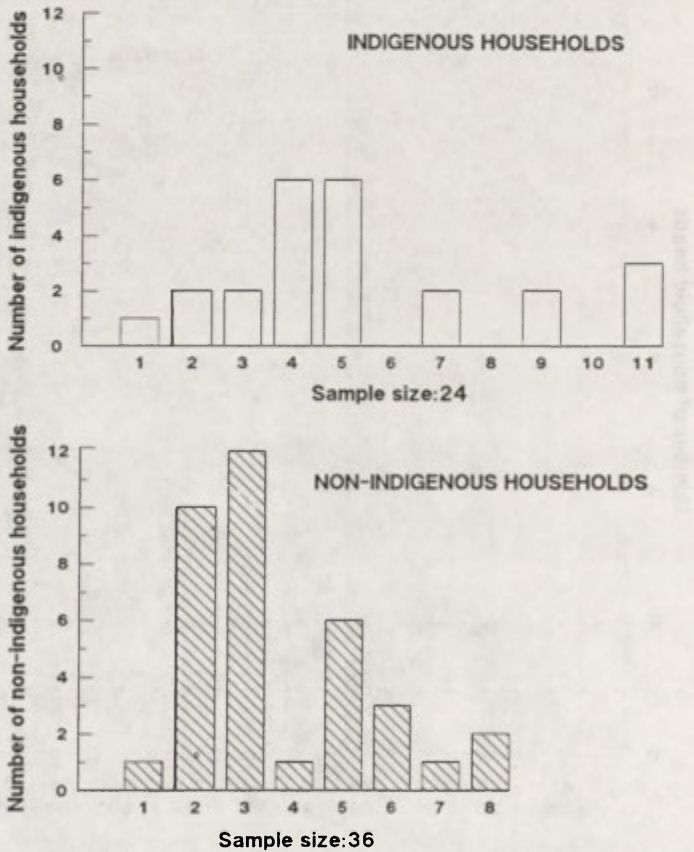


Fig. 8. Family size distribution of “indigenous” and “non-indigenous” households at Tai Po Tsai Tsuen, 1986

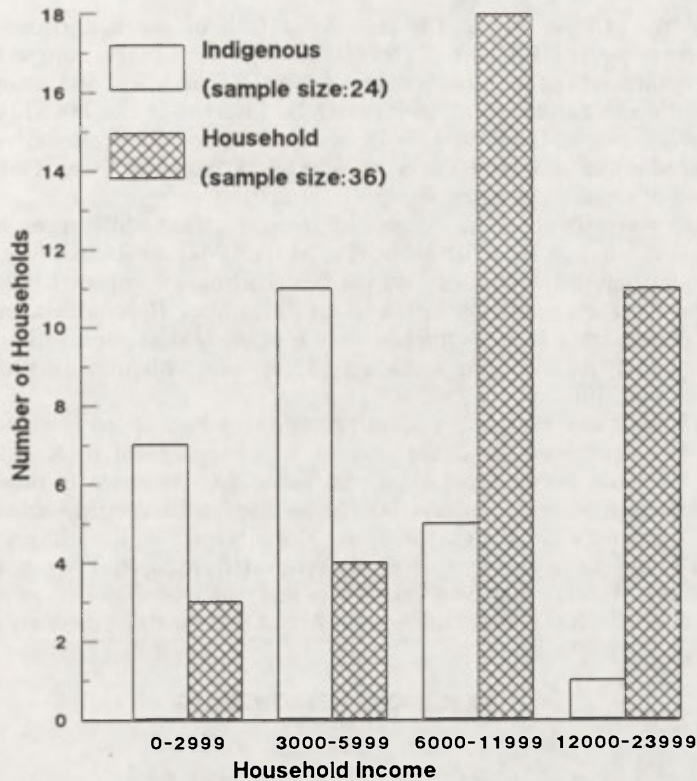


Fig. 9A. Monthly income distribution (in HK\$) of “indigenous” households at Tai Po Tsai Tsuen, 1986

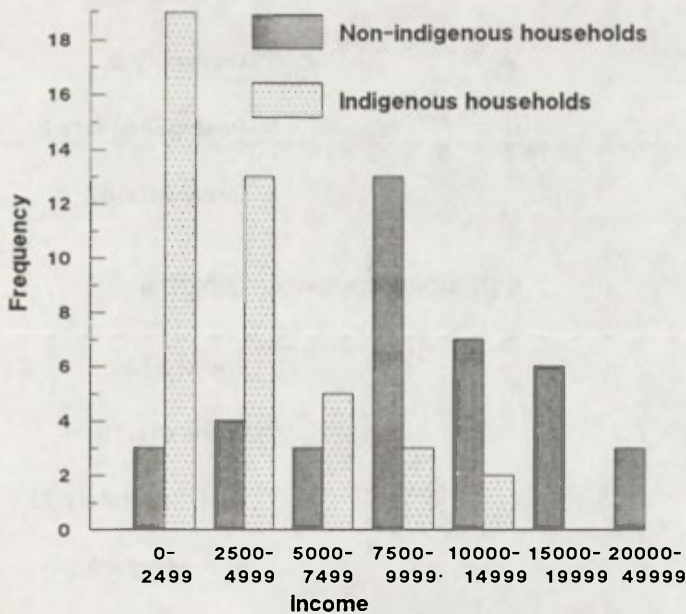


Fig. 9B. Monthly income distribution (in HK\$) of “non-indigenous” households at Tai Po Tsai Tsuen, 1986

between the two groups. At the former only a fifth of the indigenous group had monthly incomes in the HK\$6000–11 999 (US\$770–1715) range, compared with half of the suburbanites whose monthly incomes fell into this bracket and amongst whom, furthermore close to further third had household incomes in the HK\$12 000–23 999 (US\$1715–3077) range (Tse 1986, 47–48. See Figs 9A and B). A similarly-contrasting pattern emerged in the villages of Tai Wan, Wan Chuk Wan and Tseng Tau which have significant suburbanite components in their structure.

These striking differences in household income reflect differences in levels of education investigated in some detail by Tse at Tai Po Tsai Tsuen. She found that amongst 124 indigenous respondents 40 per cent had only completed primary school with only three per cent with tertiary-level qualifications. By contrast, amongst 126 suburbanite respondents 15 per cent had only a primary education while 30 per cent had a tertiary-level qualifications including 13 per cent with university degrees (Tse 1986, 48. See Fig. 10).

So far as behavioural aspects are concerned two may be detailed – choice of house-type and mobility patterns, the former having been investigated by Kathy Ng (1986, 89–90) for Tai Wan, Wong Chuk Wan and Tseng Tau. Whereas in the West it has become fashionable for middle-class people to live in thoroughly-renovated older homes, this is generally not the case in Hong Kong though in the villages of Uk Tau and Pak Sha O for example, westerners have renovated traditional row-houses for use as second homes. Rather the usual pattern is that suburbanites live in new houses, 95 per cent of them in Kathy Ng's study area. About two thirds of these are in what has

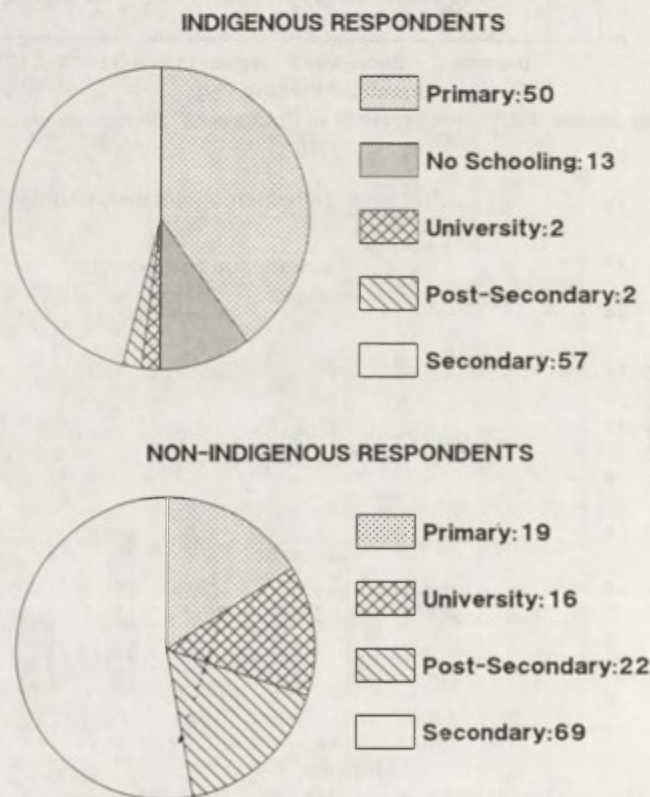


Fig. 10. Level of education of “indigenous” and “non-indigenous” at Tai Po Tsai Tsuen, 1986

come to be known as “Sai Kung Spanish” style. The size of living quarters also differs between the two groups. Kathy Ng (1986, 88–89) found that not only was the average floor area of dwellings greater in villages distant from Sai Kung (possibly reflecting lower land costs) but also that suburbanites, commanding greater wealth and choosing to live at a distance from the city where costs per unit of space are lower, had somewhat larger homes than indigenes. They also had more personal space because of smaller family size, at least at Tai Wan and Wong Chuk Wan where their households averaged 2.3 and 3.3 persons respectively, compared with 4.1 and 4.0 persons respectively for indigenous villagers.

Analysis of mobility patterns and car ownership was carried out only by Tse at Tai Po Tsai Tsuen which, however, showed no major differences between the two groups so far as place of employment, recreational and shopping trips were concerned though children of non-indigenous families tended to travel further afield to school. Half of this group had a one-way journey to school of between half an hour and an hour whereas only a fifth of the children of indigenous families had such a long journey, the rest travelling for less than half an hour (Tse 1986, 56–57). This pattern clearly reflects the recency of the influx of “non-indigenous” villagers as parents are often reluctant to remove children from schools in which they are well-established. Nor were modes of transportation or patterns of car ownership very different between the two groups though as a whole residents in this village have notably fewer cars (about a third of the families owned a car) than in more distant suburbs such as Fairview Park or Hong Lok Yuen where in excess of four-fifths of families owned a car (Fung in Tse, 1986, 53).

CONCLUSION

The phenomenon of middle-class people taking up residence in the urban fringe, whether permanently or in secondary homes, seems to be near-universal as increasing wealth permits and as perceptions of the balance between costs of relocation and commuting on the one hand and benefits of a semi-rural life-style on the other happen to change. In Hong Kong, new towns, though they have population densities somewhat below those of the urban core, are high-rise “concrete jungles” even though they provide good amenities. Low-rise developments comprising semi-detached houses or bungalows with gardens on the western pattern tend to be expensive to buy (rarely below HK\$ 1.5 million (US\$ 190 000)) and costly in terms of transportation. The larger ones, such as Fairview Park and Hong Lok Yuen, provide a wide range of amenities and are thus self-contained suburbs in the western sense.

Thus far, the question of why people move to a village rather than to purpose-built suburb has not been discussed and the reasons for relocation given by new residents in both suburb and suburbanized village are similar. In the new middle-class suburb of Fairview Park, for example, unpleasant physical environment at the place of previous residence was seen by 73 of 129 respondents (56 per cent) as the most important “push” factor. A perceived pleasant physical environment at Fairview Park was reported as the prime factor by 97 of 199 respondents i.e. 49 per cent (Lam 1979, 51, 62). Thirty-nine suburbanites in the three Sai Kung villages of Tai Wan, Wong Chuk Wan and Tseng Tau were asked to rate various “pull” factors on a scale of one to five, one being “very important”. “Good natural scenery” ranked first with a mean score of 1.1 and the successively-ranked mean scores for “less crowded”, “fresher air” and “more spacious” were 1.3 or less. Interestingly “better environment for bringing up children” did not rank particularly highly because just over two-fifths of the respondents did not have children (Kathy Ng, 1986, 49). Significantly, both at suburban Fairview Park and in the three Sai Kung villages, lower land cost or rent did not rank highly as a “pull” factor (Lam 1979, 62; Kathy Ng 1986, 49).

Despite not having shops at all, or at best shops providing drinks and snacks, despite the frequent need to install septic-tank sewerage to meet urban standards of disposal, despite possible hostility to the presence of outsiders, villages clearly are attractive to suburbanites. Suburbanites are also attracted to increasing number of villagers for they represent income and the prospect of the village remaining a viable entity rather than being abandoned as their elderly inhabitants pass away. In the suburbanization process, however, there can be little doubt that road access, preferably with a bus service, is a key factor.

Where such does not exist suburbanization, where it has begun at all, has taken a different form as both organizations and individuals seek bases for recreation. Thus on islands for example at Yim Tin Tsai, part of the village is being renovated as a holiday camp whilst at Kiu Tsui a tiny village has been totally extirpated in favour of a garish recreation club. At the isolated ocean beach of Sai Wan, boaters and walkers now provide a sufficient base for a hotel and several restaurants. The only other activity to provide some bulwark against further decay and eventual abandonment is fishing and fish-rearing. In the Sai Kung area, the northerly villages of Tap Mun Chau continue to thrive and in the south Sha Kiu Tau has become a small-scale base for a fishery based upon supplying cage-reared live fish. The redevelopment of coastal villages as suburbs dependent upon water transportation seems some way off still whilst the future of villages distant both from road and water looks bleak. The remaining villagers have insufficient political clout to insist upon improved access which is not in any case government policy in these park areas.

Many of Hong Kong's villages now conform to Connell's model of the metropolitan village (Connell 1974, 80 ff). As "small, detached portions of suburbia" their distribution clearly relates to accessibility from the urban core. They are comparable to high status suburbs, contain significant new or renovated buildings and exhibit striking internal demographic, social and economic discontinuities. Though Connell (1974, 93) has asserted that co-existence rather than integration is characteristic of metropolitan villages the truth of this statement has yet to be tested in the Hong Kong context. The presence of "outsiders" has brought benefits as well as costs. As the village representative at Tai Po Tsai Tsuen shrewdly remarked, '... their migration into the area has also helped to bid up the price of houses here in return. Such a relationship enables the outsiders to live with us harmoniously... [In any case] the degree of intimacy between villagers has been decreased in recent years.' (quoted by Tse, 1986, 56).

The traditional function of Hong Kong's villages was to house its farmers. Though in the west and north particularly, farming survives, elsewhere it has been abandoned or displaced. Yet the residential function remains and in some villages which were close to abandonment five years ago it is beginning to expand. But this survival, this expansion now has very different bases. There has thus been great change, yet without change.

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SOME ASPECTS OF RECENT IMPROVEMENTS IN THE PRODUCTIVITY OF PRIVATE AGRICULTURE IN POLAND

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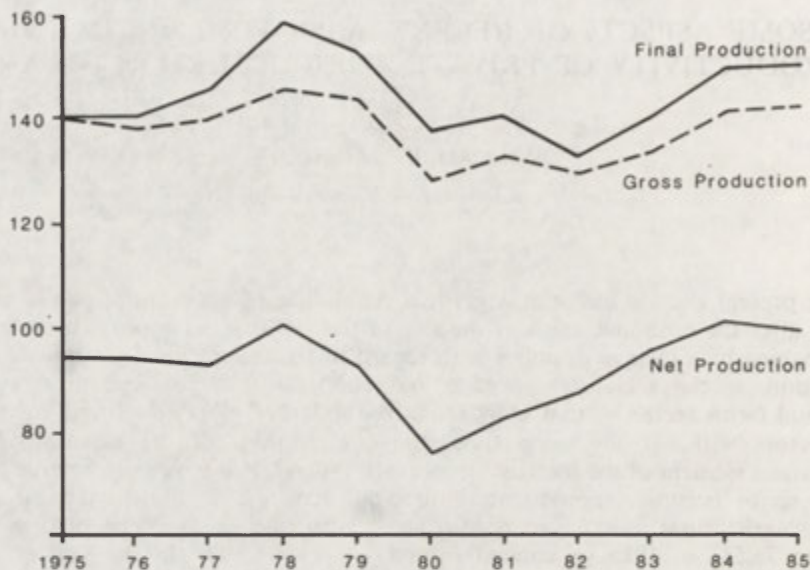
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The present decade has seen a gradual rebuilding of agricultural productivity in Poland after the economic crisis at the end of the 1970s. This improvement has been accompanied by a change of policy with regard to the treatment of the two sectors of production — the socialized or state and cooperative sector and the private or individual farms sector — that is by the introduction of more equal treatment of the two sectors with, at the same time, the confirmation of the private sector as a permanent element of the socialist structure in Poland. It is important to note that the private sector occupies approximately three-quarters of the national farmed area or area in "agricultural uses" — reduced from 79% in 1975 to 74.5% in 1980 and rising again to 76.5% in 1985 (calculated from GUS 1986A, 70). In the new policy the principles of profitability and self-financing in agriculture have been accepted and the abolition of subsidies in the socialized sector has been proposed, together with a new prices policy, intended to improve the relationship between retail prices, product prices and the prices of agricultural resources and services (Olszewski 1985, 89). The aim of the new policy is to achieve national self-sufficiency in food production and increased export of agricultural produce — difficult targets to achieve after the economic difficulties experienced and given the level of food and livestock feed imports which were thought necessary in the 1970s, even at the peak of agricultural productivity.

CHANGES IN AGRICULTURAL PRODUCTIVITY IN POLAND BETWEEN 1975 AND 1985

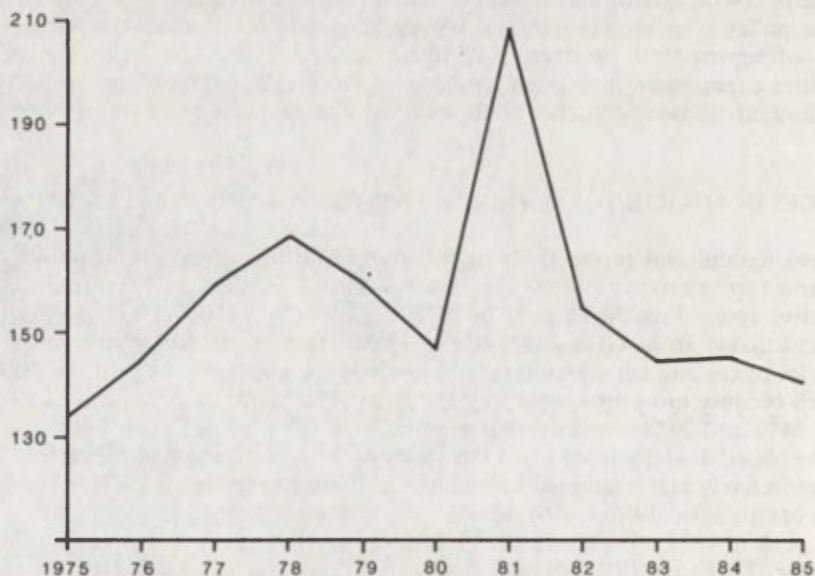
Gross agricultural productivity in real terms and final agricultural productivity in real terms (gross production less the value of all products on the farm returned to the productive system) reached a peak in 1978, declining by 12% and 13% respectively by 1980 (calculated from GUS 1982, XXVI–XXVII) (Fig. 1). Costs rose more rapidly than sales prices and net agricultural productivity fell by 24.9%. In part productivity in 1980 fell because of adverse weather conditions. The yields of potatoes and sugar beet fell by 44% and 29% respectively compared with the previous year. Grain yields had been depressed a year earlier when the yields of wheat and rye had fallen by 17% and 26% respectively and continued to stay low in 1980. In private agriculture real incomes from work in agriculture fell by 12.6% over the same period, recovered astonishingly with a peak in 1981 24% above 1978 levels, only to fall again to an even lower level in 1983 (Fig. 2). From 1982 to 1985 real gross, final and net productivity have risen, although real incomes in private agriculture have fluctuated at a low level, comparable from 1983 to 1985 with that of 1976 (GUS 1986B, XXXVIII–XXXIX). The value of

both crop and livestock production has risen since 1982. However, whilst plant production has risen to a greater value peak in real terms than any level of plant productivity achieved in the last decade, livestock production in real terms in 1985 still lagged behind the 1977 level, whilst the numbers of cattle and milk cows — one of the most important elements of the peasant economy — have fallen almost continuously in Polish agriculture as a whole since 1978. The loss of imported feeding stuffs has been



Source : GUS 1986

Fig. 1. Indices of agricultural productivity in Poland based on constant prices (1961—1965 = 100)



Source : GUS 1986

Fig. 2. Indices of real income from work in private agriculture based on constant prices (1960 = 100)

a major factor. For example, the maize import fell from nearly 2.5 million tonnes in 1981 to just over 400 000 tonnes in 1982 whilst the barley import fell from over a million tonnes in 1980 to just over 140 000 tonnes in 1982. Increased rye production has offered some compensation, rising from 6.7 million tonnes in 1981 to 9.5 in 1984 and 7.6 in 1985. There has been a small increase in the numbers of chickens and pigs, and meat consumption per caput in Poland, which had fallen from 74.0 kg per inhabitant in 1980 to 58.3 in 1983, rose again to 60.2 in 1985 (GUS 1986A, LVI–LIX, 338).

COMPARISON OF PRODUCTIVITY AND RESOURCES IN THE SOCIALIZED AND PRIVATE SECTORS OF AGRICULTURE IN POLAND

Generally the decline in the private sector between 1978 and 1981 was not quite as great as in the socialized sector despite the preference in inputs given to the latter until the introduction of the equal sectorial rights policy in 1981. Gross and final production

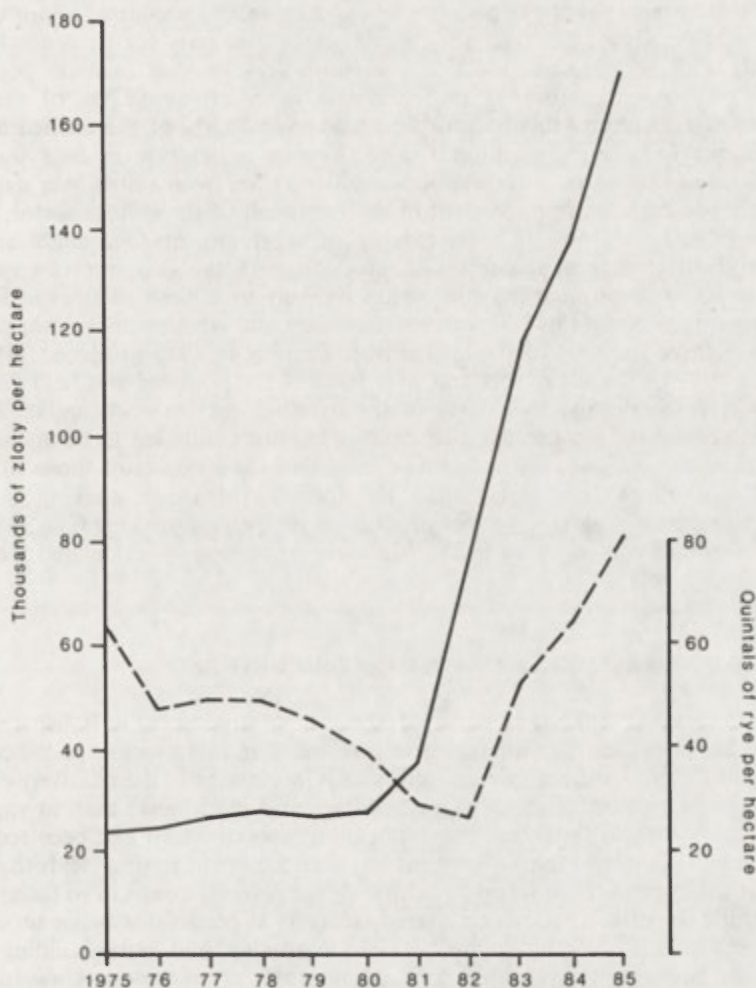


Fig. 3. The average price of arable land on the free market in Poland in thousand zloty and quintals of rye per hectare

in real terms in the socialized sector fell by 13.8% and 18.1% respectively, compared with 12.9% and 14.8% (to a minimum 1980 level) in the private sector — the private sector began in fact to recover a little a year earlier than in the socialized sector after a heavier fall up to 1980. In both sectors the falls were somewhat more severe than these figures indicate as the minima for crops and livestock fell in different years and the differences in the levels in each year tended to mask the severity of the decline in each. Thus final crop production in socialized agriculture fell by 22.5% between 1978 and 1980 and in the private sector by 32.6% in the same period. The following year, however, the private sector showed a far greater recovery. In final livestock production the socialized sector fell in real terms by 18.6% between 1978 and 1981 while the private sector fell from a 1979 peak by 14.5% to a 1981 low (GUS 1986A, 201, 209–211). Throughout the 1970s and the crisis period, private agriculture, despite rising real incomes unit 1978, suffered from an increasing disparity between the average incomes obtained over all in private farm households and those obtained in urban households. It was also affected by rural outmigration and a net loss of land to the socialized sector, accompanied by falling real land prices (Fig. 3). Moreover, despite the introduction of more equal treatment for the two sectors of production, the socialized sector continues to enjoy relative advantages over the private sector and pays for its generally higher crop yields with very high production costs and very low net incomes per hectare. Although private agriculture in 1985 received as much as 52.2% of the annual investment in agriculture, this had to be spread over 76.6% of the farmed area. The investment per hectare in agricultural use in private agriculture in 1985 was in fact barely a third of that in the socialized sector, having risen from a little over a quarter in 1981. There is clearly an improvement in the treatment of the private sector, but that improvement has been slow to more towards equal treatment. One might argue that fundamental differences in the forms of production in the two sectors require very different levels of investment, but this seems unlikely to explain so large a difference, even taking into account the differences in farm size and labour application, given that on just over three quarters of the area private farming in 1985 produced 77% of the grain, over 80% of the sugar beet and over 90% of the potatoes and field vegetables, and supported in addition over 80% of the livestock (in livestock units). The total productive permanent resources in the socialized sector continued to be maintained at 34% of the entire estimated investment in 1985 and the incomes of those working in socialized agriculture rose faster than the incomes of those working in private agriculture despite a slightly lower net production per person working (226 396 zloty in socialized farming compared with 237 628 zloty in private — calculated from GUS 1986A, 26, 209, 211).

PRODUCTION INVESTMENTS IN POLISH AGRICULTURE

As Adamowski (1986) has commented, the scale of investment in Polish agriculture as a whole has been limited compared with investment in other sectors of the economy. Yet since 1981 there has been more progress with investment in the relatively expensive fixed inputs is agriculture (mainly farm buildings and machinery) than in variable or turnover inputs such as fertilizers, the application rates of which had been reduced by 1985. Adamowski thought that investment was aimed more at raising yields than saving labour, but the current trend seems to be mainly the reverse, except in so far as it could be argued that in private agriculture more machinery is needed for better timeliness in farming tasks, which could be claimed as yield improving, and better buildings in part for improved storage with less loss of feeding stuffs or of products awaiting sale.

In the period before 1981 farm buildings took the largest share of the annual investment in fixed resources, but by 1985 machinery took the largest share at 42.3%

for agriculture as a whole and 55.3% for the private sector. There were considerable price rises for machinery between 1981 and 1985 — for example, the price of the 30 HP. “Ursus” tractor rose 4.6 times — but the price of “class 75” bricks rose 7.4 times, of “class 150” bricks 8.4 times, of Portland cement 5.7 times and of roofing material 18 to 19 times (GUS 1986A, 126, 389). Moreover, in many districts there were serious shortages in the supply of building materials, whereas greater numbers of farm machines were made available. The most spectacular increase has been in tractors for private agriculture which have risen in total from 438 000 in 1981 to 666 800 in 1985 or 78% of the total number of tractors in Polish agriculture. However, if one examines mechanized haulage power as a whole then the increase in private agriculture was from 3.4 million haulage units (a haulage unit = one farm work horse) to 4.9 million, an increase of 44% rather than the 52% in tractor numbers, but a share of 80.3% of total mechanized haulage power in 1985 for both sectors of agriculture (GUS 1986A, 136, 138). Comparison of the private and socialized sectors in 1985 shows 33.8 units of mechanized pulling power per 100 ha on private farms compared with 35.8 in cooperatives and 26.3 in state farms, but it should be remembered that the very large state farms make a more effective use of their machinery which is mostly newer and in better condition than on many private farms. Many private agricultural machines have in fact been bought second-hand from state farms and G. Gorzelak (1986) noted that the sale of machinery to private farms in the socialized sector was used as one remedy for their economic difficulties. With 18 hectares of arable land and orchard per tractor (18.5 ha in the private sector) in 1984 Poland enjoyed an apparently higher level of tractor application than any other CMEA country (GUS 1986A, 70, 138, 427). However many private farms depend on other farmers or on the “Agricultural Circles” in order to hire tractors or use horses of which private agriculture still had 1.37 million in 1985. The number of private farms (over 0.5 ha farmed area) per tractor in 1985 was 4.2. Given that many private farms own two tractors, it seems likely that at best only one in 4.5 farms possessed a tractor. The number of private farms over 0.5 ha farmed area has tended to fall and the average area farmed per farm has risen from 4.8 ha in 1981 to 5.0 in 1985 — an increase in size which may be thought possibly encouraging to mechanization. Examination of the relationship between tractors per hectare and the area of private farms suggests a positive correlation. Tractors on private farms of 10 ha and more were 4 times as many per unit area as on farms of 0.51 to 2 ha in 1979 (calculated from GUS 1982, 86). There has been an increase between 1980 and 1984 of 8.9% to 464 000 units in the number of farms with 10 ha and more in agricultural use. In addition, however, the number of holdings of less than 0.5 ha — some of which are highly productive — has increased by 44% to 1 148 000 units over the same period (GUS 1986A, 85–86), in part due to the spread of garden suburbs. There is therefore in Polish private agriculture a tendency for holding sizes to polarize with growth in the numbers of both relatively large farms and small holdings. Although the number of farms of 0.5 to 1.99 ha declined from 1980 to 1984 by 1.4% to 856 000 units, the number of medium-sized farms of 2.0 to 9.99 ha declined faster, that is by 4.9% to 1 524 000 units. This last group of private farms had the poorest prospects of all the size groups of attaining incomes commensurate with those earned in non-agricultural occupations (Galaj 1984).

CHANGES IN THE DISTRIBUTION OF THE RESOURCES AVAILABLE TO PRIVATE AGRICULTURE BETWEEN 1981 AND 1985

So far comparison has been made between the socialized and private sectors of Polish agriculture in productivity and resources in order to see how far the policy of more equal treatment has progressed. A second aspect of policy change consists of the

differences in treatment between private farmers required by the importance now attached to the professional awareness of farmers and by the proposal to stimulate the return to agriculture of those young people who have either acquired the professional "know-how" of the farmer or are inclined to learn about it (Olszewski 1985, 89). We cannot properly test this second aspect of policy change without a survey of farmers themselves, but we can look for differences in the spatial allocation of resources which may suggest uneven treatment of the private farming community, either with the intention of giving more resources to the more productive areas or of allocating them to the more backward districts in order to provide more equal treatment to the farmers. Two kinds of change in the supply of resources have been mapped:

1) change in the provision of fixed or permanent resources, including annual outlays in production investments per hectare and mechanized haulage power per hectare;

2) change in the provision of variable or turnover resources, including turnover credit per hectare paid by the bank, fertilizers in kilograms per hectare and the value of agriculturally productive services per hectare.

These have been mapped by the 49 *województwa* or voivodships for which the Central Statistical Office (GUS) annually publishes data. Correlation coefficients have also been calculated for the variables for change in the supply of selected resources in relation to the 1981 base and in relation to farm size and the values of gross and commercial production per hectare averaged for 1976 to 1980. A correlation coefficient of 0.4 or more is significant at the 1% level for 47 degrees of freedom. The attempt has therefore been made to detect the spatial trends of a few selected variables as indicators not only of changes in private agriculture but also of changes in policy towards agriculture. Such spatial examination of the geography of Polish agriculture in relation to policy and as a potential tool in planning has been attempted before, notably by Kostrowicki (1975) in an attempt to apply typological methods for forecasting and/or programming further changes in the spatial organization of agriculture where models of the spatial organization of agriculture for 1980 and 1990 were elaborated. Here the purpose is not to forecast future possibilities, but to examine past trends as indicators of the nature of the changes taking place and of the policy involved.

CHANGE IN THE PROVISION OF FIXED RESOURCES

We begin with the annual outlays on production investments per hectare in private agriculture, mapping the changes between 1981 and 1985 (Fig. 4). The examination of annual outlays was preferred to an examination of the accumulated fixed resources as the former more readily show current changes than the latter. In order to overcome the problem of inflation in the values of the productive investments in agriculture, comparison has been made not between values but between the ratios of the 1981 and 1985 values by *województwa*, dividing them into two groups above the Polish average and two groups below. The map shows a striking pattern, which could hardly have arisen by chance, of concentration of the larger changes in the ratios towards the southeast, centre and east of Poland. This pattern shows a weak negative correlation with the distribution of the outlays on production investments made in 1981, suggesting some attempt to move away from the earlier distribution and to allocate a larger share of the resource to *województwa* previously allocated low levels of investment. The correlation coefficient for the two distributions is -0.4342 which should be significant, although we have to allow the possibility of weighting in the correlation by a common element in the two variables (for discussion of the problem of a common element see Williams 1984, 264–269). On the whole the change seems to aim at giving more to some of the *województwa* more poorly provided in the past, that is towards providing

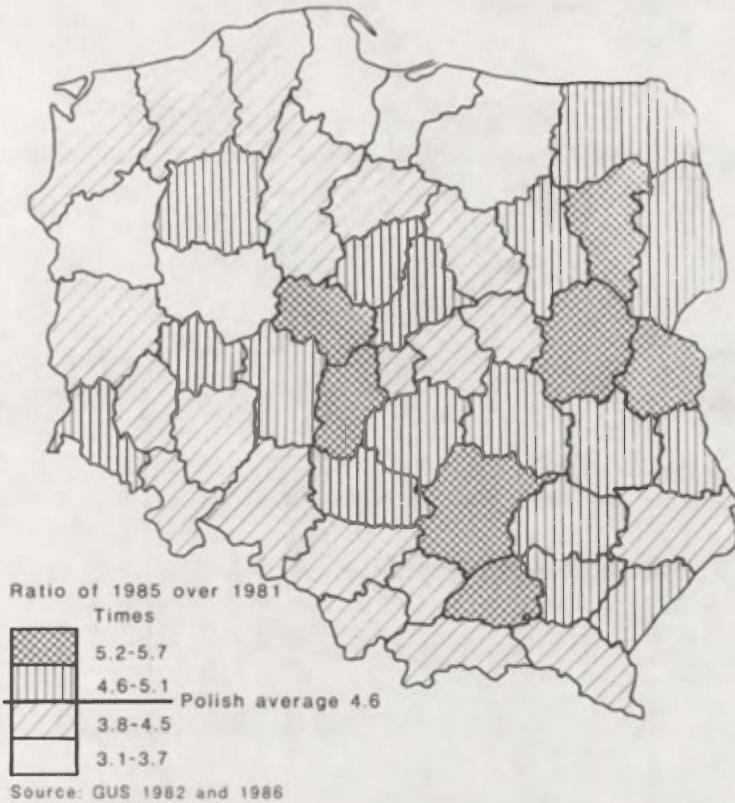


Fig. 4. Outlays on production investments in agriculture per hectare of agricultural land in private farms: 1985 as a ratio of 1981

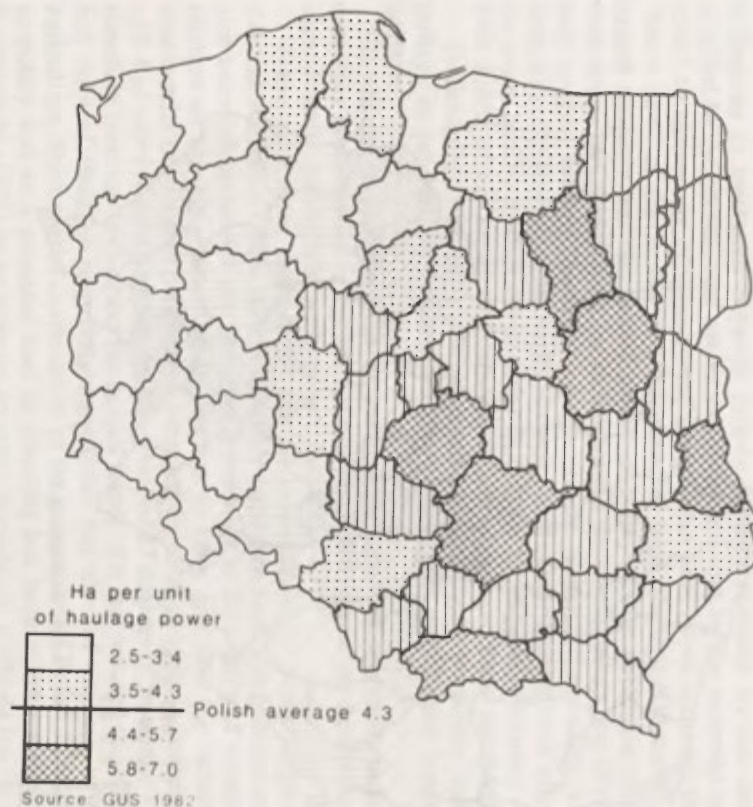
a more equal resource distribution. Changes in production investment outlays also relate to the distribution of hectares per unit of mechanized haulage power in 1981. The positive correlation coefficient of 0.4815 indicates a negative correlation with haulage power density on private farms, showing therefore a similar relationship to that with the distribution of production investments. The strongest relationship was with the distribution of turnover credit paid in 1981 (-0.5646), again suggesting some avoidance of those areas previously thought most worthy of financial support. This pattern seems confirmed by the coefficient of -0.4353 with the sale of agricultural production services in 1981 and of -0.4101 in relation to the value that year of commercial production per hectare. The last coefficient looks weak, but is suggestive in relation to the other evidence.

Figure 5 shows the pattern of change in the distribution of mechanized haulage power per hectare (i.e. positive with regard to the density of haulage power on private farms). There is not a great variation in change by *województwa* — the range is from 1.3 to 1.7 times. All districts have gained power, with the most striking gains in the east, northeast, northwest and south. There is a weak and not unexpected correlation with change in production investments (-0.4166) and the distribution of production investments (-0.4342). There is a correlation with the distribution of hectares per unit of mechanized haulage power (again negative with the density of haulage power). Figure 6 shows the distribution pattern which, as an indication of density of haulage power is to



Source: GUS 1982 and 1986

Fig. 5. Changes in the distribution of mechanized haulage power per hectare in private agriculture: 1981–1985



Source: GUS 1982

Fig. 6. Hectares per unit of mechanized power in private agriculture in 1981

some extent the reverse of Fig. 5. Changes in the distribution of mechanized haulage power also have a weak negative relationship to the distribution of turnover credit paid in 1981 (-0.4106) and the sale of agricultural production services (-0.4553).

CHANGE IN THE PROVISION OF VARIABLE OR TURNOVER RESOURCES

Turning now to the provision of variable or turnover inputs, the distribution of changes between 1981 and 1985 assumes rather a different pattern. We have no financial summary for the levels of input, but an indication in the form of the turnover credit paid to farmers. The changes in these between 1981 and 1985 have been mapped in Fig. 7. Again there is a very distinctive pattern with the highest ratios in the west of centre, more especially in the three *województwa* of Poznańskie, Leszczyńskie and Kaliskie, noted amongst other activities for pig raising, which suggests the possibility of the increased importance of turnover credit for the purchase of feeding stuffs for fattening. Changes in turnover credit also correlate with the distribution of annual production investments per hectare in 1981 (0.4378), hectares per unit of mechanized haulage power (-0.4164), fertilizer application per hectare in 1980/1981 (0.4964), the sale of agriculturally productive services per hectare in 1981 (0.5374) and the

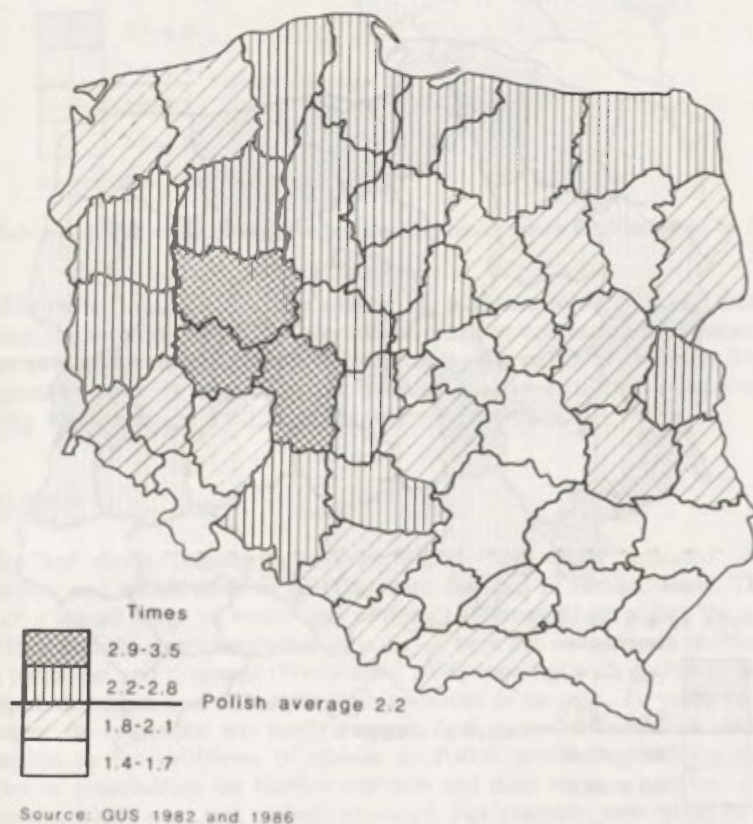
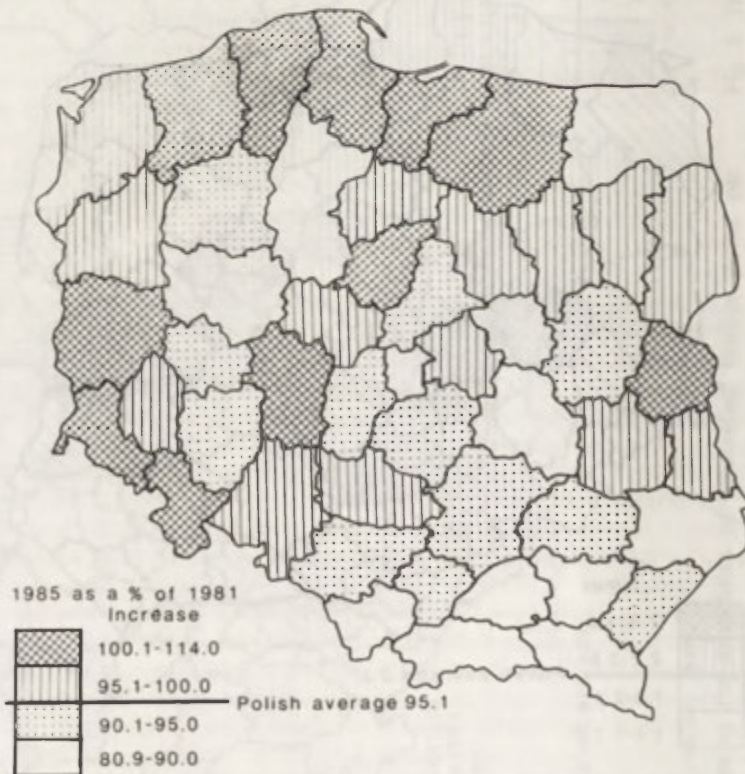


Fig. 7. Turnover credit per hectare paid to private farmers by województwa: 1985 as a ratio of 1981

distribution of average farm sizes in 1984 (0.4242). The larger farms were apparently tending to look for some increase in turnover credit per hectare. Changes in turnover credit did not relate to changes in fertilizer application nor to changes in the sale of agriculturally productive services per hectare, but the rate of fertilizer application fell in most *województwa*, and the increased values for turnover credit and productive services sales tended to be at or below the rate of inflation, i.e. not increasing in real terms. The weak relation to farm size suggests some discrimination in favour of the larger farms.

Changes in fertilizer application between 1980/1981 to 1984/1985 correlate only with farm size and that weakly (0.4069). The contrast is strong with the per hectare distribution of fertilizer application in 1980/1981 which correlated strongly with production investments, mechanized haulage power, turnover credit, the sale of agriculturally productive services and both gross and commercial productivity (all over 0.6). Changes in the pattern of the sale of agriculturally productive services per hectare do not correlate with any of the other variables, despite some strong correlations between the distribution pattern in 1981 and the variables as already described in the case of the distribution of fertilizer application. The two maps (Figs 8 and 9) showing the distribution of the changes in fertilizer application and the sale of agriculturally productive services between 1981 and 1985 reveal a wide scatter of districts with relatively high levels of change which bear little resemblance to any of the other maps.

In general, although the changes in turnover credit per hectare appear to have some relationship to the distribution of several of the input variables of 1981 and to the farm size distribution, the changes in the other two turnover inputs do not. There is little



Source: GUS 1982 and 1986

Fig. 8. Changes in fertilizer application (kg/ha) on private farms by województwa: 1981 – 1985

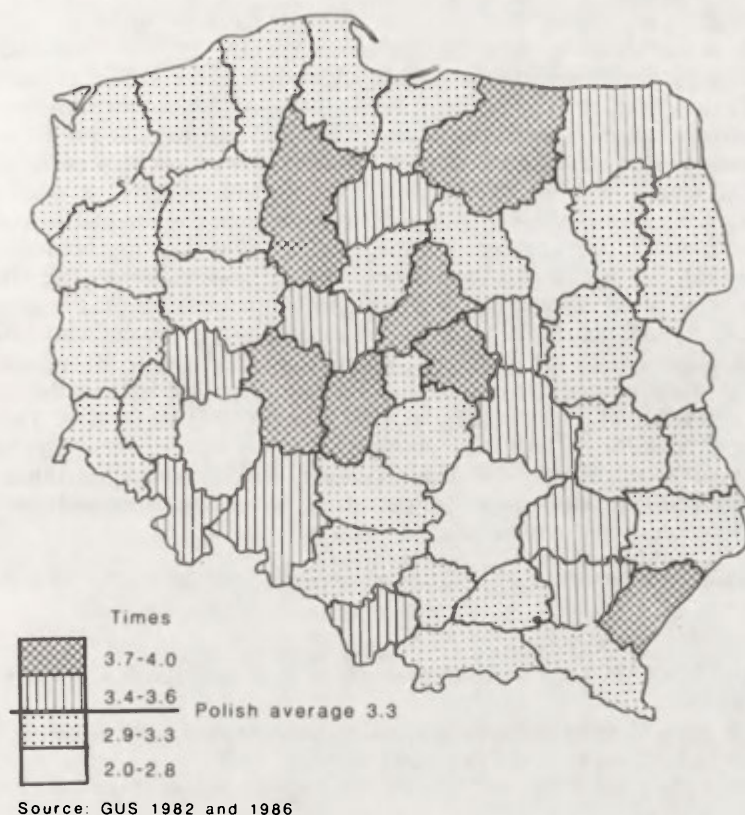


Fig. 9. Sale of agriculturally productive services to private farms in zł/ha: ratio of 1985 to 1981

discernible pattern in their distribution and no evidence to support the thesis either of promoting the interests of highly productive areas or redressing the disparity between the more productive and the less productive area. If a policy is operative here then it is not apparent that it is related to the need to raise agricultural productivity nor to improving the condition of the poorer farming districts.

CONCLUSION

There are many factors in change which have been neglected in this brief examination and which need to be taken into account in further work. These include above all a broad range of social and ecological factors which affect the geographical distribution and the implementation of policy. There are also serious problems of water supply, irrigation and drainage (Piwowarski 1986) together with problems of marketing, local input shortages and non-agricultural sources of income. To understand the map of changes in resources we need a great deal more information. However, this introduction to the problems of change in Polish private agriculture does indicate a number of possibilities for further research and does show a number of trends and relationships which were not entirely expected. For example, one might have predicted that in a farming system of units with an average farmed area of only five hectares the pattern of change would have seen more emphasis on variable than on fixed inputs.

One would normally expect that on small farms variable or turnover inputs would normally be available more easily than the more expensive investment of fixed or long term capital. Yet, in examining the pattern of changes since 1981, the most striking relationship are between the changes in annual production investments and the previous pattern of investment, turnover credit and commercial productivity. The major factor here has clearly been that the variable inputs have been more affected by shortages in supply than the fixed. These relationships suggested a small tendency towards supporting areas which in 1981 were less commercially productive and less well financially supported, i.e. a tendency towards reducing the disparity between the more productive and the less productive districts. At the *województwo* scale there is no evidence here of more support for the more productive districts on the grounds that such districts should include the more professionally aware farmers who would make the most effective use of the inputs provided. It could of course be argued that the productivity of the poorer farming districts needs to be raised both in the interests of total production and of the great mass of less productive private farmers. The question of problem agricultural regions is economic planning is a major issue which has been raised elsewhere (Kulikowski 1986). It is an issue to which Polish agricultural planning must address itself in relation to the limited supply of resources and the desire to improve the professional competence of private farmers.

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CANADA'S AGRICULTURAL INDUSTRY.
PROBLEMS AND PROSPECTS

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The purpose of this paper is to present an overview of Canada's agricultural development, to describe and explain the major regional variations and to indicate that the future prosperity of the industry is threatened by a number of serious problems. These difficulties include organic matter depletion and salinization in the Prairie soils, soil erosion in parts of Southern Ontario, land-use conflicts in the highly urbanized areas of the Great Lakes—St. Lawrence Lowlands and in British Columbia, interprovincial competition, the increasing costs of capital and the dependency on high energy technology.

Canada has 290 000 farms which employ half a million people directly and which produced gross receipts of \$20 billion and exports valued at \$10 billion in 1986 (Agricultural Statistics, Canada, 1986). This is a relatively small component of the Gross National Product but when the revenue and employment related to the transportation of agricultural products and the multitude of other industries involved in processing, packaging, marketing and in supplying equipment and the many other requirements are considered, its importance is vastly changed. Agriculture accounts for 10 per cent of economic activity and 1.5 million jobs.

Commercial farms occupy less than 5 per cent of the total land area of Canada. The agricultural development is both extensive and at the same time quite restricted. The northern limits are determined mainly by physical environmental constraints. Approximately 70 per cent of Canada lies north of the thermal limit of 1100 growing degree days which is the minimum of most types of commercial agriculture. (A degree day = one degree above a daily mean of 5.5°C). To the south of this line, adverse relief, unfavourable soils and drainage conditions and a deficiency of moisture impose further limitations. The most suitable areas from a physical environmental standpoint include the Prairie plains and the Great Lakes—St. Lawrence lowlands where 90 per cent of Canada's total farm revenue was centred in 1986 (Table 1).

TABLE 1. Farm cash receipts and net farm income by region, 1981 (per cent of total)

	Farm cash receipts	Net farm income
Atlantic provinces	3.4	4.2
Quebec	14.4	13.3
Ontario	26.8	17.4
Prairie provinces	50.6	62.5
British Columbia	4.8	2.6

1981 Census of Canada, Agriculture, Statistics Canada.

Canada's farm population represents less than 6 per cent of the total. This is because Canada has become in the last 50 years one of the most urbanized countries in the world. It is unfortunate for the agricultural industry that 87 per cent of the most productive farmland in Canada is located within 160 km of the 22 largest cities. Land-use conflicts in the rural-urban fringes of these cities create a problem that is very difficult to solve satisfactorily. The number of farms, the farm population and the total area of farmland have declined drastically since 1941. The number of farms has declined from 730 000 to 290 000 and the total acreage from 174 million to 168 million.

The more unfavourable ratio of net to gross incomes in Ontario and Québec would appear to be related to the higher land costs in these more highly urbanized provinces. Regional variations in types of agricultural production are related to many factors, social, economic and political as well as to the physical environment.

The agriculture ecumene is shown on Figure 1. Seven regions of agricultural development are identified (Troughton 1979). The following points should be noted:

1. The fragmented agricultural areas of the Atlantic provinces are located mainly in the lowlands within the Appalachian uplands. This region has less than 2 per cent of the total agricultural area of Canada.
2. The St. Lawrence lowlands of Southern Québec has 5 per cent.
3. The Palaeozoic part of Southern Ontario — 8 per cent.
4. The clay belts of Ontario and Québec and the Gaspé Peninsula — 5 per cent.
5. The prairie grasslands — 75 per cent.
6. The pioneer fringe in the Prairies, the Peace River area and the Nechako district of Central British Columbia — 5 per cent.
7. Southern British Columbia — 2 per cent.

ATLANTIC PROVINCES

As shown on Fig. 1, areas with suitable relief and soils for commercial farming are restricted. Hard rock uplands with their nutrient-deficient soils occupy a large proportion of the total area. Poor drainage conditions are common and peat bogs about in the interior of Newfoundland and in northern New Brunswick.

Although most of the region has a frost-free season of over 100 days, and has adequate precipitation, the total heat units available restricts the variety of crops that can be grown in Newfoundland and in the interior uplands of Nova Scotia and in northern New Brunswick. The frequency of fogs in coastal areas of Nova Scotia and Newfoundland and the prevalent cloudiness affect certain types of farm production. However, terrain and soil type are more severe constraints. Newfoundland especially suffers from a combination of rugged terrain and unfavourable climate. This province has fewer than 1000 farms. Hay, potatoes and vegetables are the main crops with poultry, hogs and sheep the main types of livestock. Eggs are the only commodity in which Newfoundland is self-sufficient.

Several parts of New Brunswick and Nova Scotia have similar hostile conditions for agriculture. Areas of suitable soil and topographic conditions include the Annapolis Valley, and Cumberland County in Nova Scotia; most of Prince Edward Island; Westmoreland County, the southeastern region, the Sussex area and the St. John River Valley in New Brunswick. The agriculture of Prince Edward Island is the most uniformly developed with an emphasis on potato production. Livestock and poultry are also important. Prince Edward Island's net farm income is greater than that of either Nova Scotia or New Brunswick.

Agriculture in the Maritimes has been affected by its distance from the major markets of Central Canada. Rural truck transport is not efficient because volumes are small, distances are long and many roads are inferior in quality. New technology

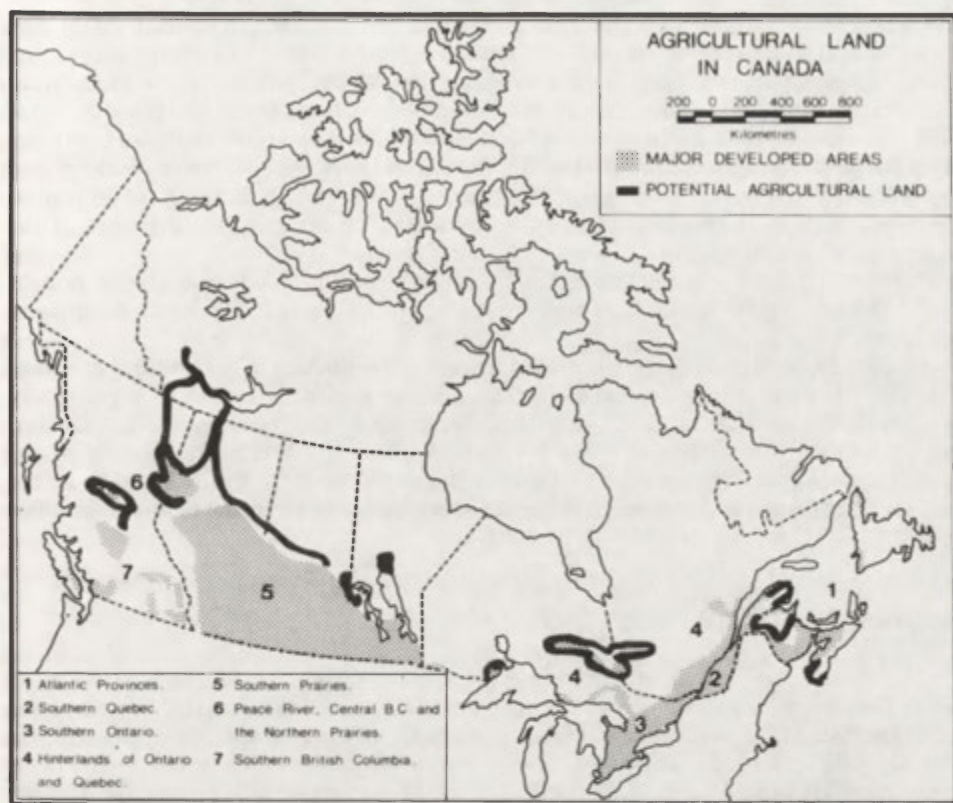


Fig. 1

cannot be adopted easily as it is not profitable where land for intensive use is restricted in area. It does not pay to spend large sums on fertilizing marginal soils and on insecticides, herbicides and fungicides.

The agricultural industry in the three maritime provinces has been undergoing rapid changes since 1951. The area occupied has declined drastically. For example, in Nova Scotia, the number of farms has declined from 40 000 in 1951 to 5 000 in 1981. The farm population has dropped from 35 per cent of the total in 1931 to less than two per cent in 1981. The same consolidation is occurring in New Brunswick and at a less rapid rate in Prince Edward Island. The trend is toward larger farms, more specialization and higher capitalization. However, the process is far from complete and small family farms with mixed enterprises still occur alongside the larger more specialized and mechanized agricultural operations. The most surprising aspect of maritime agriculture is its failure to provide sufficient food for its relative small population. The attempts by government to modernize and rehabilitate the industry in depressed areas has met with only limited success.

SOUTHERN QUÉBEC

The St. Lawrence lowlands with its suitable relief, climate and soils and its accessibility provided a favourable environment for agricultural settlement in the early period of Quebec's history. The long-lot farms and linear villages of today remain as

cultural remnants of the land subdivision system of New France (Robinson 1972). For a long period of time, the economy of Québec was land oriented and a large proportion of the population was located in rural communities. Urbanization and the modernization of agriculture occurs somewhat later in Québec than in Ontario. However, since 1951, the number of farms has been reduced from 120 000 to 50 000 and the gross value of farm cash receipts has risen to \$2.7 billion. Mechanization, specialization and capitalization have increased. Specialization has developed as a result of improved transport facilities, a more discriminating knowledge of the soils, the demands of the larger markets and improvements in farm machinery.

Loss of farmland in the lowlands has become a critical problem. Speculators bought on the average 10 800 hectares per year from 1966 to 1971, and 20 800 hectares annually between 1971 and 1976.

Québec has a plan to make the province more self-sufficient in agricultural produce. The plan involves an expansion of beef and wheat production. This is a politically motivated venture that makes little sense from an economic standpoint, since Québec has no comparative advantage when it comes to wheat and beef production. It would be more profitable to purchase wheat and feeder cattle from the Prairies and to utilize land in Québec to produce forage crops for dairy cattle, corn for hogs and vegetables and special crops for the local urban markets.

SOUTHERN ONTARIO

The Palaeozoic lowland to the south of the Pre-Cambrian Shield has the most diversified agricultural development of any part of Canada. This is related in part of the generally favourable environmental factors of relief, climate and soils. Over much of the area, the landforms are conducive to intensive use. Southwestern Ontario benefits from the longest growing season in Canada. The moisture supply is adequate for a great variety of crops and over 250 different types of soil provide a basis for crop diversification. The heavy-textured soils with a high clay content if drainage is adequate, are suitable for the production of forage crops and grain, and for livestock and dairy farming. The lighter-textured soils with more sand are excellent in the climatically favoured areas for tender tree fruit, tobacco, canning crops and market gardening. The intermediate-textured soil types are most versatile and can be utilized for a great variety of general field and specialty crops. A large percentage of the farmland in Southern Ontario is prime farmland and is classified in the top three categories in the Canada Land Inventory (Hoffman and Noble 1975).

However, one should not assume that the present diversified agricultural development in this part of Canada where the gross value of production is greater than the combined value of that in the four Atlantic provinces, Quebec and British Columbia, can be explained purely in physical terms. The present pattern of agricultural land use which includes a great variety of crops, hay, grain, corn, soybeans, tobacco, 80 different types of fruit and vegetables and every type of livestock, represents a gradual evolution that is related as well to cultural and socio-economic factors. The accessibility to a local market of 7 million is one of the obvious advantages.

As elsewhere, farms are being enlarged to benefit from economies of scale. The poorer quality land has been abandoned or is being utilized more extensively while the higher quality land is being used more intensively. Twelve per cent of the farms now account for 28.5 per cent of total sales.

The most critical problems facing the industry include the loss of farmland to non-farm uses, soil erosion and depletion, and the cost-price squeeze. The areas where loss of prime farmland has been most severe are the Golden Horseshoe area from Oshawa to Niagara Falls, and parts of southwestern Ontario. This problem has eased

somewhat since 1980 because the economic recession has slackened the demand for farmland. Monocultural practices and the failure to adopt conservation measures are threatening the future productivity in the agricultural heartland of southwestern Ontario. The higher capitalization required to operate the larger mechanized enterprises and the need to borrow large sums at high interest rates has resulted in an increasing number of farm bankruptcies since 1980.

THE NIAGARA FRUIT BELT

One of the unique areas of this region is the Niagara Fruit Belt where the loss of prime tender fruit-growing land has been of great public concern since the problem was first identified by Krueger's research in 1959.

The bulk of the fruit being grown in the Niagara Peninsula comes from the north of the escarpment, the gentle Vinemount moraines immediately to the south of it, and the Fonthill kame. These areas have considerable acreages of sandy loam soil and are particularly well adapted to the production of peaches and sweet cherries, the tree fruits with the most exacting soil requirements. The well-drained deeper sandy loams have been referred to as the tender-fruit soils. Many are derived from the deltaic sands that were laid down on the Lake Ontario plain in the former glacial Lake Iroquois and from the fluvo-glacial kame deposits and others of the Fonthill area.

The climate of the lowland to the north of the escarpment is most favourable in Canada for the growth of peaches and sweet cherries. Proximity to the moderating influence of Lake Ontario is a key factor since it reduces the probability of damage from severe winter temperatures and from spring frosts. The region has a sufficiently long growing season, adequate total heat, and one of the longest frost-free periods in Canada. The area benefits from the absence of high-velocity winds and a relative freedom from hail storms when the fruit is near maturity. Few areas on the continent possess such an ideal combination of soils and climate for the production of tender tree fruits.

Because of the fruit belt's favourable location in Southern Ontario in the industrialized Golden Horseshoe, and its good transport connections, it is also well suited to non-farm types of development. The die was cast with respect to the loss of land in the Niagara fruit belt when the Queen Elizabeth Way was built in the 1930s, for its construction marked the beginning of urban sprawl that was rampant until more stringent planning regulations were introduced in the 1970s. During this period, thousands of hectares of prime fruit-producing land were lost.

Research into the loss of farmland in Niagara is complex because the underlying causes vary greatly from area to area and from period to period. The individual farm enterprise responds to a multitude of factors, some of which are environmental and some socio-economic, while others relate to national or international political and economic conditions. All of these controls are commonly in a constant state of flux. To add to the uncertainties, the vagaries of the weather may bring about huge surpluses of fruit in one year and insufficient quantities to meet market demands in another.

Keeping the balance between preservation of this unique resource while permitting some urban development is the crux of the problem. One may sympathize with the city and regional politicians who are committed to sponsoring industrial growth and the provision of the related housing and services as a means of providing jobs and of reducing the tax rate for the beleaguered home owners. Conservationists succeeded in delaying the servicing of areas in Stoney Creek for industrial development when this was desperately needed to maintain economic growth in the Regional Municipality of Hamilton-Wentworth.

A realistic and rational solution to the problem of conflicting land uses in the Niagara fruit belt must still be sought. Problems affecting fruit production in Niagara

relate to the cost-price squeeze, which means that production costs have been increasing at a faster rate than the selling price for the produce. Related issues are labour costs and availability, the need to invest large sums of money in mechanized equipment at a time when interest rates are prohibitively high, the problem of markets, foreign competition, and the increases in land prices and taxes for services not required for fruit production.

Fruit growers, like other entrepreneurs, do not want to be restricted in selling their land. The fruit industry has adjusted surprisingly well to changing economic conditions. With some protection from foreign competition and some relief from mounting assessment and the costs of borrowing, the industry will remain viable for many decades. In spite of losses of large areas of fruit land since 1951, the total production and value of fruit have increased. The most recent problem is the prospect of a free trade agreement with the USA which may result in a drastic decline in grape production.

It is my opinion that although zoning of land for agricultural use may be the most effective means of preserving the fruit land, it does not necessarily guarantee that the land will be used for fruit production. The industry will only survive provided the production of fruit continues to be a profitable enterprise. Therefore, the critical need is to introduce whatever measures are necessary to ensure that the industry remains economically viable. This calls for a co-operative effort on the part of the three levels of government: federal, provincial, and municipal.

Furthermore, it is my contention that zoning has an inbuilt injustice since it means that a property owner who happens to be located on tender-fruit soil forfeits his right to sell, while someone a short distance away on less productive land can benefit from the sale of his property to a developer. While it is not feasible to compensate all farmers in Ontario whose land is zoned for agricultural use only, this seems to be a reasonable policy for the unique Niagara region (Reeds 1969).

THE HINTERLANDS OF ONTARIO AND QUÉBEC

This region includes the clay belts of both provinces, the Lake St. John lowland and the Gaspé peninsula (Fig. 1). Although it has the largest area of potentially arable land in Canada that might be developed more fully, the actual occupied farmland is only between one and two per cent of Canada's total at the present time. Furthermore, development has retrogressed since the maximum occupancy of 40 years ago. In addition to the constraints imposed by a small local market and great distances to external markets, the development of viable commercial farming is plagued by a short growing season, a limited total heat supply, and by imperfectly drained peaty soils.

In most of the Great Clay Belt of Northern Ontario, farming is a part-time activity and is combined with work in the woods, or in pulp and paper mills or on railways. The Little Clay Belt has the benefit of more uniform soils, and a slightly more favourable climate. But even here, agriculture has retrogressed as evidenced by a 20 per cent decline since 1941 in the area being farmed. Prospects for expanding the livestock industry would appear to be good as the cool summers and plentiful moisture favour the production of good quality forage crops. On the other hand, consumers prefer meat fattened on grain in Southern Ontario feedlots. The New Liskeard Clay Belt is also suitable for the production of excellent quality oats for milling purposes.

The mixed farming of the Thunder Bay area benefits from proximity to a sizeable urban market. In the other clay belts in the lowlands between North Bay and Sault Ste. Marie, in the Rainy River District and around Dryden, agriculture is declining and many farms are reverting to woodland.

For a time, the industry in the Great Clay Belt of Québec progressed favourably because of the benefit of government subsidies and assistance. Settlement was

pre-planned and sponsored by church and government-supported colonization societies. But in spite of this encouragement, which was not available in Ontario, the battle with isolation and with the adverse physical conditions of the frontier has not been won. Here as in Ontario, the total area of occupied farmland has been declining. Forest farming may be the answer in these areas until the demand and prices for food increase drastically.

Similar conditions prevail in the Lake St. John lowland where there is a considerable area of fair quality agricultural land. Outmigration has reduced the market for locally produced food and the area being farmed is shrinking.

The Gaspé peninsula is another remote area with a limited area of land that is suited to commercial farming. Farms are scattered along the coastline and in some of the interior valleys. Plans have been attempted with ARDA (Agricultural Rehabilitation and Development Act) funds to consolidate the industry and to improve productivity. The rural society of the Gaspé have been reluctant to adopt the new technology. Traditionalism is deep seated, change is difficult to accomplish and farming remains a low income occupation.

THE PRAIRIES

The Prairies lead as the largest area of agricultural land having half of the total farms in Canada. This region is undoubtedly rich in agricultural resources and is capable of producing one billion bushels of wheat annually along with many other crops and types of livestock. Saskatchewan leads in wheat production while Alberta is first in dairying, beef cattle, hogs and poultry. The climate and soil of many parts of the Prairies are well suited to the production of barley, oats and rapeseed and with irrigation many types of small fruits and vegetables. Alberta has 200 000 hectares of irrigated agriculture.

Figure 2 is an attempt to show the relationships between land use and the physical environmental factors. The diagram indicates that CaCO_3 and other soluble salts tend to accumulate in prairie soils at varying depths from the surface. The variations in depth of this zone of accumulation is related to the total moisture supply. Under certain moisture conditions, salts in solution tend to move upward in the soil by capillary action and are precipitated toward the surface. Salinization, the concentration of these salts in the surface horizons, affects the productivity adversely. This process has been more active in recent years. The climates of the past determined the type of vegetation, which in turn controlled the organic matter content, the colour and the soil's inherent capability for various agricultural uses.

Although this simplified model provides a basis for understanding the patterns of agricultural land use in the Prairies, it is inadequate in accounting for all the spatial variations in production. One must look at fluctuations in weather and in the world demand for wheat and feed grain, and the policies of the Canadian Wheat Board and of the provincial governments. The Wheat Board regulates to a great extent the amounts of production. If land-use planning were being done on a regional and rational basis, Saskatchewan should concentrate on wheat production while other crops and livestock might be centred in Alberta and Manitoba. But in order to build a more balanced economy, Saskatchewan has attempted to diversify and to expand livestock production and even to introduce vegetable production using water from the Gardiner Dam. Manitoba and Alberta, in competition with Saskatchewan, have expanded their production of wheat in recent years. Thus, as a result of inter-provincial competition, the farmers lose some of the benefits of regional comparative advantage and of specialization (Baron 1970).

The huge potential agricultural productivity of this vast region is in some

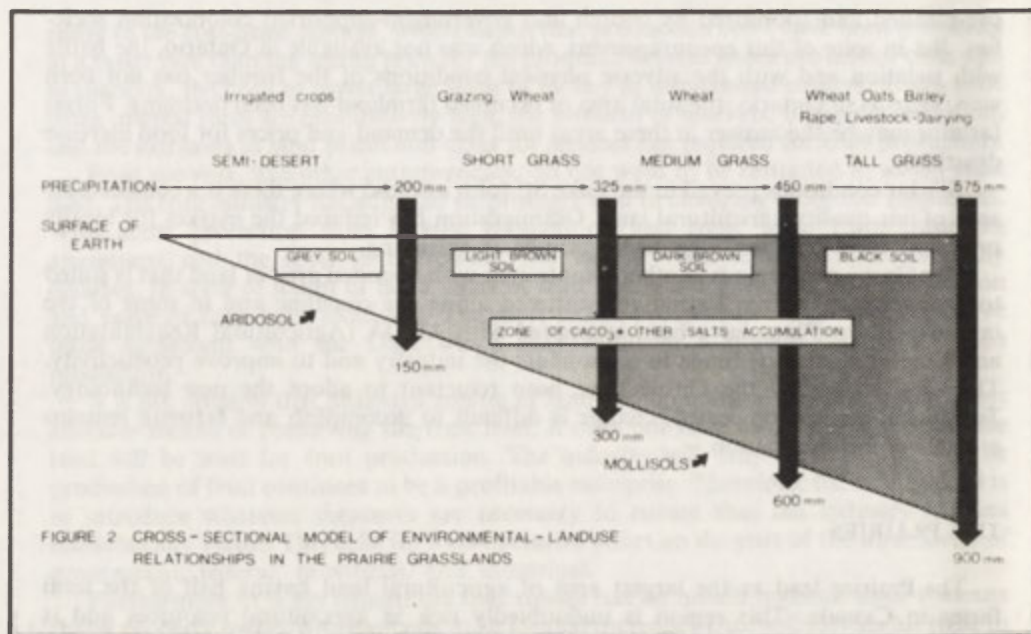


Fig. 2

considerable peril because of problems related to salinization, organic matter depletion and soil erosion. The traditional practice of summer fallowing tends to accelerate the loss of top soil. In addition, monocultural crop practices especially in the specialized wheat growing areas of Saskatchewan deplete the organic matter content and render the soils more susceptible to wind erosion.

The agricultural landscape of the Prairies is changing rapidly as farms are being enlarged to take advantage of economies of scale and to cope with increasing capital costs. Between 1971 and 1981, the average farm increased by 20 per cent to 23:0 hectares. The 400 to 800 hectare farm is becoming more common. The accompanying loss in farm population will eventually result in the decline of many formerly viable rural community centres (Woodcock 1983).

THE PEACE RIVER REGION, CENTRAL BRITISH COLUMBIA AND THE NORTHERN PRAIRIES

This region includes the pioneer northern fringe in the Prairies, the Peace River Country of Alberta and British Columbia and the Nechako area of central British Columbia. Latitudinal location, isolation and dispersed agricultural settlement are its common characteristics. This is the only zone in Canada where the area of occupied farmland has increased in recent years.

The Peace River section has the greatest area and the most potential for development. It benefits from its relatively long growing season for this latitude and its inherently productive soils. Some of the best quality wheat in the world is produced in the Peace River Country. Although forage crops are suited to this environment, insufficient heat and moisture preclude a highly developed commercialized agriculture. Livestock production is low because of high transport costs, but the prospect exists for expansion especially if the population increases as resources are developed.

In the northern fringe areas of the Prairies, and in central British Columbia, commercial farming is limited. Agricultural development exhibits many of the same characteristics as that of the clay belts of Ontario and Québec. Much of it is on a part-time basis and extensive use of the land prevails. A more intensive use awaits the shift of population northwards as mineral and other natural resources are developed more fully.

SOUTHERN BRITISH COLUMBIA

More than 90 per cent of the province is unsuitable for commercial farming because of relief or climate. The short growing season is a problem in the north and aridity restricts agriculture in the south. The most favourable area, the southern coastal lowlands has to contend with urban encroachment. Because of the limited extent of arable land, legislation has been enacted for the purpose of preserving as much as possible of the prime farmland for food production.

The lower Fraser Valley and delta and the southeastern coastal lowland of Vancouver Island are highly developed and intensively used agricultural areas. Proximity to a large urban market and a propitious physical environment are conducive to the development of market gardening and to dairying and poultry production. Flowers and kiwi fruit production are additional specialties on the island.

In the southern interior valleys, fruit and vegetable production is important on the irrigated fine silty soils of the terraces above Okanagan Lake. The Okanagan benefits from its long growing season, a mean summer temperature of 17°C and ample sunshine. Other areas in the southern interior are used for ranching. The largest ranch in Canada with 240 000 hectares is located near Douglas Lake between the Nicola and Okanagan Valleys. This is Crown land that is leased from the province. Land in the lower elevations is irrigated to produce hay and grain. The cattle graze on the forest uplands during the summer. This single enterprise markets 5000 yearly beef cattle annually to feedlots in Alberta, Ontario and to the American Mid-West. Agriculture throughout the southern interior has to compete with forestry and parkland uses and to contend with rugged relief, low moisture supply and distance to markets.

SUMMARY

This survey has shown that Canada's main productive agricultural areas are confined to the Prairies and to a fairly narrow southern zone in other regions. Ninety per cent of the total farm revenue was produced in the Prairies and in southern Ontario and southern Québec in 1986. These two regions benefit from a combination of the most favourable physical environment and the most amenable economic conditions for agricultural development.

The critical constraints to commercial farming in other regions include too little heat, adverse relief, unfavourable soils and drainage conditions and moisture deficiency. Seventy per cent of Canada has too little heat for a great variety of crops. Most of the Appalachian highlands, the Pre-Cambrian Shield, and the Western Cordillera are unsuitable because of adverse relief, soils and drainage while the interior of southern British Columbia and part of the Prairies are handicapped by a moisture deficiency. In the northern outliers, (zones 4 and 6 on Fig. 1), commercialization and diversification are limited by the adverse environment and by distance from the major markets.

In spite of the limitations cited, the nation's agricultural resources are sizeable and varied. They range in intensity and type from the low income farms of the north, the large grainproducing farms of the Prairies, and the extensive ranchlands of British Columbia, to the intensively used land in the lower Fraser Valley, and the fruit growing

areas of the Okanagan, Niagara and Annapolis, and the productive diversified agricultural areas of Southern Ontario and Southern Québec. For the most part, farms are becoming larger, more highly specialized and capitalized and are faced with dramatic and in some cases crippling increases in input costs.

The Canada Land Inventory has vividly revealed the limited amount of prime farmland and the relatively small supply of potential new arable land. The future productivity of the Prairies is being threatened by organic matter depletion, and by soil erosion and salinization. Monocultural practices and neglect of conservation measures are creating problems for Ontario's agricultural heartland. Loss of prime farmland continues to be a critical issue of concern in Southern Ontario, in Southern Québec and in the lower Fraser Valley of British Columbia.

Canada's agriculture is thus experiencing a considerable deterioration in its soil resources, sizeable losses in its farmland base and a continuing struggle with increasing input costs. Farmers need to be encouraged to adopt sustainable production practices. The preservation of our agricultural resources should be given higher priority. Canadians generally should be prepared to accept higher food prices since the ratio of disposable income spent on food in Canada is the lowest among western industrialized nations.

FUTURE PROSPECTS

Canada's agricultural industry is in a transitional phase and at an economic crossroads. Adjustments to technological change are critical for the future. Mounting costs of production and too low prices for produce have thrown many farmers into bankruptcy. Because of higher capitalization, lower land values, and strong competition from the heavily subsidized American and European Economic Community countries in recent years, almost 25 per cent of Canadian farmers are in financial difficulties. Food prices should be permitted to rise in order to keep the industry solvent. The problems of loss of farmland in the most favourable climatic zones and the loss of topsoil are unsolved. Agriculture needs to be given a higher priority in the planning process and ecological farming may be the answer to soil erosion and degradation. Changes may be needed in monocropping practices and in the excessive use of synthetic fertilizers, pesticides and herbicides.

It appears that mechanization will continue to expand, especially in the horticultural types of production. Increasing amounts of capital and credit will be required to finance these more highly mechanized applications. Land rental may become more important as a means of expansion. Corporate farming may tend to replace the traditional family farm. Part-time farming will continue to increase, particularly in the vicinity of the larger cities. Policies will be needed to assist the younger, marginal, low-income farm operator to transfer to other occupations. Increased demands for recreational open space and for all the services required to accommodate expanding cities and industry will continue to threaten the most productive foodproducing areas.

Farm operators will have to become more skilled managers and be better acquainted with marketing practices and research findings in order that they may be able to cope with the more sophisticated management tools and services. Computers, now used by fewer than 5 per cent of the farmers, will become commonplace by the turn of the century. On-farm computers will enable the operator to improve productivity and management. Energy may be produced largely on the farm. The long-term effects of the accumulation of carbon dioxide in the atmosphere will result in an increase in temperatures, a lengthening of the growing season and the prospect of producing a wider range of crops.

The proposed free trade agreement with the United States is vital to Canadian

farmers since one-third of Canada's agricultural exports go to the USA. While some types of production such as grape-growing and wine may suffer from the agreement, the overall effects are expected to be beneficial to the industry.

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REGIONAL STRUCTURES AND TYPES OF THE AGRICULTURE IN THE GDR*

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More than other branches of economy, agriculture is characterized by a close connection between the general socio-economic development and the natural and socio-economic factors differentiated regionally. The regular regional differentiations require adaptation of organization and management of agriculture to the concrete territorial resources. This is the real basis of the scientific agricultural geography. In the following we will examine at first territorial aspects of the main branches of agricultural production in the GDR. Then follows an attempt to give an all-round geographical typology of the agriculture in the GDR.

1. TERRITORIAL ASPECTS OF THE AGRICULTURAL PRODUCTION. A SURVEY OF THE MAIN BRANCHES

Agriculture in the GDR is determined, first of all, by the size of the agricultural area and by the relationship between arable land and grassland. In 1951 the agricultural area was 6 546 000 ha, reaching then its highest value. However, because of increasing industrialization and brown-coal mining, housing construction, modern infrastructure and building-up of industrialized agricultural plants the agricultural area (AA) until 1970 diminished by 260 000 ha to 6 286 000 ha. That means, that about 13 000 ha of land a year were transformed to other uses. Understandably, the agricultural area was cut back above all in agglomerated regions.

There have been taken many measures for protecting the soil being the most important means of production as, for instance, some acts on land culture and mining, the Land Utilization Decree, land taxes and so on. By this way we were able to reduce the losses of agricultural area and to recultivate temporarily devastated mining areas. In 1985 there were still 6 224 000 ha AA. That means that the agricultural area decreased from 1970 to 1985 by only 62 588 ha, i.e. 4173 ha a year. On the other hand, we consider that the intensification of national economy, the realization of our housing construction programme aimed to solve certain questions and finally the development of new brown-coal opencasts make the territorial planning of land utilization more and

* The author dedicates this article to Jerzy Kostrowicki on the occasion of his jubilee. Hereby he wants to express him many thanks for a lot of scientific impulses and for organizing friendly relationships since the end of the fifties. Besides, this paper will document the many years lasting co-operation between agricultural geographers in Halle and Warsaw. Last, but not least the author wants to acquaint the Polish reader with his friendly western neighbouring country.

more decisive. That is why we ought to pay special attention to the utilization and protection of all potential agricultural areas and to the recultivation of temporarily devastated agricultural and forest areas.

The share of AA in the total area of our land and the arable land-grassland relationship are a certain expression of how farmers have used the given natural resources over hundreds of years with respect to the current conditions of production.

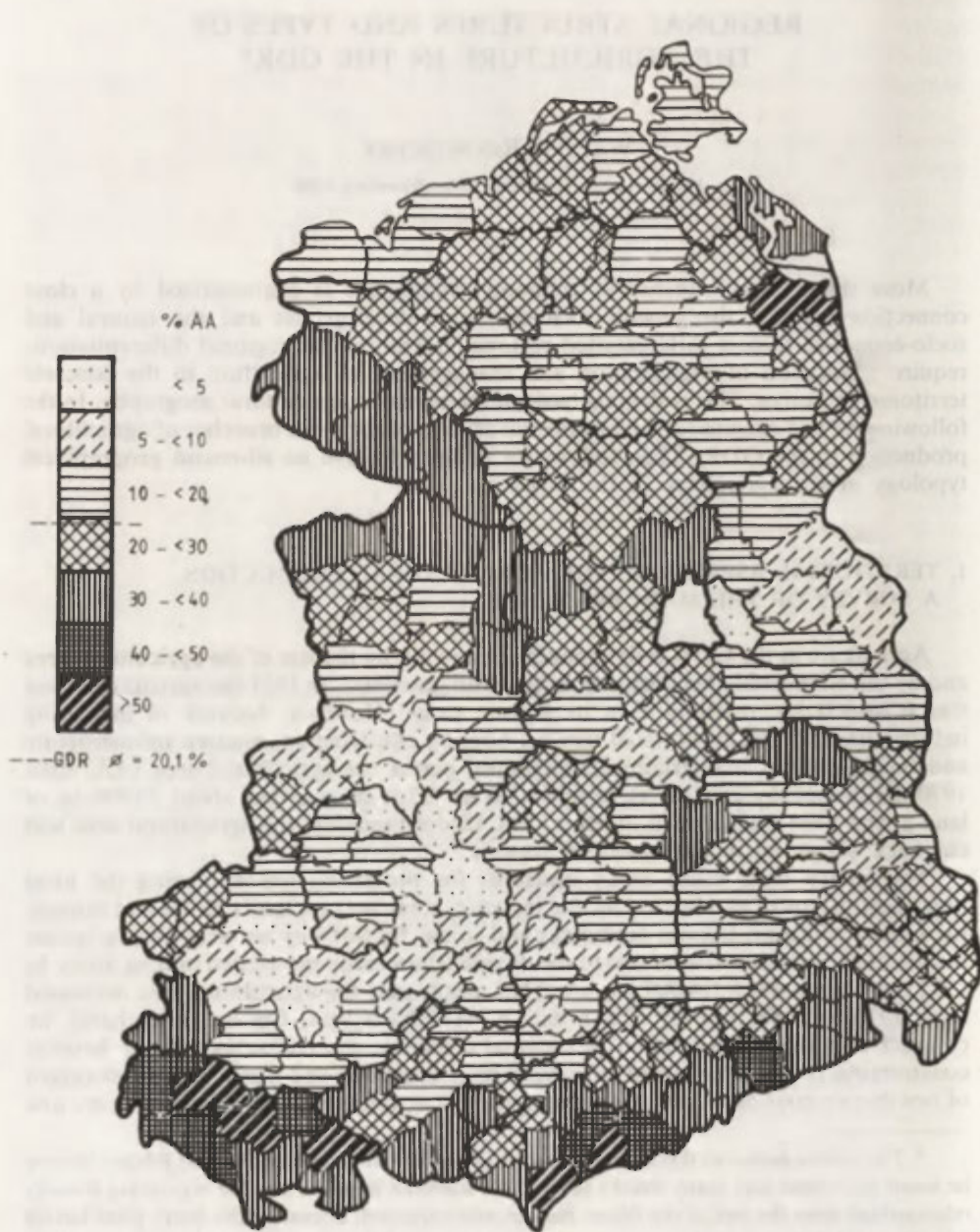


Fig. 1. Percentage share of grassland in the total agricultural area (AA) in 1986 (by counties)

“Absolute” grasslands cannot be used as arable land or only by very great efforts and with a high risk. Grasslands in the GDR are areas with a high ground water level, regions often flooded or mountain areas with high rainfall, low temperatures and a short vegetative period unfit for agricultural utilization because of their flat soils and the relief conditions unfavourable for using machines (see Fig. 1). The Mecklenburgian coast-landscape is characterized by a high share of grassland. In the central lowlands there are grassland areas around large glacial valleys and river meadows (Rhinluch, Wische, Spreewald an others). Only the Oderbruch is mainly used as arable land. The relatively dry-warm western part of the loess zone (Magdeburgian Börde, the sugar-beet raising area of Halle, the Thuringian Basin) has only a small grassland proportion. The Saxonian loess zone and the foothills have by far more grassland. From the Rhön to the eastern Erzgebirge meadows and pastures constitute more than 30 per cent of the agricultural area, which points out the typical mountain character of this region.

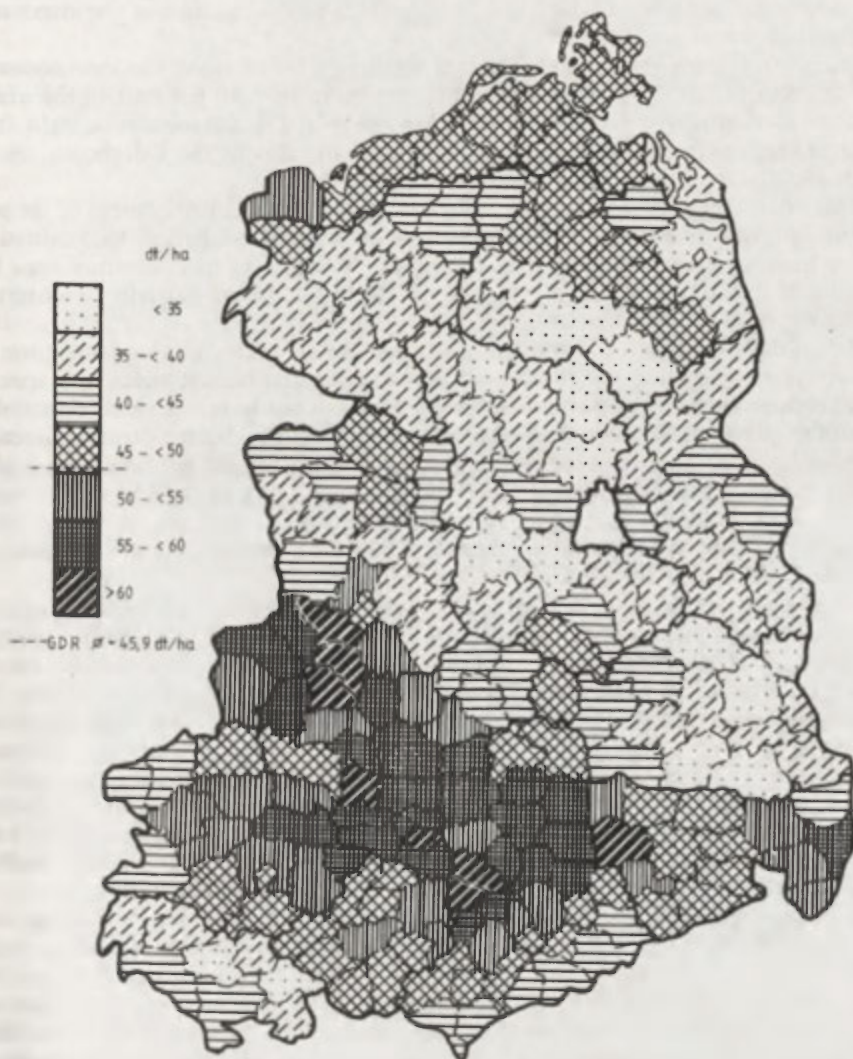


Fig. 2. Net grain yield in decitons (100 kg)/ha in 1984/86

In 1985 we have cultivated grain on more than 2.5 million hectares, i.e. more than 53 per cent of the arable land in our country. Even individual grains, i.e. wheat, barley or rye, took more place than potatoes, sugar-beets or field forage crops. During the last decades the intensive mineral fertilization changed the relationships between barley/wheat and rye/oats in favour of the first ones, especially escalating the winter grain farming. Thereby the yields per hectare were evidently increasing. In future we will have to raise the national grain production, above all by intensifying it, but also by enlarging the area under cultivation.

The average net grain yields per hectare in individual districts of the GDR in 1984/1986 make evident large regional differences (see Fig. 2). While the chernozem and other loess zones give above-average yields of more than 5 or even 6 tons/ha, the nutrient-poor and ground water-far lowlands mostly deliver less than 4 tons/ha. This indicates the great influence of the specific natural yield factors.

Now, we will briefly illustrate the clear yield differentiation between nutrient-poor regions and areas with a high soil fertility (1:2) by the example of the alternating preference of wheat or rye.

Winter wheat dominates in nutrient-rich regions as, for instance, the loess zones. In the chernozem loess regions winter wheat covers more than 20 per cent of the arable land. It is also cultivated in the *Lommatzscher Pflege* and in the loess zone right from Elbe river (region in the neighbourhood of Bautzen), also in the Oderbruch, in the Uckermark and on other heavy Pleistocene and Holocene soils.

On the other hand, rye makes only a few demands to the nutrient content of the soil. However, it is sensitive to extreme wetness. For the wheat (and barley, too) cultivated on more humous loess clay soils gives higher yields than rye, its cultivation area has been reduced to the large nutrient-poor soils of the lowlands and partially to mountain areas, too.

Due to the possibility of cultivating several grain species at the same time or successively, it is just the point to find out how to reach the highest yields by a specific regional combination of grain and other crops. Last but not least, the yield relationship between the given species determines the cultivation rate. Besides the planting acreage, all crop yields must be intercorrelated. Thus, for instance, wheat because of its higher potential power can be cultivated at nutrient-rich places, whereas rye is not able to give best yields there, where it may have its highest capacity of yields per ha, but at those places, where wheat yield is sinking. That is why rye is exceeding wheat by yield on worth Pleistocene soils.

Forage from arable land, similarly to grain, is cultivated in all of the cropping areas in the GDR. As a rule, it takes 15–30 per cent of the total arable land, it depends on the size and cultivation intensity of the natural grassland and also on the stock of ruminants. Forage crops have positive influence on the soil fertility. In order to utilize the regionally different cropping capacity, several forage crops can be grown (as, for instance, clover, lucerne, seed-grass, maize, annual or perennial mixed forage crops) as main, second or intercrop. Raising perocious corn species used as concentrated feed stuff becomes more and more important for producing silage or CCM (Corn-Cob-Mix). Field forage crops (and natural grassland, too) enable us to utilize lots of liquid manure, can be irrigated with clear water as well as with waste one, and is the basis for the industrial forage production.

The potatoe-growing area has been gradually reduced over a long time along with the raising yields per hectare. The territorial specification has followed according to the kind of utilization in a given region. Potatoes are multiplied mostly in the "sanitary regions" of the three northern counties, whereas table potatoes are grown on all appropriate soils near the consumers. Beside Berlin only the three agglomerations Halle — Leipzig, Karl-Marx-Stadt — Zwickau and Dresden must import potatoes from distant regions delivering them as agreed in many years lasting contracts. The relatively

warm places on chernozem soils, too, are specialized in early potatoes. Potatoes used for starch production and processing are grown as near as possible to industrial enterprises mostly in the northern counties. Solving the strategic task to cover the total grain consumption (also for fodder) by inland production until 1990 we not only have to escalate the national production of grain, but also to produce more sugar beet and forage crops (by increasing the yields per hectare). The energy capacity of sugar beets per hectare is greater than that of all the other farm crops. Sugar beets are effectively used, too, in keeping cattle (till now above all as coppled products, i.e. the tops as silage, the roots as wet or dry cuttings). Sugar beets are traditionally grown on the chernozem soils in the counties of Halle and Magdeburg. During the last decades one started to raise them also on the Saxionian loess soils and on the ground-morain soils of the counties of Rostock and Neubrandenburg. However, sugar-beet crops cover more than 10 per cent of the whole arable land only at some places in the counties of Halle and Magdeburg. Besides, the Börde, too, is famous for its sugar-factories and has a lot of experiences in growing sugar beets.

Among the oilseeds winter rape in the GDR is taking a first position. It likes very wet places above all near coasts influenced by the sea and also some of the foothill places.

Choosing places for producing vegetable depends on several criteria: crops sensitive to transport are mainly grown near the consumers. The food processing industry (conservation, freezing) has been settled down at the best places for producing cucumbers, green peas, green beans etc. Head cabbage, Brussels sprouts inclusively, are growing very well in a relatively maritime climate. Hothouse production, partially combined with field vegetable growing or with ornamental floriculture, is carried out near the consumers, too. If possible, one uses the waste heat of exotherme industrial enterprises. The territorial concentration of vegetable production has enormously developed. Twelve large vegetable-growing areas with specialized farms, store houses and industrial enterprises build up near the greatest centres of consumption cover about 2/3 of the national production of vegetables. Besides, these regions use a lot of experience with crop growing, methods of irrigation, special technologies and industrial waste heat.

In general the local administration aims to supply the people of villages and smaller towns with vegetable in close co-operation with agricultural and horticultural farms, with the "Association of Small Gardeners, Settlers and Small-cattle Breeders" and with all the other small producers to make short ways from production to consumption.

Fruit growing traditionally dissipated and mainly destined for self-supply could not meet the quantitative and qualitative requirements for a long time. That is way in the seventies five large fruit plantation-areas have been created and/or enlarged. These plantations combined with store houses, process enterprises and commercial institutions have considerably improved the stability and quality of supply (above all of apples) in some districts. The plantations cultivated in Potsdam — Werder, Halle — Süßer See, Lommatszsch — Dürrweitzschen, Dresden — Pirna and Erfurt — Mühlhausen show how climatically favourable areas have been effectively used for producing fruits and selling them above all in neighbouring agglomerations. However, we will have to make great efforts to diminish imports, to widen the commercial production assortment and to improve quantity and quality of fruit production. Likewise, small gardeners will not only supply their own families, but also support the local market.

Livestock breeding takes about 3/4 of the total marketable production. That means, that productive livestock rearing is one of the most important lines of our agriculture. Milk and dairy products, meat and meat products, eggs and fish are of great importance for the nutrition. The by-products (wool, skins etc.) are important raw materials for the industry. During the last decades the demand for all of these products has rapidly risen. Nevertheless, animal and crop husbandry ought to guarantee the matter flow "soil-plant-animal-soil" within the integrated agricultural reproduction

process. Besides, livestock rearing, first of all cattle breeding must deliver enough organic matter for keeping and improving the soil fertility.

Among important factors determining the territorial dislocation of animal husbandry, one can identify demands for animal products strongly differentiated corresponding to the local population density, the structure and quantity of animal stocks and the given climatic and soil conditions for fodder production. In the seventies industrialized big livestock farms have been built taking into account favourable transport distances and the possible nearness of processing plants, consumers and places with special natural or technological resources (water, energy, environmental tolerance etc.).

Livestock breeding branches are differently bound to the given places. Young stock is bred above all in grassland-rich zones. One pasture period at least must be used for breeding. Young cows can be well kept on the Darb, in the Lewitz, Wische, on other low grounds rich in grassland and also in the foothill and mountain areas of the counties of Suhl, Gera and Karl-Marx-Stadt. However, when planning the territorial

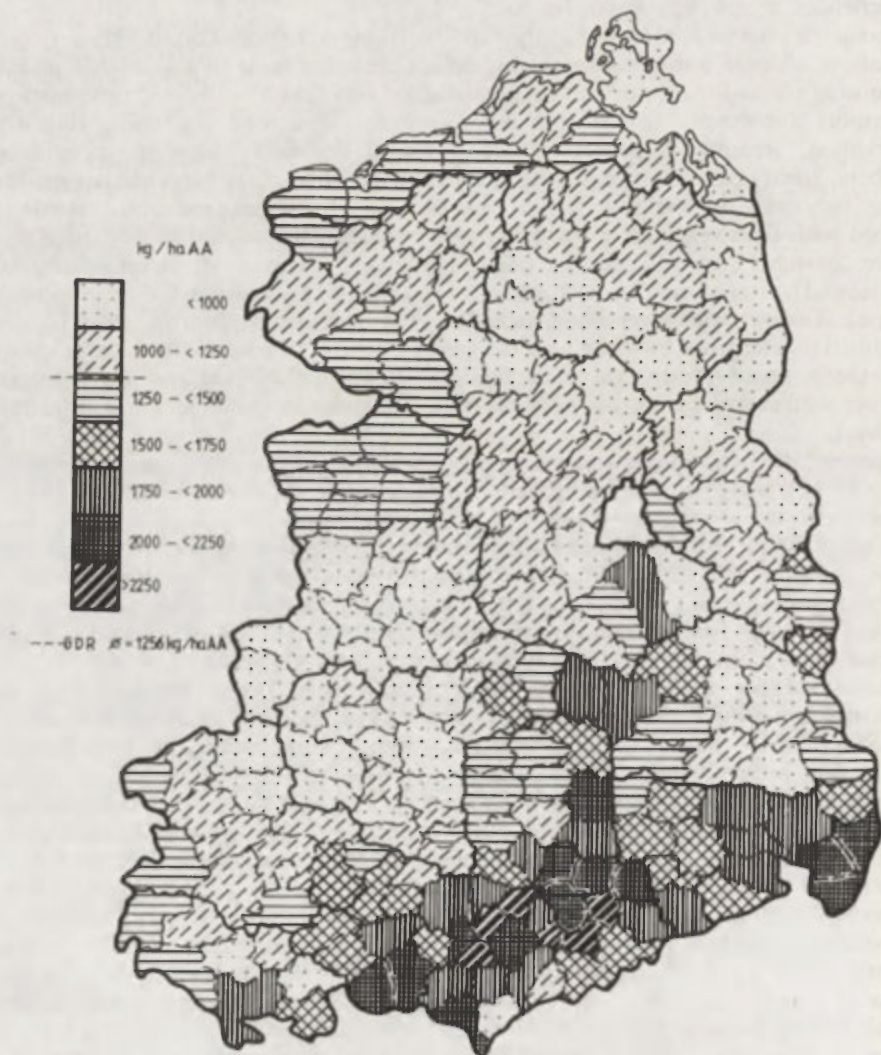


Fig. 3. Production of milk (national procurement) in kg/ha AA in 1986

location one must consider the economic factors, too (transport costs, stable room, which will be a disposal for a longer time).

The milk production ranks foremost among all commercial products in all of the counties (*Bezirke*) and in most of the districts (*Kreise*). The coarse fodder resources of milk cows are rather various reaching from natural grassland over field fodder to sugar beet tops and chips dependent on the given area. Cattle and cow stocks as well as milk production are the greatest in the southern regions of the GDR. In many of the districts in the counties of Karl-Marx-Stadt, Dresden, Leipzig, Gera and Suhl there are more than 120 cattles/100 ha. In regions with a high population density, where fodder is growing very well, farmers produce 2000 kg of milk/ha, whereas the best soils of commercial plant production (Borde) and the northern agricultural regions with a smaller population density give only less than 1000 kg/ha (see Fig. 3).

Cattle fattening is carried out in all of the GDR's regions. Male animals and calves not needed for reproduction are slaughtered for meat. In numerous co-operative and

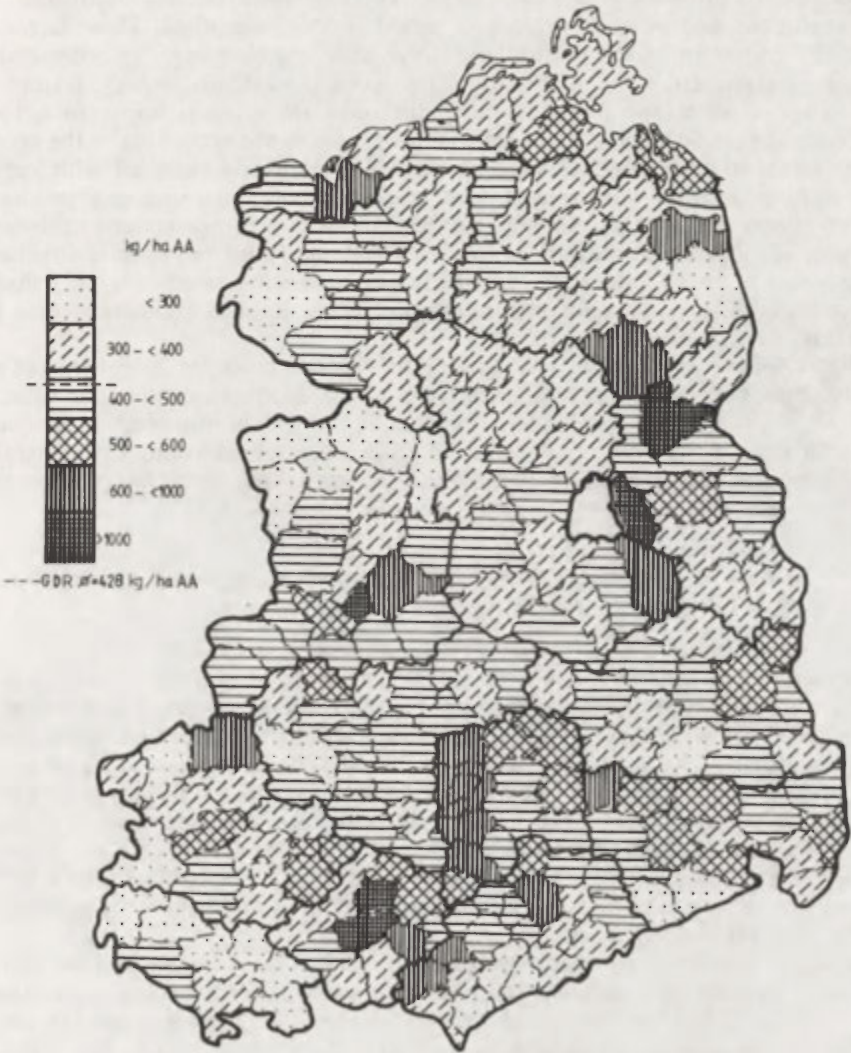


Fig. 4. Production of meat (national procurement). Slaughterings (life weight) in kg/ha AA in 1986

state farms the cattle is kept in old sheds and fed with roughage. Some industrialized fattening farms keep plenty of cattle. These big farms utilize roughage produced on their own fields or combine it with concentrated fodder, thus reaching high parametres of fattening and a high effectivity.

Sheep are kept for meat. Besides they provide the textile industry with a great part of fine wool. The sheep, also called a *Pfennigsucher* (penny-seeker), helps to use economically the grassland less fit for keeping cattle. Sheep are even able to graze the remains of crops of arable land (sugar beet etc.). That is way sheep stocks were continuously growing during the last years. In the relatively dry counties of Erfurt, Halle and Magdeburg farmers keep more than 100 sheep/ha.

In 1986 pig breeding has had the greatest share (62.6 per cent) in the total meat stock production (2 775 900 tons of living weight). Pigs are kept above all in farmland areas and at other places, where pork is processed and consumed, whereas grassland-rich regions understandably stay behind. Pig breeding depends on the local fodder production (potatoes and grain), on the kitchen waste coming from the town agglomerations and on the existence of mixed fodder enterprises. These factors are especially important for industrialized large-scale pig keeping. The demand for technical infrastructure and such natural resources as water and energy, transport as well as waste water and liquid manure utilization are of great importance, too.

Fresh-egg production in large-scale factories is planned according to the needs of large towns and agglomerations. The rural population is supplied with eggs by individual producers delivering about one third of the total egg production (5.5–6 billion eggs a year). Already in 1985 250 000 tons of poultry and rabbits were produced. In locating industrialized chicken farms, one must pay special attention to the existence of mixed fodder plants, slaughteries, processing enterprises and consumption centres, in order to minimize the transport costs. Rabbits exclusively come from individual producers.

Figure 4 shows that in 1986 most of the GDR's districts produced 200–400 kg of cattle for slaughter. Only on the grasslandrich crests of the middle mountains this value falls below. In towns and their surrounding regions equipped with meat-processing factories, as well as in areas, where fattening stations and other industrialized livestock breeding farms are located, the meat production (600–800 kg or even 1300–1600 kg/ha) is especially high.

2. REGIONAL TYPES OF AGRICULTURE

In the following the author wants to demonstrate the geographic variability of the agriculture in the GDR by the example of the main regional types. The typology has been worked out according to the following method. The reference unit applied here is the *Kreis* (district). The administrative unit *Gemeinde* (municipality) is only seldom the basis of statistic investigations. The total area of a single socialist farm is greater by far than that of a municipality. The area of municipalities or farms is often changing, whereas the area of the districts remains constant since 1952. The district was chosen to be our reference unit, for here exist the best possibilities to co-ordinate the territorial problems of agricultural lines within the national economy between governmental, agricultural and social institutions.

In Table 1 the types are characterized by their territorial parametres. Here you can find, among others, parametres of the total area, the share of agricultural acreage, the above sea level, data on the climate and the soil fertility. Besides some data on the consumers and labour force help to characterize nutrition needs, the degree of

industrialization and the labour force situation. The crop production is represented by five-year average growing and yield values of 13 main crops and by the gross turnover in the crop production (measured in grain units). With regard to livestock production, the two main species, i.e. cattle and pig stocks are taken into consideration. Furthermore, we have paid special attention to the milk yield per cow, the production of cattle for slaughter and the milk production per hectare. Twelve examples of districts compared with the statistical average show the territorial variation of the agriculture in the GDR (see also the short description in Table 2).

These tables let assume that there are two main types, one of them being the town-near farming mainly determined functionally (supply of near large consumption centres with perishable fresh products, for example Berlin), second, there are very different main types determined structurally and influenced both by natural and by socio-economic factors (all the examples from Grevesmühlen to Neuhaus). The type of town-near farming having a low agricultural quota is characterized by a high rate of agricultural manpower per 100 ha. This, on the other hand, correlates with a well-developed vegetable gardening and a high production of cattle for slaughter per hectare of agricultural land. From this follows that conditions of transport are of greater importance than the quality of natural factors.

The types mainly determined by structural forces are characterized by a changing influence of natural and socio-economic factors. (Of course, the different population density per hectare and the specific supply exert an influence of functional determination too, see for instance, Hohenstein – Ernstthal). Besides, the share of the agricultural acreage in the total area of the districts may characterize the territorial differentiation of the general conditions in the single types. The agricultural-area quotient is extremely varying (with exception of the town districts with their special conditions) from sandy forest-rich Pleistocene areas (Weisswasser – 22 per cent) and the crest areas of the mountains (Neuhaus – 18 per cent) up to the chernozem arable-land regions (Wanzleben – 93 per cent; see Table 1). The more distributed the agricultural areas are, the greater are the costs for production and transport, too.

Great shares of agricultural acreage and arable land (type Wanzleben) correspond with a relatively dry warm climate and a high nutrient content of the soils. These soils give the best yields of grain and are generally specialized in commercial plant production. The gross plant production measured in grain-equivalent units per hectare goes up to more than 60 dt, whereas the milk productivity per unit area remains low.

Table 1 makes clearly evident of what importance are the yield relations. Thus, for instance, in 1981 – 1985 wheat covered only 3.7 per cent of the total agricultural acreage in the district of Gransee (yield per ha – 29.9 dt), in Wanzleben – 27.7 per cent (yield/ha – 58.7 dt). Rye cultivated on 22.2 per cent of the agricultural acreage in the district of Gransee gave only a yield of 26.8 dt/ha, whereas in the district of Wanzleben rye took only 0.2 per cent of the agricultural acreage (yield/ha – 38.1 dt; see Table 1). There is a significant correlation, too, between the rainfall, yields and the extent of fodder cultivation (see the districts of Wanzleben, Oschatz and Hohenstein – Ernstthal). Compared with Wanzleben, the yield brought in on meadows and pastures in the district of Oschatz went up to more than 100 dt/ha. In connection with it the part of grassland enlarged, too. Above all in the district of Hohenstein – Ernstthal the great demand for fresh products (population density – 456 inhabitants/km²) is closely connected with a high co-efficient of natural fodder supply. That is why the people there can be well supported with fresh milk from near farms. Comparing the values of Gransee and Weisswasser with one another identifies the great influence of population density (demands for daily supply of fresh products) on the development of the corresponding agricultural lines (milk production in the district of Gransee – 856.4 kg/ha, in the district of Weisswasser – 1453.1 kg/ha AA).

TABLE 1. Geographical types of agriculture

		1		2		3		4			
		GDR in total		Berlin		Grevesmühlen		Prenzlau		Pritzwalk	
I. General data											
Total area, km ²	1985	108 333		403		667		795		762	
Agricultural acreage (AA), per cent of the total area	1985	57		28		78		78		73	
Height above sea level, m		0—1214		36		30—50		50—80		60—80	
Yearly average precipitation, mm		429—1483		550		500—650		500—600		600—650	
Main duration of daily temperature average above 5°C		18—235		230		220—230		210—230		220—230	
Mean soil valuation ^a index		8—100				50		40		34	
Population	1985	16 640 059		1 215 586		41 810		44 147		32 551	
Population density, inhabitants/km ²	1985	154		3016		63		56		43	
Agricultural quota ^b	1980	9.5		0.8		31.4		32.0		30.6	
Workers/100 ha of AA ^c	1985	14.1		93.8		12.5		11.7		9.8	
II. Crop production											
	1981—1985	per cent AA	dt/ha	per cent AA	dt/ha	per cent AA	dt/ha	per cent AA	dt/ha	per cent AA	dt/ha
Wheat		11.2	48.5	0.3	40.0	15.5	48.9	14.9	46.9	6.6	32.2
Rye		11.0	32.1	17.2	39.8	5.0	35.1	7.3	36.1	19.9	28.3
Barley		14.7	43.6	3.4	40.4	13.5	46.5	20.7	42.1	11.8	32.8
Oat		2.9	37.9	—	—	6.4	39.8	2.8	39.9	4.9	34.7
Sugar beets		3.9	294.1	—	—	6.0	273.4	7.9	268.7	2.0	232.5
Potatoes		7.9	206.4	—	—	3.5	178.4	4.2	174.8	12.1	172.0
Fodder maize		5.9	317.8	11.5	305.6	5.5	327.7	5.3	287.4	8.1	296.8
Clover		2.5	451.7	0.8	477.5	4.4	436.9	2.5	438.7	1.0	374.9
Lucerne		2.2	389.7	—	—	1.4	376.8	5.7	398.4	1.1	411.6
Meadows		8.9	295.9	3.4	246.4	4.5	200.2	6.5	298.4	4.9	264.9
Pastures		9.5	316.0	0.04	273.5	9.2	294.5	1.8	244.4	11.3	311.5
Plant gross production/ha AA											
in grain equivalent units	1981—1985	45.4		35.6		46.7		45.7		38.7	
Vegetables % of AA	1983	1.0		9.3		0.5		0.3		0.2	
Fruit-growing and gardening, special crops, % of AA	1981	1.4		0.6		0.1		0.4		0.2	
III. Livestock breeding 1985											
Cattle per 100 ha		93.6		67.2		90.7		67.9		78.4	
Pigs per 100 ha		208.0		303.9		209.1		182.2		168.6	
Milk production per cow ^d , kg/year		3824		4790		3760		4197		3353	
State procurement											
Meat production kg/ha		416.1		1648.1		377.5		351.1		313.8	
Milk production kg/ha		1209.4		1378.2		1254.9		1124.7		876.6	

^a Soil valuation index = taxation of the natural soil fertility (100 points = maximum)
^b Agricultural quota = the share of workers constantly employed in co-operative and nationally owned farms in the
^c Total number of workers in the national economy socialist agriculture
^d With a fat content of 4.0 per cent

in the GDR (in comparison with the average data)

5		6		7		8		9		10		11		12	
Gransee		Weisswasser		Lübben		Wanzleben		Oschatz		Hohenstein – Ernstthal		Dippoldiswalde		Neuhaus	
945		525		806		454		458		134		458		321	
44		22		43		93		66		69		58		18	
50 – 70		120 – 150		40 – 60		120 – 200		120 – 200		300 – 400		440 – 700		500 – 800	
550 – 630		600 – 700		500 – 590		450 – 550		550 – 650		700 – 900		700 – 1000		700 – 1200	
210 – 230		220 – 230		220 – 230		230		230		210 – 220		180 – 210		180 – 200	
28		30		27		88		57		44		33		21	
44 317		60 177		32 456		42 439		51 983		61 089		44 999		34 470	
47		115		40		93		114		456		98		117	
20.3		5.1		23.3		32.3		20.7		4.9		13.6		2.7	
10.9		13.3		10.2		14.0		18.0		16.5		12.3		12.4	
per cent	dt/ha	per cent	dt/ha	per cent	dt/ha	per cent	dt/ha	per cent	dt/ha	per cent	dt/ha	per cent	dt/ha	per cent	dt/ha
AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA
3.7	28.9	2.9	36.5	2.1	35.5	27.7	58.7	16.6	55.1	11.1	52.7	4.5	45.5	1.1	27.5
22.2	28.8	21.4	32.5	24.2	29.6	0.2	38.1	6.2	43.9	4.4	45.8	5.6	40.0	1.0	24.7
10.8	30.3	8.0	36.8	7.1	32.3	17.8	53.4	21.3	52.6	19.3	51.4	14.1	41.2	6.8	26.8
4.3	30.6	2.7	30.2	0.7	30.8	2.6	49.1	0.8	44.0	0.9	46.0	4.8	40.0	3.5	27.6
0.5	240.3	0.6	299.8	—	—	11.8	347.1	6.9	327.4	0.7	323.5	—	—	—	—
12.1	160.0	7.7	188.5	8.6	183.1	2.9	268.0	8.7	261.7	8.7	237.8	5.9	252.6	2.2	140.9
6.5	227.8	6.2	289.0	7.5	272.5	7.4	365.0	7.1	390.9	3.4	463.5	0.3	406.0	—	—
1.3	301.6	2.8	433.8	2.7	389.1	1.0	498.2	5.7	585.3	4.3	546.7	5.6	468.0	0.4	367.0
1.1	352.4	0.9	259.2	0.1	315.6	4.7	400.7	1.8	518.1	—	—	—	—	—	—
10.1	258.9	18.0	308.3	25.2	294.6	2.0	217.1	6.9	324.2	4.6	385.3	11.5	309.3	30.4	283.3
12.5	315.2	6.5	313.5	9.3	297.5	0.9	243.0	2.5	372.6	18.5	391.1	29.1	350.6	28.6	256.8
35.3		37.5		34.9		62.3		60.6		52.2		45.2		29.1	
0.6		1.4		1.4		4.0		2.7		0.4		0.1		—	
1.0		0.3		—		0.2		0.8		1.8		—		—	
84.4		115.5		129.0		118.0		129.4		126.7		140.8		84.9	
201.3		69.3		134.9		164.3		271.9		178.1		61.0		20.7	
3393		3686		3324		3858		4445		3875		4168		3402	
364.8		303.5		314.6		579.0		530.1		397.1		234.5		88.3	
856.4		1453.1		976.5		586.2		1999.0		1850.6		1754.8		110.2	

TABLE 2. The main geographical types of agriculture in the GDR

Type	Example	Characteristics
1	Berlin	city-near farming, a type mainly determined by its functions (supply of large consumption centres with perishable fresh products)
2	Grevesmühlen	effective farming of Pleistocene soils with a high nutrient content, relatively maritime, high degree of breeding improvement
3	Prenzlau	effective farming on Pleistocene soils with a high nutrient content, relatively continental, mainly used as arable land
4	Pritzwalk	farming on lighter till middle Pleistocene soils, relatively low population density, high agricultural quota
5	Gransee	poor ground-water — distant relative infertile sandy soils in the northern counties, low population density and labour force
6	Weisswasser	poor ground-water — distant relative infertile sandy soils in the southern counties, widely agricultural acreage, middle population density and labour force, low agricultural quota
7	Lübben	farming in alluvial lowlands and on Pleistocene soils with a high ground-water level, great part of grassland, less developed
8	Wanzleben	productive farming in the fertile chernozem zone, relatively dry and warm region with a high share of commercial plant production
9	Oschatz	productive farming on fertile parabrown soils with various lines of production
10	Hohenstein — Ernstthal	medium fertile soils and areas suitable for fodder cultivation in foothill zones, very densely settled, low agricultural quota, dominance of forage and milk production, high yields per ha, great need of supply
11	Dippoldiswalde	low-mountain farming, strictly orientated to meadow cultivation and cattle breeding
12	Neuhaus a.R.	above all meadow cultivation for young cattle breeding in the crest areas of the mountains, under cold and wet climate conditions

Altogether, the examples point out the obvious regular territorial differentiation dependent on transport distances as well as on natural and socio-economic factors, and at the same time they emphasize the need in geographical investigations and territorial organization and management of the agriculture in the GDR.

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FARM AND OFF-FARM FAMILY INCOME IN AUSTRALIA

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Farm incomes in Australia fluctuate markedly from year to year depending on seasonal conditions, input costs, and the prices paid for Australian farm products on volatile and often unpredictable world markets. In recent decades the cost-price squeeze has prompted continual agricultural adjustment aimed at increasing the productivity of resources used in farming. Farmers have increased the size of their properties, changed the output mix, substituted new technology for labour, and intensified farming. Since 1970 government rural policy has shifted its focus from the price support and income stabilisation schemes of the early postwar years to measures facilitating the adjustment process. Rather than helping to perpetuate marginal farming, most government intervention now enables farmers "to get big or get out".

An important component of agricultural adjustment has been the growth in off-farm income. Until economic pressure on farming became acute, the large size of most Australian farms, the seasonal spread of labour requirements in typically multi-product livestock farming, and the limited opportunities for off-farm employment in sparsely populated pastoral regions had militated against the partial deployment of farm resources to non-farm uses (Wills 1978, p. 196). But the substitution of capital for labour has helped not only to reduce the employment on farms of hired labour but to release part of the operator's labour for use off farm. Before the mid-seventies few Australian publications made more than passing reference to off-farm employment, which grew significantly from the late sixties to the late seventies. Not until 1982–1983 when off-farm employment had appeared to stabilize were comprehensive sample-farm data published for almost all agricultural industries by the Bureau of Agricultural Economics (BAE).

This paper seeks to examine, against the background of farm types in Australia, the spatial pattern of farm family income, to trace the growth and salient features of off-farm employment and investment from data scattered through numerous BAE farm surveys, and to examine the spatial contribution made to farm family income by farm resources deployed off farm. Since much of the European and North American literature on off-farm income deals essentially with part-time farming (cf. Fuller and Mage 1976; Shaw 1979a, b; Robson *et al.*, 1987), it should be stressed that the present study focusses on all full-time family farms in Australia. It also differs from almost all other geographical and even economic studies in that it attempts to examine the role not only of off-farm employment but also off-farm investment which over the past decade has assumed increasing significance in Australia as farmers sought to make their farm businesses more viable under acute economic pressure.

FARM TYPES

In 1984–85 Australian farms, defined by the Australian Bureau of Statistics as agricultural establishments, numbered 171 400 (ABS, 1986a). An agricultural establishment covers all operations undertaken by a single operating legal entity at a single physical location or agricultural holdings but where two or more holdings in the one local government area (or county in South Australia) are operated under one management, the holdings are combined to form one establishment. A single legal entity means an owner-occupier, a partnership, company, trust, co-operative, or an estate. Although recent decades have seen a substantial increase in the number of partnerships and trusts, most comprise husband and wife, and family farms, whatever their legal entity, make up some 90 per cent of all agricultural establishments (Campbell 1981, p. 51). Whereas the ABS totals of farms by type relate to establishments with an estimated value of agricultural operations amounting to \$2500 or more in 1984–1985, the BAE defines family farms as those establishments employing at least 48 man weeks of operator and family labour a year; large company farms and small hobby or part-time farms are excluded. This paper cites in this section the ABS totals of establishments by type but subsequent analysis relates to family farms as defined by the BAE.

Australian farms are predominantly livestock oriented (for details see Scott, 1981). Much of northern and central Australia consists of arid and semi-arid country where beef cattle graze extensively on native pastures over vast holdings; in 1984–1985 beef-cattle properties numbered 31 700, or 19 per cent of all farms (Fig. 1). Farms which run sheep and beef cattle, where the combined value of these operations accounts for at

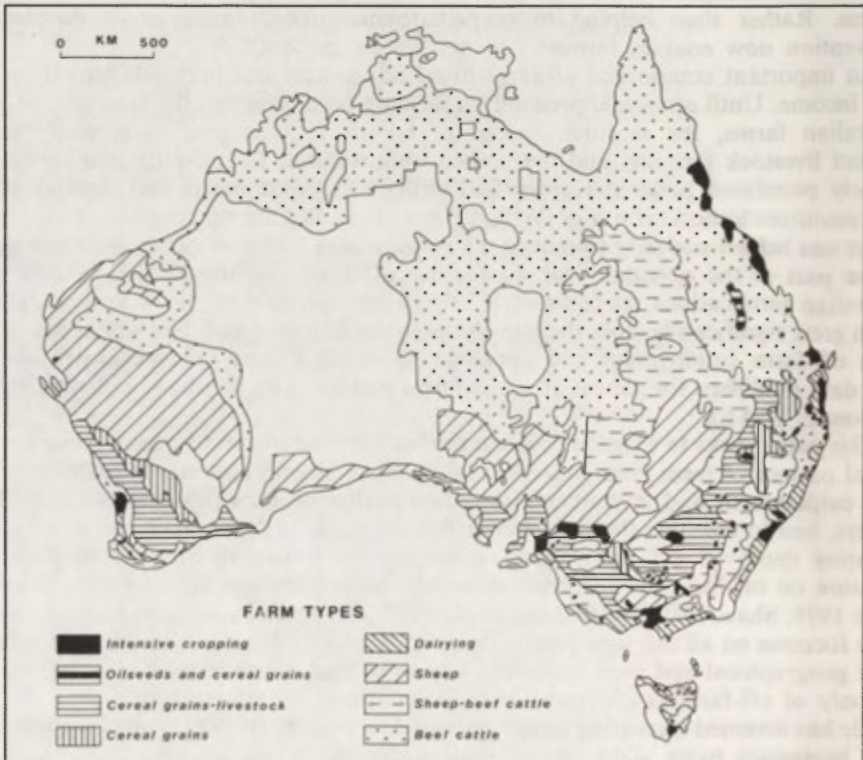


Fig. 1. Farm types in Australia (Source: *Division of National Mapping*, 1982)

least 75 per cent of the farm total, and neither activity contributes more than four times the value of the other, number 9900, or 6 per cent; they occur mainly in central Queensland, northwestern New South Wales, and on the southeastern tablelands. In southern Australia the beef cattle and sheep-cattle farms merge southward into sheep properties, numbering 23 000, or 13 per cent, which in turn merge into the cereal grains and crop-livestock farms of the southeast and the southwest. In these belts, popularly known as the wheat-sheep belts, the rainfall is generally sufficient for improved pasture species, which are incorporated in crop rotations comprising not only cereal grains but also coarse grains, oilseeds, and dry field peas or beans; livestock are sheep and/or beef cattle. A crop-livestock farm is defined as one where the combined crop and livestock activities account for at least 75 per cent of their estimated value of farm operations and neither activity contributes more than four times the value of the other. Grain farms number 19 200, or 11 per cent, and crop-livestock farms 28 000, or 16 per cent. Dairying, with 18 800 farms, or 11 per cent, is largely confined to the higher-rainfall, coastal regions of the southeast and the southwest. Pig farms, located in peri-metropolitan areas and in the crop-livestock belts, number 2500, or 1.5 per cent, and poultry farms, located near cities, number 1600, or 1 per cent.

Intensive cropping, made up of specialist crop and associated activity, is either strongly localized close to major urban markets or widely scattered in areas of highly favoured environment and in irrigation districts. The 29 200 farms, or 17 per cent, include 4500 producing grapes, 8900 producing plantation, orchard, and other fruit, 6100 vegetables, 6000 sugar cane, 600 tobacco, and 500 cotton. Locational and other detail are given where relevant in subsequent discussion.

FARM FAMILY INCOME

Since farm incomes fluctuate widely, the choice of a study period is crucial. The only fairly comprehensive data available on farm family incomes are those obtained in sample farm surveys by the BAE. Farm income is the income, left to be distributed among family members after allowing for cash costs, inventory changes, and depreciation; in other words, it is the family's return to the capital and labour input. Until the 1980s the BAE undertook industry surveys from time to time but in no year were all the major industries covered, the data from various surveys were not readily comparable, and some industries were never included. After 1980 the BAE amalgamated specific industry surveys into a single, broadly based, annual survey, which not only provides coverage of almost all the major farm types but ensures a high degree of consistency in the results. In 1983–1984 the BAE changed significantly its sample design and industry coverage by adopting the Australian Standard Industrial Classification used by the ABS in reporting agricultural and manufacturing statistics, including those on agricultural establishments cited above. Accordingly the annual surveys now cover beef cattle, sheep-beef, sheep, wheat and other crops, crop-livestock, dairy, and horticultural farms. On this basis final data are available for only 1983–1984, a year following a disastrous drought when agriculture was recovering, and 1984–1985, a generally buoyant year in the pastoral industries, an average year for grain growing in eastern Australia, and a record year for cereal grains in Western Australia. It was decided to use the 1984–1985 data which are available in published form only by state and farm type (BAE, 1987). Although additional data for that year are also available for sugar, tobacco, rice, and cotton farms, no information on off-farm income was collected for sugar farms, which are therefore excluded from the spatial analysis. The only farm types for which no data exist are pig, poultry, plantation fruit, and vegetable farms.

In 1984–1985 total farm family income averaged \$23 600, indicative of the very depressed state of the farming sector, notwithstanding generally good seasonal

conditions. For Australia as a whole total incomes were, from highest to lowest, above the national average for sheep, sheep-beef, tobacco, and beef farms and below the national average for crop-livestock, horticultural, cereal grain, rice, and cotton farms. Figure 2 reveals that in general the west, centre, and north enjoyed higher returns than the southeast, and a comparison of Figures 1 and 2 shows that in general pastoral regions performed better than regions of intensive and even extensive cropping. In the Northern Territory, where two-fifths of the vast cattle stations are company owned and have been excluded from the analysis, total incomes averaged \$84 500. Other outstanding regions with total incomes ranging from \$62 000 down to \$44 000 were the grain belt of Western Australia, the sheep-cattle region of central Queensland, the sheep farms of southern Queensland and the Tasmanian midlands, the crop-livestock belt in the west, and the cattle stations of northern South Australia. Seasonal conditions for particular crops and regions had some impact, for crop-livestock and grain farms fared badly in Queensland and New South Wales, somewhat better in Victoria, better still in South Australia, and strikingly well in Western Australia. Nevertheless, the overall pattern reaffirms the thesis that in general the extensive pastoral systems in Australia are more efficient in resource use and more viable than the intensive, high-rainfall cropping systems of the southeast.

Total farm family incomes vary widely around the average portrayed in Figure 2. Thus of all the farm types analyzed, cotton farms had the lowest average total income of -\$270 but no less than one-eighth had incomes exceeding \$256 400 and another one-eighth incomes below -\$230 100. While cotton farms showed by far the greatest

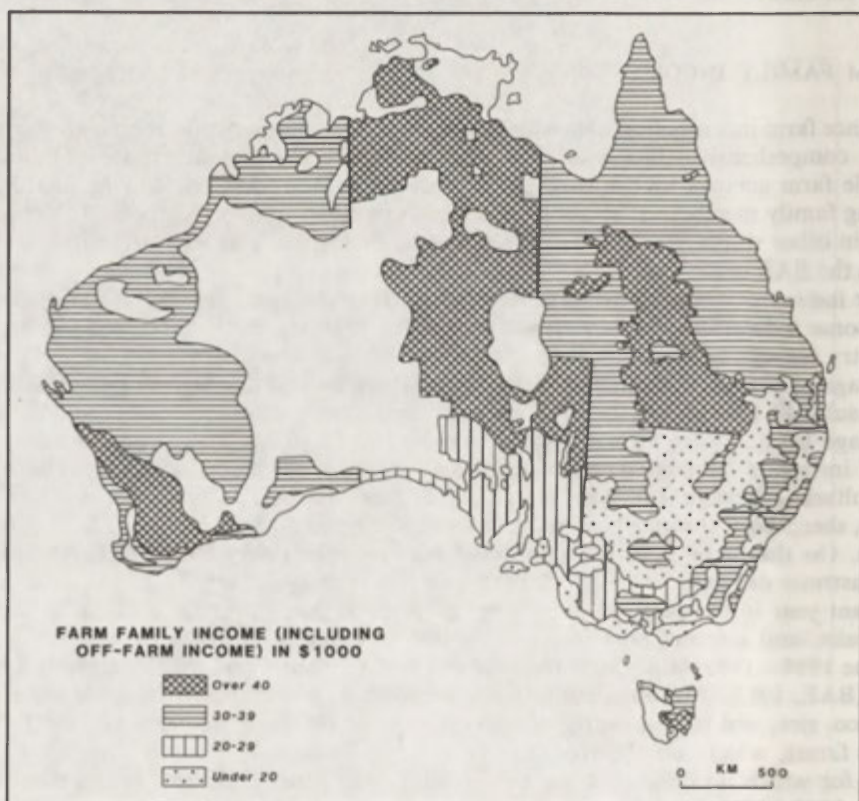


Fig. 2. Total farm family income per rural property, 1984-85 (Source: BAE, 1987)

dispersion around the mean, the smallest range was returned by horticultural farms with one-eighth having incomes greater than \$36 100 and one-eighth incomes below \$1400. In fact, of all Australian farms surveyed, one-eighth had negative total farm family incomes, and had it not been for the contribution made by off-farm income, the proportion would have approached one-quarter.

OFF-FARM EMPLOYMENT

Low-income farms tend to be small or medium-sized properties characterized by underemployment of labour and capital. While land and non-land capital cannot readily be deployed off farm, liquid assets on most low-income farms tend to be too small for significant off-farm use, and the only farm resource available for allocating off farm is family labour. Accordingly, off-farm employment not only supplements low farm incomes but permits an efficient use of farm and family resources (Lee 1965). The incidence of off-farm employment depends *inter alia* on farm size and enterprise structure, the age, education, farming experience, and personal attributes of the farmer, family structure and stage in the life cycle, and the farm location with respect to off-farm job opportunities, including the availability of work on other farms.

In some agricultural industries on-farm labour requirements leave little scope for off-farm employment. Surveys of the pig and poultry industries in the late sixties and early seventies respectively revealed that, even though pig and poultry farms were mainly located near urban job markets, off-farm work contributed on average 5 per cent to total farm family income in the pig industry and absorbed 17 per cent of a farm operator's time on average in the poultry industry (see BAE survey reports cited in Scott, 1981; only the relevant BAE reports not listed there are cited in this paper). On horticultural farms in the late sixties and dairy farms in the early seventies, off-farm work provided only about one per cent of total farm income, despite acute adjustment problems in those industries (BAE, 1975a, p. 61). On horticultural farms in the late seventies operators worked fewer weeks off farm if farms were irrigated, because yields on irrigated farms were higher and irrigation imposed additional labour requirements (Jervois and Kahn 1980, p. 408).

In general, the incidence of off-farm employment tends to decrease as the density of rural and urban population and therefore job opportunities decrease. In the sheep industry off-farm work in 1972–1973 contributed to family income on 23 per cent of properties in the southern high-rainfall zone, 19 per cent in the crop-livestock zone and 13 per cent in the northern pastoral zone, the average for the 16 000 Australian sheep farms being 20 per cent (Mead 1976, pp. 68–69). Since town jobs are few and far between in sheep country, three-fifths of all woolgrowers working off farm were employed on other farms, and only two-fifths in non-farm work. A similar situation occurs within farming zones. In the crop-livestock zone, for instance, only 7 per cent of town farmers in the Mallee east of Adelaide in 1969 engaged in off-farm work but bordering the River Murray, where population density is greater and jobs are more numerous, the proportion of farmers with off-farm work in 1971 was 20 per cent (Williams 1970, p. 185; 1976, p. 279). Among Murray fruitgrowers in 1972–1973 no less than 90 per cent of farm families had some non-farm employment, which furnished on average 40 per cent of household income (cited in Tubman, 1977, p. 212). Of this amount, farm operators earned on average 69 per cent, their spouses 29 per cent, and other dependents 2 per cent.

Two other studies of the early seventies give insights into the role of off-farm employment in structural change. A study of dairyfarmers who withdrew from dairying between 1970 and 1974 showed involvement in off-farm employment during the withdrawal period, indicating that off-farm work facilitates not only adjustment to

short-term fluctuations in farm income but also long-term adjustment to structural change in agriculture (BAE, 1975b, p. 26; cf. Robinson and McMahon 1981, p. 25). Moreover, a study of unsuccessful applicants for debt reconstruction assistance under the Rural Reconstruction Scheme found that rejection prompted many farmers, ranging from one-quarter of rejected applicants in Western Australia to two-fifths in Tasmania, to undertake off-farm employment, thereby increasing the longer term viability of their farms and raising income to more acceptable levels (BAE, 1975c, p. 18).

Since the late seventies off-farm employment has been the subject of special questionnaire surveys and economic analysis. It has also been incorporated in all BAE farm surveys but survey reports have since been published only in summary. In 1975–1976, when off-farm employment occurred on 40 per cent of grazing properties, the net farm income on properties having no off-farm work averaged 2.5 times that of farms where at least one household member worked off farm (Riethmuller and Spillman 1978). Properties associated with off-farm employment were smaller in area, carried fewer livestock equivalents, had a lower capital input, a higher ratio of debts to assets including land, a lower return per unit of labour input, and a lower return to capital and management than properties with no off-farm employment (cf. Quiggin and Vlastuin 1983). Nevertheless some 30 per cent of properties with negative net farm incomes had no household member working off farm. The reasons given for off-farm employment were in respect of properties with negative average net farm incomes to provide carry-on finance and to reduce debts, in respect of properties with positive but low net farm incomes to provide funds for personal or household expenditure, and of those with the highest average net farm incomes to buy livestock or capital equipment or to improve or develop the farm. A study of the Australian sheep industry from 1976–1977 to 1979–1980 concluded that off-farm employment is more common among younger, more educated members of farm households who have better employment prospects in the non-farm sector (Paul 1982). However, in 1977–1978 a survey of wheat-sheep farms in New South Wales found that age was not a significant factor affecting the incidence of off-farm work, though most operators who worked off farm had younger families, were more highly educated, and more concerned to maximize household income than those without off-farm work (Robinson and McMahon 1981).

Although this paper focusses on full-time family farms, two studies of part-time farming near Melbourne have some relevance (Wills 1978, 1983). Farm surveys carried out in 1974–1975 and 1978–1979 recorded a marked increase in part-time farming but little change in overall land use or the area farmed. Few of the survey farms derived substantial income from farming, and most farmers claimed they farmed for non-financial reasons. Yet part-time farms were found to be almost as productive as neighbouring full-time farms, and scant evidence was found that small part-time farms were neglected or badly managed. These findings suggest that part-time farming, as indeed off-farm employment, may constitute a viable and stable adjustment in farm resource allocation.

In the mid-1980s off-farm employment occurred throughout all the major farm-type zones. The proportion of family farms with operator and/or spouse engaged in off-farm work was 35 per cent in horticulture, decreasing through 22 per cent in dairying and 20 per cent in the wheat-sheep zone to 17 per cent among grain farms, then rising sharply to 41 per cent in the sheep belt, decreasing once more through 32 per cent among sheep-cattle farms to 30 per cent among cattle stations; it averaged 27 per cent for all Australian family farms (Males, Poulter, and Murtough 1987, p. 164). Some 30 per cent of off-farm work by farm operators was on other farms, and 70 per cent in non-farm employment. For all Australian farms off-farm work supplied 11 per cent of the average total farm family income.

While the proportion of farm operators employed on other farms, as returned in BAE farm surveys, broadly corresponds with that revealed by ABS surveys, official ABS reports on multiple jobholding seriously understate the true incidence of off-farm work in Australian agriculture. Over the decade 1975–1985 the decline in the farm labour force was balanced by increased employment in services to agriculture, so that the labour force employed in agriculture and services to agriculture fluctuated around 385 000. But the number of persons employed in agriculture who had second jobs is stated to have risen from 17 500 to 19 800, of which the number working on other farms fell from 10 200 to 7 600 respectively (ABS, 1976, 1986b). These ABS statistics report only about one-fifth the incidence of off-farm work revealed by the BAE surveys. The discrepancy arises from the fact that the ABS survey of multiple jobholding in agriculture is undertaken in mid-August every two years and relates to a specific week. The BAE surveys on which this study is largely based related to the farming year. Nevertheless the ABS data highlight three important trends: the increase in multiple jobholding among farmers, the decline in employment on other farms, and the increased employment in other occupations.

The occupational structure of off-farm work is an area on which scant information exists. In 1977–1978, when one-fifth of farm operators in horticulture worked off farm, 28 per cent were self-employed, 27 per cent worked on other farms, 18 per cent in other manual work, and 16 per cent in executive or managerial positions; office or retail jobs and skilled trades each accounted for only 3 per cent (Jervois and Kahn 1980, p. 408). Off-farm work claimed as many wives as farm operators; about one-third of wives in permanent jobs worked in offices or shops, almost one-third in professional occupations, and one-fifth were self-employed; two-thirds of wives with casual jobs worked in shops or offices. In 1976–1977 and 1977–1978, when one-quarter of graziers worked off farm, one-third in each year worked on other farms (Robinson and McMahon 1981, p. 27). But whereas in 1976–1977 only 16 per cent worked in office, retail, executive, or managerial jobs, in 1977–1978 the proportion was 38 per cent; the percentages for each year in manual work together with skilled trades were 32 and 24 respectively. Clearly horticulture, which is located in southern regions more populated than the grazing country of the interior and north, provides farm families with a wider variety of non-farm occupations. But as the grazing industry illustrates, the occupational structure of non-farm work varies markedly from year to year.

OFF-FARM INVESTMENT

Before the mid-1970s only a few BAE farm surveys furnish data on off-farm investment. In the late sixties the contributions of investment and work off farm were 3 and 1 per cent respectively in the deciduous canning fruit industry, 15 and 1 per cent in the apple and pear industry, and 4 and 5 per cent in the pig industry; in the early seventies the proportions in dairying were 8 and 1 per cent respectively (BAE, 1975a, p. 61). In the grazing industry off-farm investment contributed 5 per cent to total farm income in the high-rainfall zone and 3 per cent in the wheat-sheep and pastoral zones (BAE, 1976, pp. 21 and 25–27). An analysis of the data contained in a study of small sheep farms on the southern tablelands of New South Wales over the period 1969–1970 to 1970–1972 suggests that non-farm income made up no less than one-half of household income, of which about three-quarters derived from off-farm work and about one-quarter from investment (Powell and Hoogvliet 1974). However, these farms were suffering acutely from depressed economic conditions.

In the late seventies the pre-eminence of employment as a contributor to off-farm income is reflected in a considerable economic literature on off-farm work and the paucity of studies on off-farm investment. An analysis of off-farm income among farm

households in the grazing industry in 1976–1977 concluded that employment provided roughly twice the income derived from investment (Robinson and McMahon 1981, p. 29). A similar conclusion might be drawn, after allowing for data problems, from the studies of horticulture over the period 1974–1975 to 1977–1978 (Jervois and Kahn 1980) and of the sheep industry over the period 1975–1976 to 1979–1980 (Paul 1982).

By the mid-1980s, however, off-farm investment had become equally important with off-farm employment. No less than two-thirds of farm operators and spouses derived income from off-farm investments, which furnished nearly 14 per cent of the average total farm family income (Males, Poulter, and Murtough 1987, p. 165). However, investment income includes interest on working capital, and if this component is estimated and excluded, then the estimated incidence of off-farm investment income falls to 30 per cent of farms. Nevertheless the remaining investment income constituted nearly one-half of income from all off-farm sources. In the dairying industry the proportion was only 30 per cent but in horticulture it was 40 per cent and in extensive pastoralism and crop-livestock farming over 50 per cent. Off-farm investment tended to assume greater significance in farm-resource allocation the larger the farm and the older and the more highly educated the operator. Among wheat-sheep farmers in New South Wales those with larger investments off farm were motivated primarily by high returns and security, though they were also investing surplus farm income or to meet future debt requirements (Robinson and McMahon 1981, p. 41). Farmers with smaller investments were motivated mainly to stabilize incomes or to raise capital for future farm development or for retirement.

OFF-FARM INCOME

From the early seventies to 1984–1985 the growth in the importance of off-farm income from employment and/or investment can be illustrated by reference to dairying, wheat farming, and beef-cattle grazing. Among dairy farms off-farm income increased from 9 per cent of total farm income to 18 per cent, and among wheat farms from 9 to 27 per cent (BAE, 1975a, p. 61; 1987, pp. 51 and 71). Among beef-cattle properties the respective proportions are 9 and 13 per cent for South Australia, 7 and 18 per cent for Queensland, 2 and 29 per cent for the Northern Territory, and 1 and 25 per cent for Western Australia.

In 1984–1985 off-farm income was earned by operators and spouses on three-fifths of all family farms in Australia, and contributed almost one-quarter to the average total farm family income. In addition, direct government payments, made up almost entirely of family allowances but also pensions, special benefits, and unemployment benefits, were obtained by a further 8 per cent of family farms (unemployment benefits by less than 1 per cent), amounting to a further 3.5 per cent of family income. Since a significant proportion of farms had very small or negative incomes, the incidence of welfare payments, by comparison with the wider community, would seem to be particularly low. Clearly off-farm income is a substantial contributor to the welfare of farm families in Australia.

A comparison of Figures 2 and 3 reveals an inverse relationship between the size of family income and the proportion derived off farm, as evidenced by high family income and the low off-farm proportion in pastoral Queensland, the cattle country of the Northern Territory, and the crop-livestock and wheat belts of Western Australia, or the low family income and the high off-farm proportion in the crop-livestock belt of the southeast, in horticulture, cotton farming in New South Wales, and the sheep country of southeastern Tasmania and South Australia. Although the pattern of off-farm income is also affected by limited employment opportunities in regions of extensive pastoralism, it bears little relationship as a whole to the pattern of population distribution. Another contributing factor is the high component of off-farm investment in some large-scale farming systems,

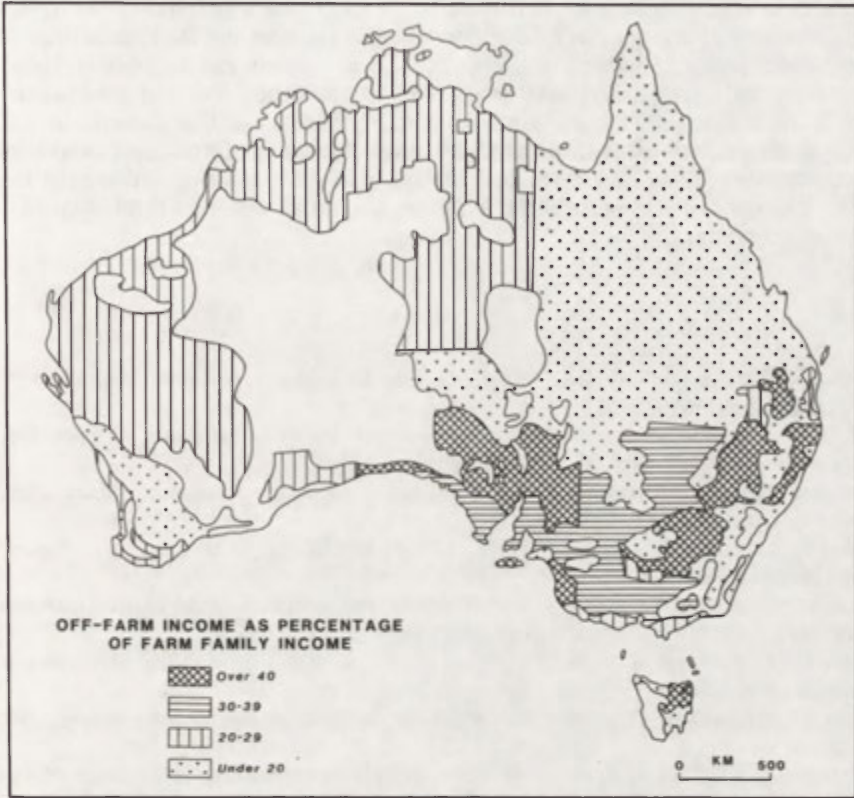


Fig. 3. Off-farm income as a percentage of total farm family income per rural property, 1984–85
(Source: BAE, 1987)

notably cattle grazing in the Northern Territory and cotton growing in New South Wales. In dairying regions with low family incomes the off-farm proportion tends also to be low, largely because of on-farm labour requirements.

CONCLUSION

Off-farm employment and investment enable operators of full-time family farms to adjust to fluctuating farm income and to achieve a more efficient allocation of farm resources. The generation off-farm income furnishes an alternative strategy — virtually the only strategy feasible for many small farmers — to using additional resources on farm. It may also facilitate a change to part-time farming, or exit from agriculture, or even, for part-time farmers operating under favourable circumstances, entry into full-time farming. Yet the definition of full-time family farms employed by the BAE, like definitions of part-time farms, is arbitrary, for whether a farm qualifies as full-time or part-time depends on family structure and the work allocation between operator and hired labour. Moreover, many full-time farms with no off-farm employment income could well become part-time if opportunities became available for temporary non-farm work despite the pattern of farming activity remaining unchanged. To assess the full impact of off-farm income in Australian agriculture it would be

necessary to take also into account those part-time farms which qualify as agricultural establishments under the ABS definition but fail to meet the BAE definition of full-time family farms. Similarly an important area of concern comprises those low-income family farms, often with large families (cf. Robinson and McMahon 1981, p. 35), that generate no off-farm income. Nevertheless the growth in off-farm employment and investment, from which most Australian farms now derive income, constitutes not only an important new dimension of Australian agriculture but evidence of the changing interrelationships between the farm and non-farm sectors in the national economy.

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MICRO LEVEL TYPOLOGICAL CLASSIFICATION OF INDIAN AGRICULTURE: THE CASE OF UTTAR PRADESH

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India, due to its vast size and enormous relief, has large variations in soil, climate, vegetation etc, and is able to produce most of the agricultural products of the world. A phase of growing emphasis on agricultural planning and intensive development of agriculture began in the country during the recent plan periods, particularly after 1951. Some of these were due to changed land laws, some because of organized technical advances in agricultural enterprises, some due to receptivity and response of the assiduous farming communities and significantly due to the expansion of irrigation facilities. These changes improved the use of agricultural land, increased the yield per hectare and brought about an all-round development of rural sector placing the agricultural progress on a permanent footing. In spite of this improvement, there are still weaker and poor areas, covering vast expanse, where the level of agricultural production is much below the National index. Thus, an overall detail assessment of social, cultural, political and economic conditions and their reasonable regionalisation is needed.

A REVIEW

Agricultural region conveys a concept of an uninterrupted area having some physical homogeneity and cohesive nature of agricultural activities and attributes. Scholars have been contending since long, simply by demarcating and studying agricultural regions and presenting a descriptive analysis of the distribution of agricultural and farming elements in a wider context. Some of them have even used natural regions as agricultural regions for most purposes.

On account of its multitudinous utility, many scholars in the field of agricultural geography and agricultural economics have long been engaged in classifying agricultural regions in India. The most widely recognised study on world agricultural region was done on the basis of (i) the production structure of agriculture, (ii) intensity of land use, (iii) farming methods and farm technology, and (iv) social structure of agriculture by D. Whittlesey in 1936, who divided India into 2 agricultural regions: (i) rudimental sedentary tillage, and (ii) intensive tillage (a) with or (b) without rice. O. H. K. Spate (1957), took geographical factors like topography, climate and density of population as the basis. In 1950, C. H. Seng used 5 criteria viz., topographical situation, agricultural water supply (rainfall and irrigation), crop and land tenure systems and general economic development and divided India into 16 regions. D. Thorner, in his paper

Rationale of Regional Variations in Agrarian Structure of India also carved out 16 agricultural regions selecting 7 variables like socio-economic systems; types of holding and concentration of controlled labour supply; control of credit, marketing, processing, shopkeeping; geographical factors; cultivation, holdings and overall modernization.

P. Sen Gupta (1968) attempted to bring out agricultural regions on the basis of territorial differentiation of crop structure and their efficiency in production and recognised macro-, meso- and micro-agricultural regions. In this regionalisation she has given prime importance to the physical regions. P. S. Sharma (1971) attempted an agricultural regionalisation of India selecting six agricultural variables like gross area irrigated, average annual rainfall, net area sown, intensity of cropping, gross area sown per capita and soil index rating. His divisions were on the basis of census zones. B. K. Roy (1971), on the basis of cropping, production and yield, classified 5 farming regions and 34 subregions. In all the above studies, the role of livestock in agriculture was not at all considered to be important. B. P. Panda (1979) included this variable along with land use, cropping and irrigation systems, intensity of cropping and size groups and structures of farms.

In 1974, J. Singh, in his book, *An Agricultural Atlas of India: A Geographical Analysis*, discussed regional diversities in physical complex, regional imbalances in irrigation facilities, national disparities in land usage, regionalism in land use efficiency, cropping pattern and changes and therein regional imbalances in levels of agricultural production and livestock combination. Finally, he divided India into agricultural regions for the implementation of agricultural development plans.

The concepts of agricultural regionalisation could not, however, serve the purpose because they are not fully defined in terms of agricultural types which include in detail the role of crops, land use, livestock, farming processes, tenancy and cropping systems and levels of specialisation and commercialisation. An attempt has been made to explain successfully the difference in terms like agricultural typology, system and region. A bibliographical account of the works done in the country was also published (L. R. Singh 1974). After the introduction by J. Kostrowicki of the 22 agricultural attributes, the first attempt in determining agricultural typology was presented depending upon the available primary and secondary data on State level. Some generalizations were also made on the basis of samples and case studies for simplification and identification of a definite type. On the basis of maximum class similarity six agricultural types were recognized (V. R. Singh 1979). B. P. Panda and B. L. Sharma worked out for Madhya Pradesh and Rajasthan respectively having based their classification on 20 attributes and computing the same on maximum class similarity. J. Singh (1983) selected 2 variables and grouped them under five broad categories on the basis of society and ownership, size of holdings, organizational and technical ability, production and structural characteristics and worked it out for Haryana. He did not consider all the parameters, adopted for diagnostic purposes, as suggested by J. Kostrowicki.

After the introduction of 27 variables approved by the IGU Commission, M. Lal (1986) brought out a detailed typological analysis of Central India fully adopting the typological concept. The first, second, third and fourth order types were computed taking respectively 30, 20, 10 and 5 per cent deviations into account. None of the international type was found in the area, so a new type *Tmm* at the third order, was recognized. He had also projected the typology for the year 2001 and even then, he could not arrive at any international type because of a slow agricultural progress.

V. R. Singh and N. K. Singh (1986) tried to improve upon the previous works done in India and came to the conclusion that 6 agricultural types of the third order are observed of which only two, *Tir* and *Tiu* are of international type and the other four *Tml*, *Tic*, *Tif* and *Tmp* are new ones. It is observed that the previous classification made by V. R. Singh (1979) does not stand now. It is because of the political reform and

economic policies of the nation. Due to the various land-reform measures, the traditional pattern of feudal ownership and tenancy rights have been replaced by a system of owner-operated holdings which has a complete and effective control over the use and transfer of land. Common ownership has been minimised and the share cropping system is gaining popularity. Thousands of hectares of arable land, acquired from the above ceiling area (the ceiling limit of holdings has been fixed at 7.5 hectares) and reclaimed from forest and grazing land, have been distributed among the landless agricultural labourers. Measures like release of bonded labourers, fixation of minimum wages for agricultural labourers, and financial assistance through banks for land development, purchase of milk and draught cattle, fertilizers, high-yielding variety of seeds, tractors as well as minor irrigation equipment like pump sets etc. have changed the production and structural properties of agriculture. There exist a common similarity in ownership and social characteristics, although the size of field units and number of field owners have increased abruptly.

A CASE STUDY

Uttar Pradesh (U. P.) having three different types of physical terrain, has been chosen for case study. Sample surveys have been made and available data have been worked out on tahsil level. It presents a multi-faced landscape having prevalence of traditional form of life and infrastructure intermingled with modern innovative characteristics and techniques. The mixture of these traditional and modern agricultural practices makes it difficult to identify an international type. The old customs, traditions and practices are still striving hard against the new wave of agricultural development and thus traditional subsistence to commercial type of agriculture on various scales has emerged side by side. Uttar Pradesh covers an area of 392 840 sq. km between the Greater Himalayas in the north and Vindhyan—Satpura ranges in the south. Physiographically, the state can be divided into 3 distinct regions: The Himalayan region in the north, the Ganga plain in the middle and the Vindhyan Plateau in the south (Fig. 1).

The Himalayan region is mountainous and has extensive and thick forests in its southern fringe and is thinly populated. Agriculture is confined to river valleys and on terraced hill slopes. The principal crops are rice and wheat.

The northern part of the Ganga plain, which runs from Saharanpur to Deoria, is called the Bhabhar and Tarai. It is self distinctive being composed of sandy soil, water logged areas and swamps. The main crops of this region are wheat, rice and sugar cane. The gentle slope of the northern Ganga plain is from north-west to south-east and is drained by the Yamuna, the Ganga, the Gomati and the Ghaghra rivers with their numerous tributaries. The whole plain is alluvial and very fertile. It is densely populated and intensively cultivated. The principal crops are rice, wheat, sugar-cane and millets.

The Vindhyan Plateau consists of hills and valley plains but it is not suitable for large-scale intensive agriculture. The region is drained by the Son, the Betwa and the Ken rivers and their valleys are densely populated. It is less developed in agriculture than the rest of the state.

SOCIAL ATTRIBUTES

It is observed that 80 per cent of the arable land is individually held and owned by the cultivators under the new tenancy rights and therefore there is very little scope for common ownership and collective or state enterprises. They are negligible and nowhere they exceed class I.

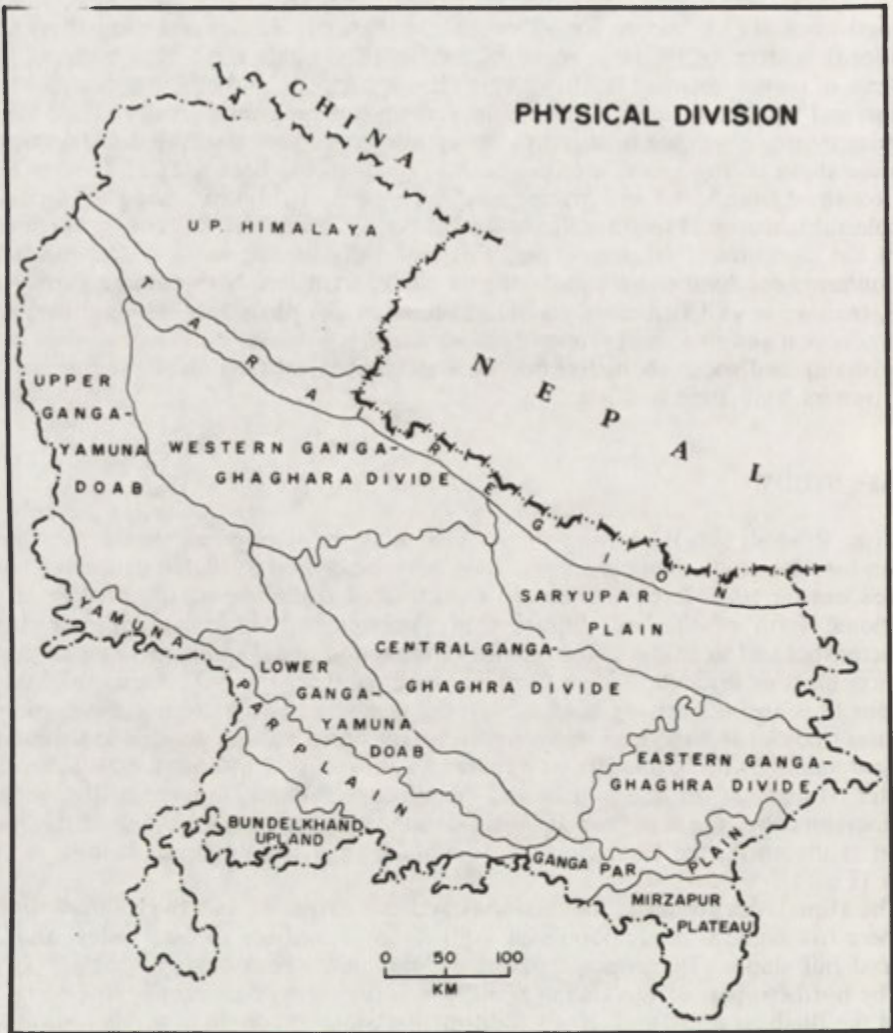


Fig. 1

Share cropping system is very common because it is practised on about 40 per cent of the arable land, on behalf of absentee land-owners or disabled persons or big farmers who do not cultivate but prefer to give it to agricultural labourers, who have little agricultural land of their own. Such data are not available as land laws do not permit such practices. However, some primary source data concerning the non-resident farmers and sample case studies, show that in about 80 per cent of the tahsils share cropping is prevalent on up to 20 per cent of arable land (Fig. 2) and in the remaining tahsils it is on 20 to 40 per cent of arable land which is more obvious on the rim of the Vindhyan Plateau excepting in 4 tahsils where it is even more than that and the highest being 62 per cent.

Three types of holdings, relationships between persons employed in agriculture, agricultural land and output have been worked out and they present an interesting picture. They hardly go beyond class I on international level except in the case of

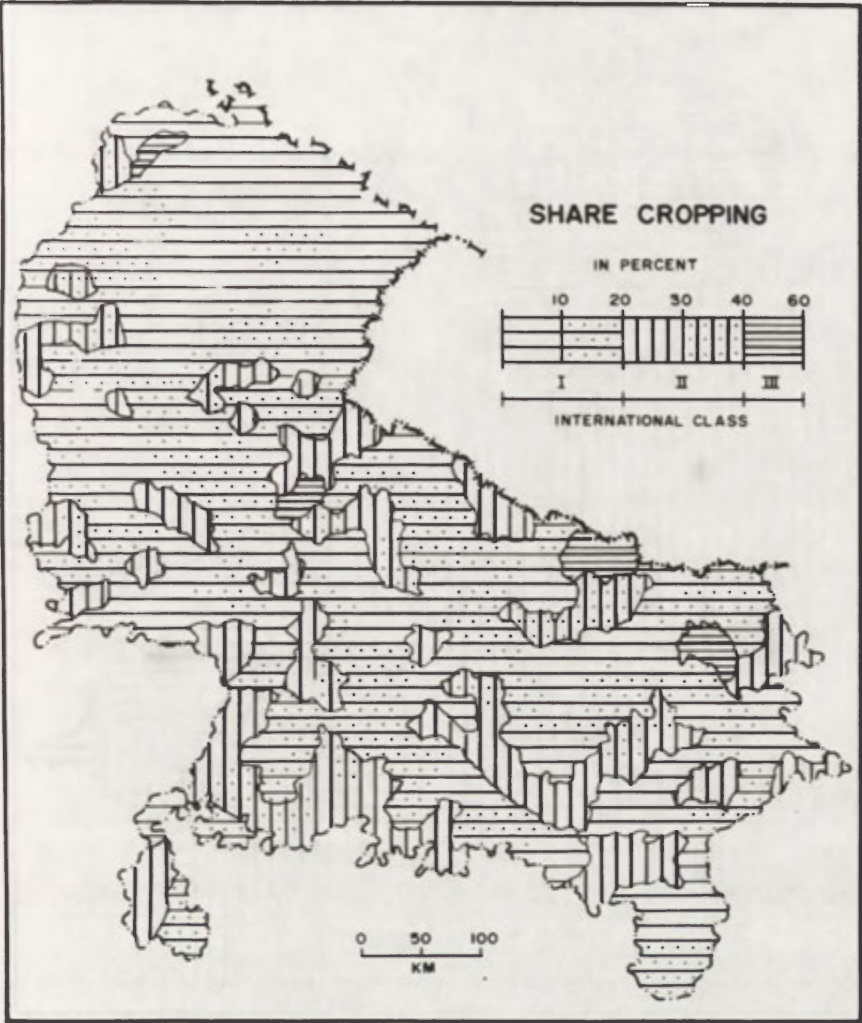


Fig. 2

employed persons and output where 11 and 8 tahsils respectively fall in class II. It further reveals the fact that agriculture on hills and plateaus generate more employment opportunities. In the Tarai as well as in western Uttar Pradesh, the yield (100 to 397 grain units per holding) is higher than in the plains.

OPERATIONAL ATTRIBUTES

In agriculture the input of labour, animal and mechanical power, fertilizers, irrigation intensity and livestock play an important role and control the gross production. The input of labour, in terms of people actively employed in agriculture per 100 ha of agricultural land, depends largely upon the nature of crops grown. Paddy, for example, requires abundance of labour for transplanting and harvesting. A similar

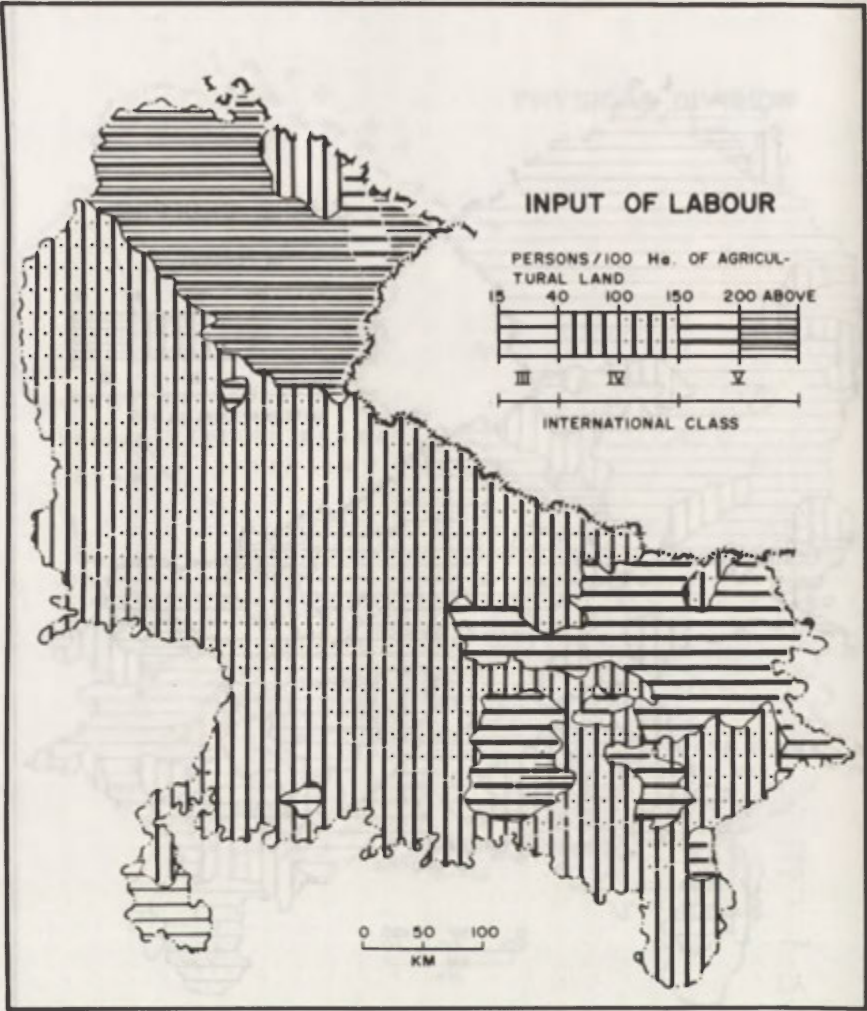


Fig. 3

condition prevails at the time of wheat harvesting when all the activities are manually operated. This is because the three tahsils lying on the Vindhyas Plateau, producing mostly millets and barley, record 15 to 40 persons per 100 ha of cultivated land and elsewhere it is from high to very high. The wheat-rice/sugar-cane growing area of western Uttar Pradesh and millets/rice-oilseeds/pulses producing Vindhyas Upland record high labour input, whereas the rice-wheat growing areas of U. P. Himalaya and eastern Uttar Pradesh show very high labour input (Fig. 3). The highest labour input has been found out in Karnprayag where agricultural land per holding comes to be 0.1 ha and 2.68 persons are engaged per agricultural holding. This pattern is found throughout the Himalayas, having limited agricultural land, terraced farming and prevalence of hoe culture. It is further supported by the input of animal and mechanical power which are found in reverse direction where they fall in class V and I respectively (Fig. 4 and 5), although in three-fourth of the area, animal power in conventional

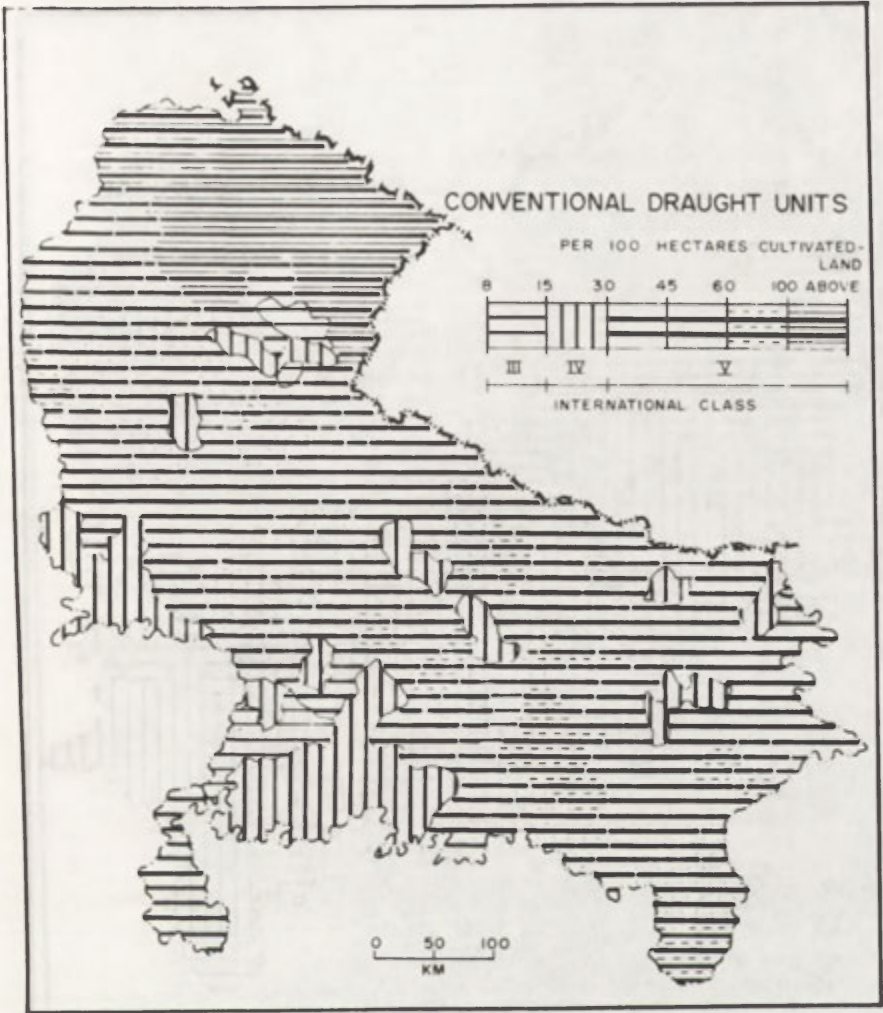


Fig. 4

drought unit, is very high ranging from 30 to 1105 conventional drought units per 100 ha of cultivated land. Very high use of mechanical power is observed in western U. P., western Tarai and in a block in eastern Tarai, where tractors, harvesters, threshers and pumping sets are intensively used. The whole of the Ganga plain lies in medium category where tractors, threshers and pumpsets are the main source of mechanical power. It may be mentioned here that most of the tractors are not properly used in farming operations and agricultural activities as tractors close to urban areas are mostly engaged in non-agricultural activities while the tractors of rural areas operate only for 3 to 4 months in agricultural activities and in the rest of the period either they remain idle or move to construction areas where they transport labour and building material. In rural areas they are also taken as a status symbol.

Use of chemical fertilizer is an essential element in boosting up the agricultural production. Its use is uncommon on the Vindhyan Upland and U. P. Himalaya as it is

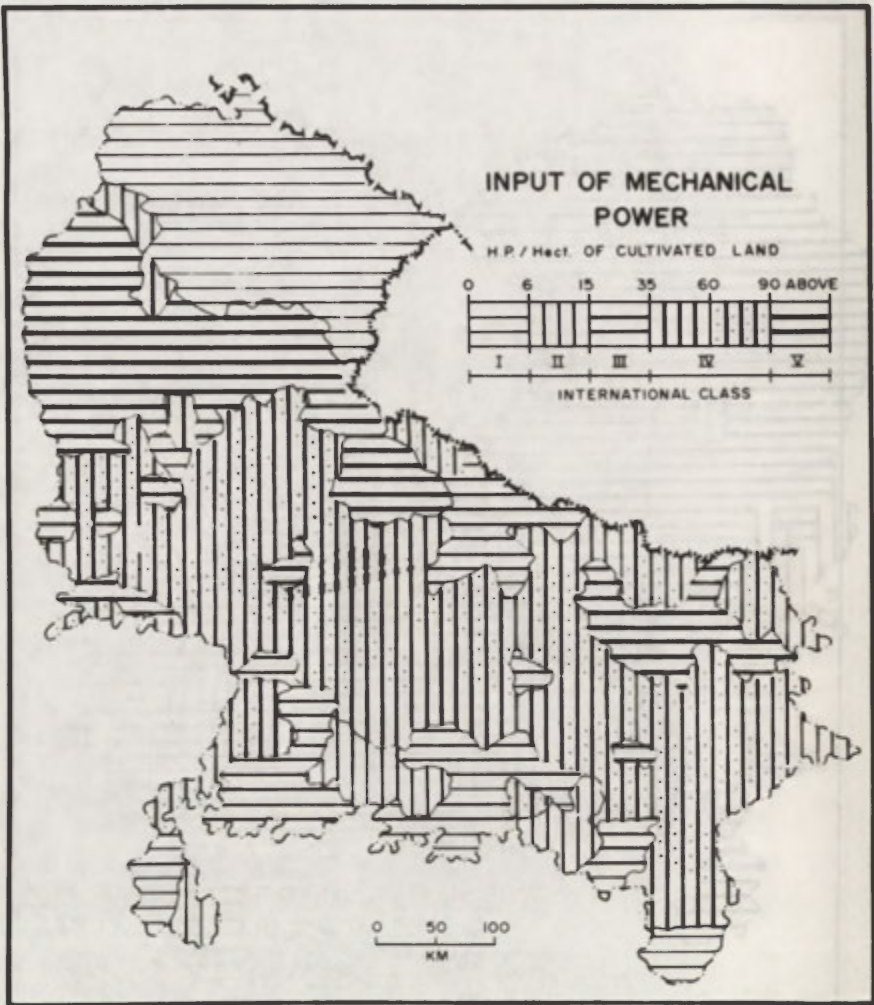


Fig. 5

less than 30 kg of NPK/ha and in the rest of the state it is more than that falling in the medium and high classes (Fig. 6) backed by high to very high irrigation (Fig. 7) and a very high cropping intensity. In general 69 per cent of the tahsils have more than 50 per cent irrigation intensity while the cropland use and the intensity of livestock breeding is very high (130 to 160 large animal units, in 84 per cent of the tahsils) (Fig. 8). In India, growing two to three crops in a year is a usual practice depending upon the availability of soil moisture. This is further exemplified in the Himalayas, a patch in Tarai and in Chakia tahsil recording more than 200 per cent of cropping intensity. In the former two areas, soil moisture remains high throughout the year whereas in the latter area, assured canal irrigation increases soil moisture and thus most of the arable land is cultivated twice or thrice in a year.

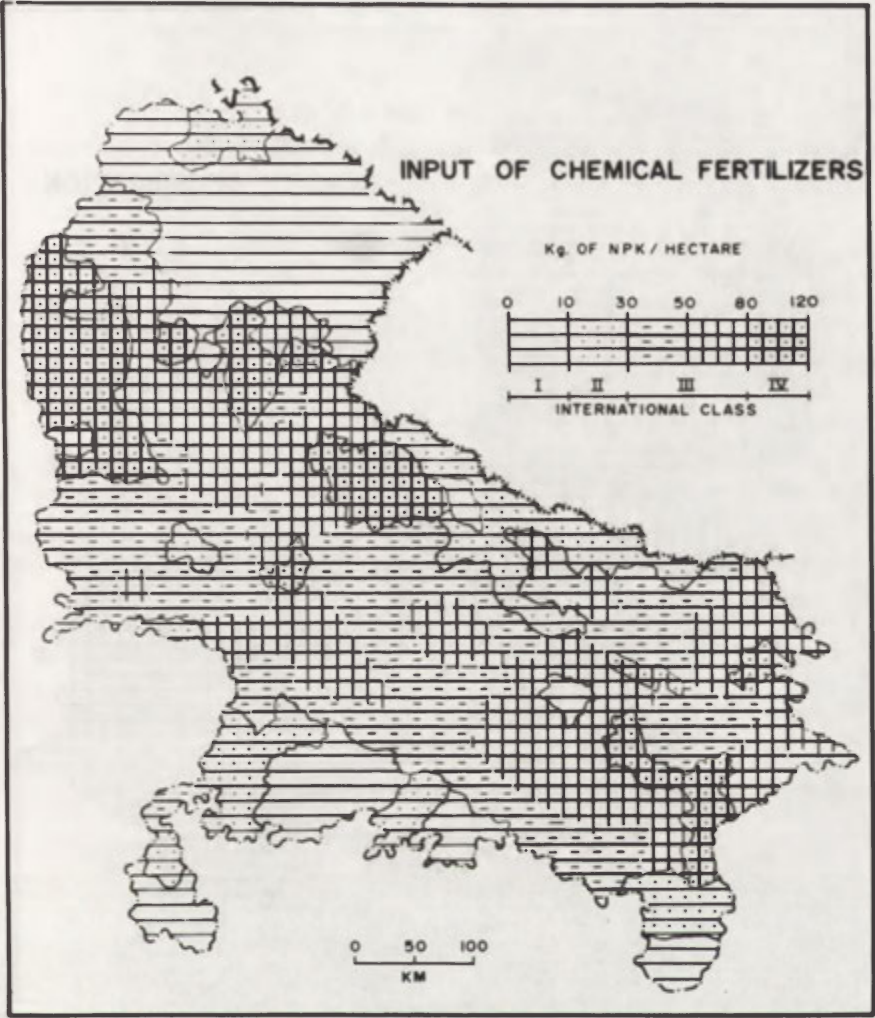


Fig. 6

PRODUCTION ATTRIBUTES

The ultimate goal of any operation done in an agricultural system is to produce and provide more and more to fulfill the rising demands of modern and daily necessities of the society. In this system, land productivity is the major factor and the state records three distinct spatial patterns: (i) The Ganga plain with the largest area (56 per cent) has medium productivity, (ii) The Western plain, Tarai and the Himalayas covering 28 per cent area have high and very high concentrations, and (iii) The Vindhyan Uplands have low productivity (Fig. 9). More or less similar patterns are observed in the case of cropland productivity.

Very low labour productivity showing less than 40 grain units per person is found in

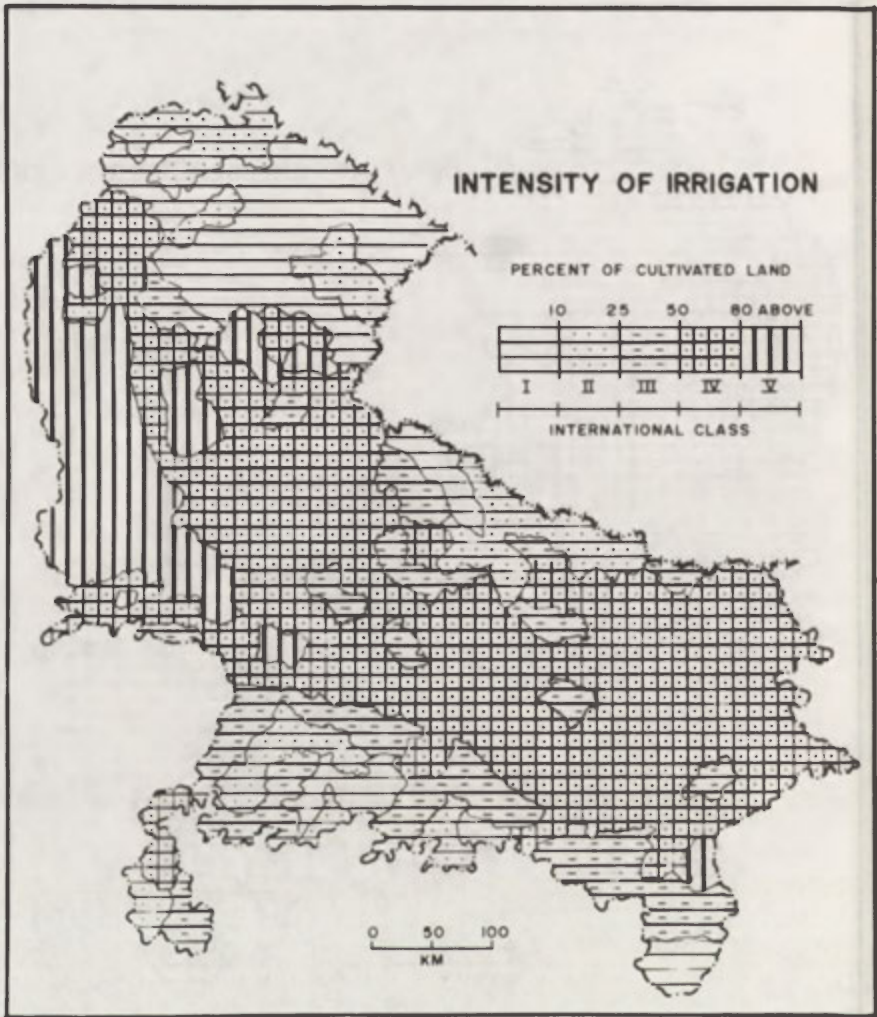


Fig. 7

81 per cent of the tahsils representing high pressure of labour force on the agricultural land and the remaining tahsils (19 per cent) fall in the western plain where it is low. The Tarai region shows a slightly better performance as it contributes 40 to 100 grain units per person. This relatively higher position of labour productivity is due to farm mechanisation. Commercial labour productivity also follows a similar spatial pattern as the western plain specialises in sugar-cane cultivation followed by vegetables and gardening as this area is more urbanized.

The degree of commercialisation is determined on the basis of the amount of farm products which are sold off the farm. In the absence of any published data, estimates and personal enquiries have been made which show that 80 per cent of the cereals, 60 per cent of the pulses, 85 per cent of the vegetables, 70 per cent of sugar-cane and oilseeds, and 80 to 95 per cent of other commercial crops like tobacco, fibres

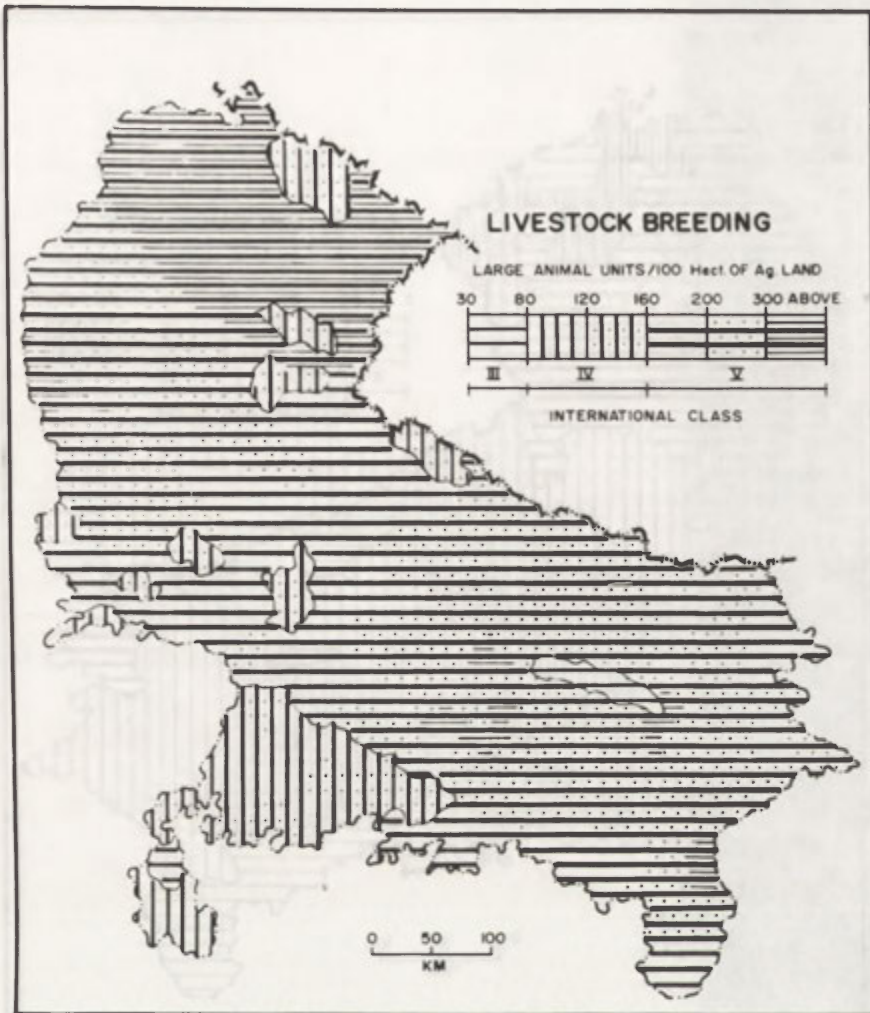


Fig. 8

etc. and animal products are delivered off the farm. On this basis, the majority (83 per cent) of the tahsils show a high degree of commercialisation. The northern and eastern rims of the Himalayan zone have comparatively higher percentage and they indicate a very high degree of commercialisation.

High and very high levels of commercial production are found in the northern and western Uttar Pradesh, covering about 29 per cent of the tahsils. A medium class occupies 54 per cent of the tahsils stretching over the central and eastern Uttar Pradesh while the Vindhyan Upland shows a low level.

About 95 per cent of the tahsils have medium degree of specialisation, because in most of the tahsils cereals account for 40 to 60 per cent area followed by milk and sugar-cane in commercial production. High specialisation is observed in the Himalayan region where milk shares about 79 per cent and other commercial products are well within 5 per cent.

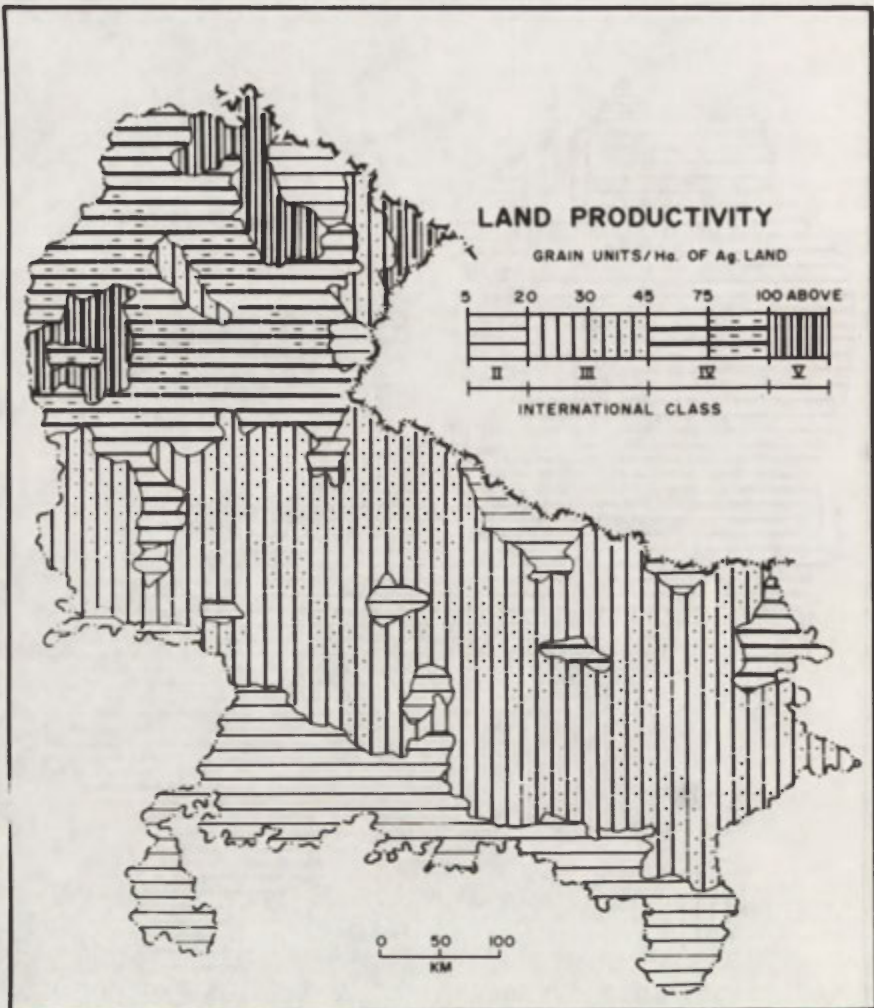


Fig. 9

STRUCTURAL ATTRIBUTES

Limited cultivated land, irrigation, fertilizers and adoption of rotational cropping system compel the farmers to get maximum return from the land. Thus, food crops and other commercial crops, which are non-perennial, receive the maximum attention. Intensity of perennial crops is very poor and poor and about 93 per cent of the tahsils fall within these two categories. Medium class is found in the sugar-cane growing areas of western Uttar Pradesh which occupies 6.9 per cent of the area.

As for permanent grassland, the whole of the plain area covering 71 per cent tahsils, is in a very poor condition excepting the central and the Vindhyan Upland which are in a comparatively better position. Himalayan region has more meadows and permanent grasslands which are mostly used in common.

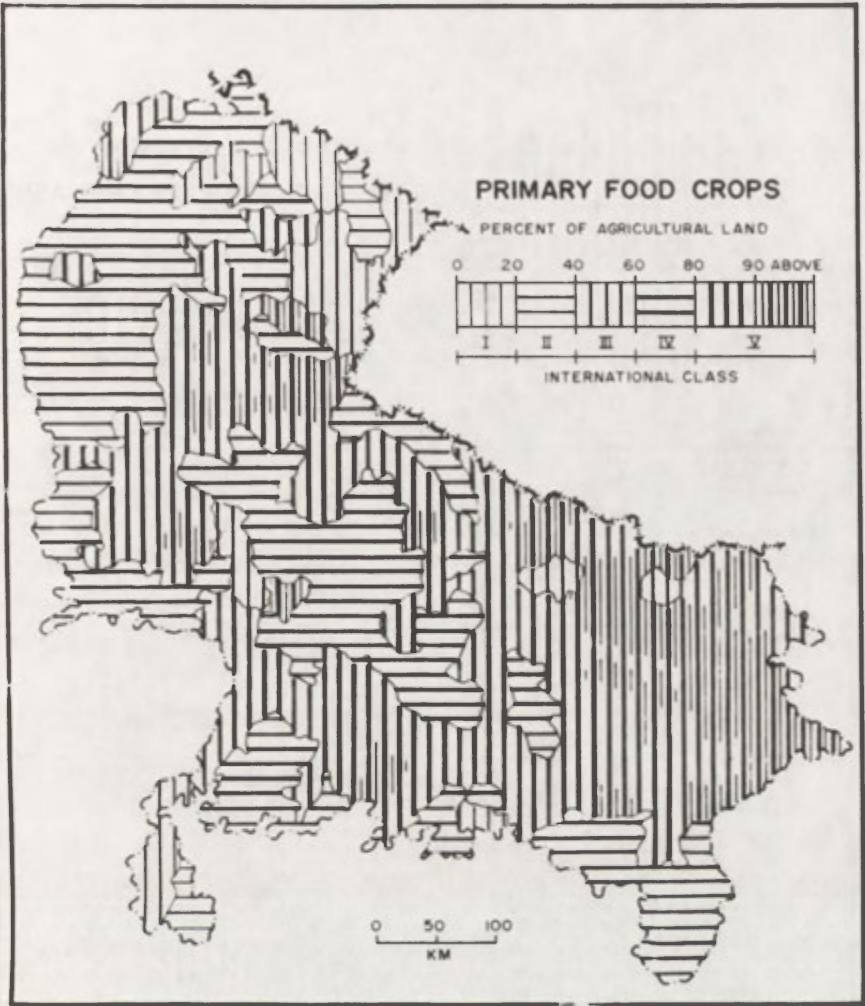


Fig. 10

Though on an international scale all the five classes are observed but about 92 per cent of the total tahsils have more than 60 per cent of their land under food crops (Fig. 10). In general, in gross production orientation, the emphasis has been laid on the share of animal products in the gross agricultural production where about 84 per cent of the tahsils have less than 40 per cent share of animal production. Only the Himalayan regions have high and very high concentration of animal products (Fig. 11).

General commercial orientation in the state is more interesting as the Himalayas, Tarai and western Uttar Pradesh and the Vindhyan scarpland have very high, very low and medium percentage of animal production share in commercial production of agriculture respectively. Percentages of industrial crops are important in western Uttar Pradesh and Tarai regions where these crops occupy more than 20 per cent of the area.

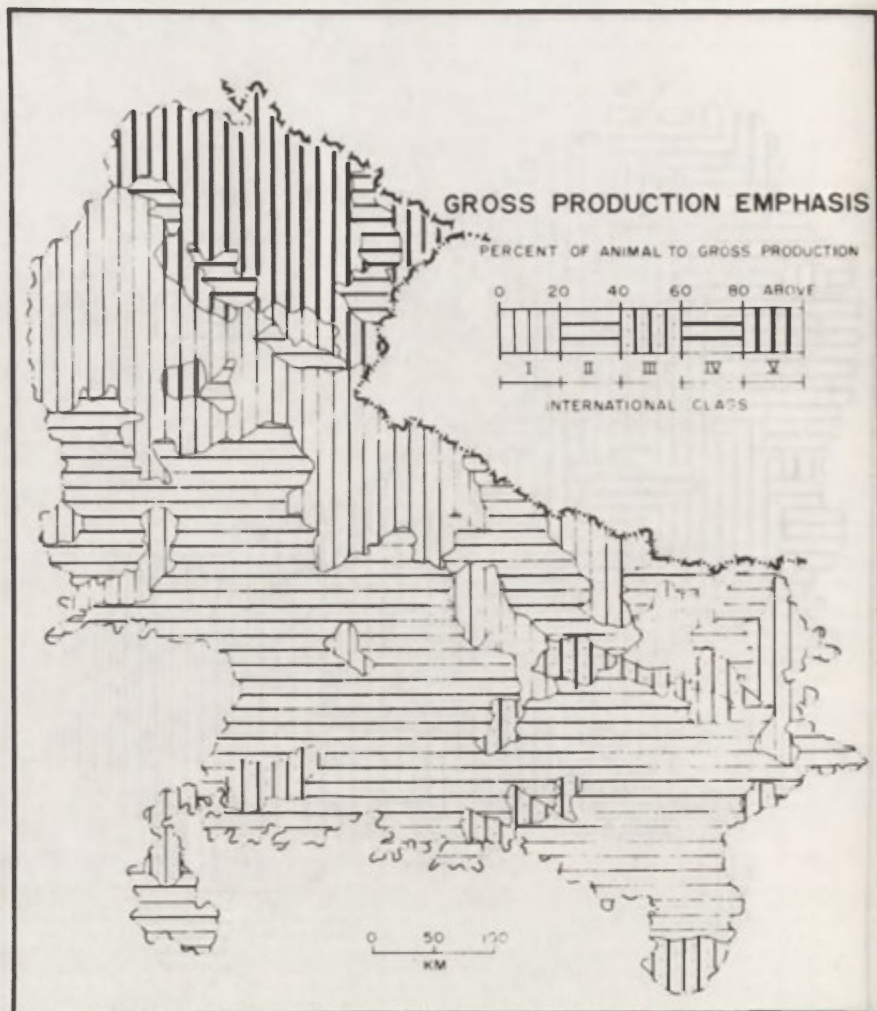


Fig. 11

AGRICULTURAL TYPES

The combined interplay of 28 agricultural attributes shows that agricultural types do not follow the natural boundary at the second order level in the state, which may however show its influence in demarcating the third order level. It brings out 3 distinct agricultural types and excepting one (*Tm*), the other two are new ones.

The first type resembles very much the Malaysian semi-commercial rice growing type (Hill 1983) with 18 variance; but it is far off with *Ti* and *Mi* model types as they record 27 and 24 variance respectively and moreover the area under study is wheat producing area, therefore it is different and has been treated as a new type and thus *Tg* code has been suggested. The second type is altogether different from the world models, though it has some resemblance with *Tm*, as in social attribute it has 3 variance; with *Lp* type the operational attributes show 6 variance; in *Sg* type

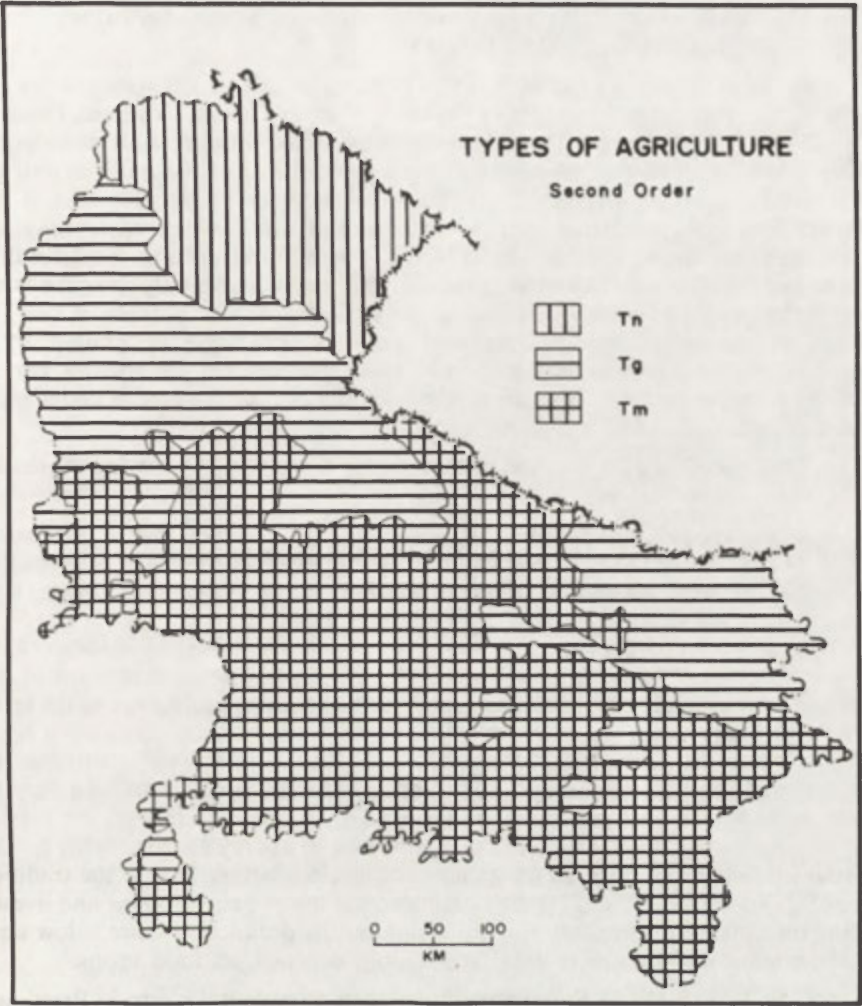


Fig. 12

production attributes record 4 variance and with *En* model the structural attributes have a single variance. Thus, this type has some common feature at different levels; as such *Tn* code has been suggested to represent very small scale agriculture with prevalent livestock breeding.

It is obvious that operational, productive and structural attributes record various levels and degrees of development, showing variations and changes depending upon individual performances and attitudes towards farming systems in varying natures of societies and communities. As such, a few more codes can be added in the traditional type of agriculture where social attributes remain more or less constant but other attributes widely differ. To indicate the touch of traditional character, *T* can be added to the type which it resembles. The three types of agriculture recognized in the state are dealt below (Fig. 12).

(1) The Traditional, Semi-Commercial and Small Scale Mixed Agriculture

$Tm = 1151222 - 4423143 - 3321321 - 1242315$

It is the most common type as it covers more than half of the state (58 per cent) stretching over the Ganga—Ghaghara Divide, the lower Ganga—Yamuna Doab and the Vindhyan Upland. This type is dominated by mixed farming with prevalence of livestock breeding. It is quite evident that about 40 per cent of the gross as well as of commercial production is obtained from animals in spite of the fact that it is an important food crop producing area (60—80 per cent). In this type of farming, cows and buffaloes are raised for draught as well as for milk production. Stall feeding is common and animals are allowed to graze over the cropped land only after the harvest is over in late summer season and during early monsoon. The number of cows and buffaloes is increasing because improved varieties are being distributed by the government to the landless labourers and small farmers on 50 and 33 per cent subsidized rates respectively. In general, about 66 per cent of the area is under plough followed by grazing (14.67 per cent) and forest land (5.5 per cent).

(2) The Traditional Highly Intensive Commercial Food Crop Growing Agriculture

$Tg = 1151112 - 5554455 - 4422443 - 1151125$

This is the second largest area, extending in two stretches and a few patches, covering 34 per cent of the area. Agriculturally these areas are very well developed and mechanised. It covers the regions of Tarai, western Ganga—Ghaghara Divide, Upper Ganga—Yamuna Doab and Saryupar Plain.

In general, about 65 per cent of the area is cultivated followed by forests (14.7 per cent), water bodies (9 per cent) and pastures (5.3 per cent). The concentration of water bodies and pasture land in the remaining area is due to the physical nature of the terrain.

This type differs from the other two agricultural types, because it records a high to very high status in operational attributes, high land productivity, cultivated land productivity, degree of commercialisation and commercial production, and very high position in production of primary food crops. This is, because this region produces wheat and rice as the main crops and sugar-cane as a secondary crop in highly fertilized and irrigated fields, adopting very high input of mechanisation. Due to the traditional nature of social behaviour and farming practices, the use of animal power and livestock breeding for milk and draught is still quite high but its production share is low and as such the commercial nature of this type mainly depends on food crops.

(3) Traditional Very Small Scale Agriculture with Prevalent Livestock Breeding

$Tn = 1151111 - 5511155 - 3311434 - 1424515$

The Uttar Pradesh Himalaya, covering about 8 per cent of the State's total area, is an important potato, chilli and apple producing region, practising transhumance and livestock breeding. Forests and grasslands alone account for about 93 per cent of the area, leaving very little for agriculture and horticulture. Owing to this limitation of agricultural land (3.4 per cent), very intensive cropping system has become a way of life in this hilly terraced tiny land holdings with the help of very high labour and animal power input, which forms the backbone of this culture. The input of mechanical and chemical power is yet to be introduced and the soil moisture remains high during a major part of the year.

As a result of high percentage of meadows and grassland (5.4 per cent including some of the forests which are open for grazing), apple plantations, vegetables and livestock put this area into high degree of commercialization and specialization. The general gross production and commercial emphasis are also high and very high respectively. It indicates prominence of livestock breeding over agriculture, as the commercial production in conventional units per hectare of agricultural land and land share under primary food crops fall in the medium and low categories.

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RETROSPECT AND PROSPECT OF THE URBAN DEVELOPMENT IN CHINA

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1. HISTORICAL REVIEW OF THE CITY DEVELOPMENT

The development of cities has various political and economic backgrounds in different historical stages. At the very beginning, cities emerged due to political and military demands. The slave owners of Xia and Shang Dynasties (1700–1100 BC) built cities with slave labour to protect their properties and to defend attacks from alien tribes. All through the feudal stage, the rulers recognized city construction as a fundamental measure for building up a nation. Cities became the political centres of small states of the Spring and Autumn Period and the Warring States Period (770–221 BC), most states at that time were city-states or poleis. Qin Dynasty (221–207 BC) unified China and established county as the fundamental administrative unit, there were 800–900 cities as political centres at different level in whole China. Up to the end of Han Dynasty (about AD 200), the number of cities amounted to more than 1500. The emperors of feudal dynasties usually poured huge amount of labour, resources and money to build their capitals, such as Xian, Loyan, Kaifeng, Hangzhou, Nanjing and Peking, into the biggest cities of the country, the urban population of some of them even surpassed 1 million.

During the feudal stage, in most cities political function predominated, while at the border regions the cities were built mainly for defence purpose. And up to now, those military garrisons are still visible.

In the later part of the feudal stage, handicraft, commerce and services for the ruling class began to flourish, thus endowed the cities with more functions. Particularly those cities located at the junctions of land and water routes developed even faster and bigger. But on the whole, urban economy at that time was essentially self-sufficient, with the characteristics of natural economy.

The Opium War of 1840 forced China to open her door to the imperialists. The cities along the sea-coast and the Yangtze River were turned into trading ports, and even foreign settlements were established as the bases for plundering resources and dumping goods, and thus spread the capitalist commerce into China.

At the end of the 19th century, the Qing government launched the Westernization Movement (Yangwu Yundong) to introduce techniques of capitalist production and to open coal mines, to set up mills and to build railways in cooperation with private or even foreign capital. More cities with small industries sprang up at the junctions of railways and in the centre of coal fields.

Since the founding of the People's Republic in 1949, the Chinese government has developed industry in a planned way. And during the period of the First and Second

Five Year Plan (1951–1960), more than 160 items of modern industry were built up with support from the Soviet Union and other socialist countries. Thenceforth, industrialization has been the chief impetus of China's urbanization. Besides the big cities, such as Harbin, Changchun, Dalian, Shenyang, Beijing, Taiyuan, Xian, Wuhan, Chongqing and Chengdu boosted by industries, more medium sized cities, mainly in the Northeast and North China, were transformed into industrial cities.

In the late 1960s and early 1970s, according to Chairman Mao Ze-dong's idea of "being prepared against war", the focus of industrialization was moved to the "Third Line", that is the vast area to the south of the Great Wall and to the west of Beijing–Guangzhou railway. According to the principle of self-reliance, the Chinese government invested much of its technical personnel and equipment, material strength and funds to develop heavy industries and armament industries in that area. About 70 cities, large and small, were immediately decked with large scale factories and their urban functions multiplied. As most of the constructions were being finished during the chaotic period of the "Cultural Revolution", infrastructures in the cities were not provided adequately, leaving behind many gaps.

The plenary meeting of the Chinese Communist Party held in 1978 made a significant decision to affirm modernization, instead of class struggle, as the nation's paramount business. And in the following years, policies of economic reform and opening to the outside world were adopted. Four special economic zones were established, 14 major cities along the coast and the island of Hainan, the Yangtze Delta, the Pearl River Delta and the triangular area of Southern Fujian Province were declared open to foreign entrepreneurs, and thus the advancement of the coastal cities has been accelerated.

In the Seventh Five Year Plan, becoming effective in 1986–1990, the country is delineated into 3 economic zones, the East, the Middle and the West. In industrial and transport construction, more emphasis will be put in the middle zone and in the eastern part of the west zone, and consequently, a group of new mining and industrial towns and new railway junction cities are coming to emerge in that part of China.

2. QUANTITATIVE ANALYSIS OF THE CITY DEVELOPMENT

Statistics about Chinese cities were fragmentary and scarce in the preliberation years. In 1947, there were 6 extra-large cities with more than 1 million population, 10 large cities with 0.5–1 million, 19 medium cities with 0.2–0.5 million and 34 small cities with less than 0.2 million population, there was no numerical data for even smaller cities and towns.

After Liberation, the Chinese government defined cities with a population of more than 100 000 as designated cities with city government and settlements with population of more than 3000 (70% of which is non-agricultural) as designated towns with town government. In 1949 there were 191 cities with population of more than 50 000 and about 5000 designated towns, altogether there was 57.65 million urban and town population, accounting for 10.6% of the nation's total population.

Along with the industrial development in the First Five Year Plan period, the urban population amounted to 15.4% of the total population in 1957. In the years of "Great Leap Forward" (1958–1960), more than 10 million of rural population swarmed into cities, urban population reached the highest record of 19.7% in 1960, adding much burden to the cities. By 1961, the policy of readjustment was put into effect, those peasants who have joined productions in the cities were asked to move back to the countryside, and a lot of cadres was mobilized to go down to the grass-roots units and consequently the urban population was cut back by about 20 million. During the "Cultural Revolution", Chairman Mao Ze-dong initiated the youth rustication

campaign, about 30 million young people moved down to the countryside from the cities. In 1975, the percentage of urban population to total population recorded only 12.1, and in the meantime urban economy was much curtailed. With the smash of the "Gang of Four" the curtain was drawn over the tragedy of the "Cultural Revolution" in 1976, the national economy began to get resuscitated, and the urban population resumed its increase.

The amount of the designated towns was 5400 in 1953, and after the socialist transformation of capitalist industry and commerce in 1956 and the switch-over to people's communes, private trade was banned and commodity economy was suppressed. As a result, the designated towns dropped to 2904 in 1965. And they were further depressed during the "Cultural Revolution", and in 1976, there were only 2874 left. Things were rectified after the conclusion of the "Cultural Revolution", and towns resumed their way of healthy growth. The number of designated cities and designated towns in 1985 increased by 165 and 4637 respectively as compared with that in 1976, and the percentage of urban population to the total population rose from 12.5 to 15.8.

The Ministry of City and Country Construction and Environmental Protection classified the cities in China into 4 classes according to the size of their urban population, namely, the extra-large city with population of more than 1 million, large city with 0.5–1 million, medium sized city with 0.2–0.5 million and small city with population less than 0.2 million. The guiding principle for urban development is "to control the extra-large and large cities, reasonably develop medium sized cities and enthusiastically develop small cities".

In addition to the 118.26 million urban population living in the 324 designated cities, there was still 60 million non-agricultural population in the 7500 designated towns and 30 million non-agricultural population in the undesignated county cities, market towns and mining districts, so altogether there were in China's urban population 210 million totalled, which is the largest among the countries of the world. China has the biggest number of extra-large cities as well.

The distribution of population concentrating toward cities is an irreversible tendency the world over. Large cities with better productional conditions and services for industrialization, attracting more enterprises and offering more jobs, have become the hubs of population concentration. The rapid swelling of big cities has been out of control particularly in many of the Latin American and Asian developing countries, and has caused many troubles and worries.

In socialist China, controlling urban population is strictly handled, however the expanding of cities is still unavoidable. For example, the urban population of Beijing city increased from 2.8 million in 1949 to 5.1 million in 1985, and in addition there was 1 million mobile population. The number of extra-large cities increased from 7 in 1953 to 22 in 1985, and by 2000 it might reach 34 and the share of urban population in total population might reach more than 30%.

There are different views about the problem of optimum city size. The one is that a city is a spatial system of intensive population, economy and technology for the purpose of assembling economic profit, hence the bigger the city the better it is to bring its function into full play. The other holds that a city with more than 2 million population will create a series of unsolvable problems, such as the over-burden operation of infrastructures, the shortage of housing, the jamming of traffic and the deterioration of the environment, all these negative consequences will surpass the economic profits to be generated. The compromise view is that the optimum size of a city depends on its specific conditions, it is not wise to control the city size by mechanically restricting its population.

In China, some hold that to control the development of extra-large and large cities is not practical, as China is a populous country, the cities could easily attract and assemble population around them. Furthermore, China lacks cultivated land, how to

economize land in urban construction is crucial, so it is reasonable to put up more high-rise buildings and to have a bigger population in the city. They suggest therefore to rectify the grade of cities into: extra-large city with population of more than 4 million, large city with 1—4 million, medium city with 0.3—1 million and small city with less than 0.3 million, and correspondingly readjust the policy of city development as: making great effort to control extra-large cities, carefully developing large cities, and enthusiastically developing small cities. It is supposed that appropriately relaxing the restrictions on the city size would fit China's situation and help urban development and construction in the days to come.

The policy of developing medium and small cities and towns accords with the objective reality of China since the performing of economic reform. It is estimated that by 2000, the designated cities will increase from 324 to 650, and the designated towns from 7500 to 15 000, there will emerge new cities and towns along the coast and the Yangtze River and at the junctions of railways and main highways.

3. PROBLEMS IN THE PRESENT STAGE OF URBAN DEVELOPMENT

In China, urban development is now ushering into a new stage of planned construction and planned management. Of the 324 designated cities, 319 have adopted general planning of their own, and of the 2200 county cities, 30% have devised urban planning. Even so, in the course of urban construction and development the following crucial problems need to be solved:

(1) Infrastructures lagging behind development

In the previous years, urban construction concentrated on building factories and offices, while infrastructures of electricity, water and waste disposal, transportation, communication and other facilities and services were regarded as not indispensable. In fact, poor infrastructure has already hampered the economic productivity and the maintenance of an appropriate living standard in the urban area.

A survey, covering about 300 cities, made in 1985 disclosed: in water supply, only 88% urban inhabitants using tap water, and each day there was a shortage of 12 million tons, most of the large cities in North China and 8 of the 14 open cities along the coast suffered water shortage due to over-concentration of industries; in water discharge, of the 34 000 million tons of waste water discharged by the cities each year, 80% without any treatment, thus polluted the nearby water bodies; in fuel supply, only 22% of urban inhabitants using gas, the majority still relying on coal, and the combustion of coal caused serious air pollution and acid rain dropped on the industrial cities located in the river valleys in the Southwest; in transportation, there were 45 155 buses running in the cities, 38 000 km road and 358 million square meters of road surface; on the average every 10 thousand urban inhabitants shared 3.9 buses, 3.3 km of road and 3 square meters of road surface, consequently the traffic was very crowded and the commuters wasted too much time and energy every day en route.

What is the most pressing is housing shortage. Under the "left" guiding ideology in the past decades, urban construction put production first and livelihood next, much more money was invested in productive building, while residential construction was ignored. The unbalanced situation was rectified after 1978, and 640 million square meters of housing, corresponding to the total work done during the first 30 years after liberation, was completed during 1979—1986, and the housing problem was then somewhat alleviated. In 1985, there was 2320 million square meters of building space in all the cities, of which 51.4% was productive building, and 48.6% residential. The average floor space for each urban inhabitant was 5.2 square meters, higher in the small cities and lower in the big cities, the figure for Beijing and Shanghai were 6.2 and 5.4 respectively. It was estimated that of

the total urban households, 28.8% was short of housing, it was not rare to see three generations living in a single room.

(2) Disjunction of urban planning and regional planning

The development of a city depends on its hinterland, and *vice versa*, the city as an economic centre could bring along its associated area in advancement. It is reasonable to have a macro survey of the surrounding area first, then focusing on its centre city to have a micro study of their developmental problems. It is more proper to consider the allocation of major enterprises and projects in the hinterland first, then to decide the function and scale of the city, that is to consolidate the urban planning of the central city and the regional planning of the associated area closely. The ideal planning process is to have a strategic delineation of comprehensive economic region for the whole country first, then to work out regional planning for regions of different order, and still then to compose urban planning for the central cities of the related regions. By so doing, planning of different levels could be coordinated.

In China, urban planning work started in the early 1950s, and has been carried on extensively, while regional planning work commenced much later and has been conducted only as experiments at some selected areas. Hence, most of the urban planning was prepared without regional planning as their basis, and in some cases, urban planning for the central cities was completed before regional planning of the associated areas was started. For example, the three big cities in the North China Plain, Beijing, Tianjin and Tangshan, each has prepared urban planning, while the regional (territorial) planning for the region was not commenced until 1984, thus the responsible government agency took great pains in coordinating the three cities, particularly difficult in division of labour among them. Due to the non-existence of regional planning, the horizontal linkage between nearby cities is usually very weak.

The separation of sectoral planning and urban planning has also caused many troubles. In some areas, the development of industries not relying on cities in organizing production and living conditions has brought about inconveniences to the workers and their families. It refers particularly to the "Third Line" construction, under the guidance of lopsided defence view-point, where the factories were distributed separately in the hilly areas, as a result, they were economically, socially and environmentally unfavourable. Now all the improperly allocated factories have to be removed or even to be closed down, anyway leading to great losses.

(3) The spontaneous growth of market towns

China's economic reform made a break-through in the countryside first, in 1978 the family responsibility system was established, in the following year the purchasing prices of agricultural products were raised and the prices of the means of production lowered, and finally in 1984, the system of planned purchase and marketing by the state was replaced by contract order and free purchase and marketing. All these reforms widely called up peasant's enthusiasm and proceeded the restructuring of agriculture, and precipitate the peasants to transfer from petty producers to social commodity producers.

Since 1981, the gravity of economic reform shifted from countryside to the cities, to start with the granting of economic autonomy to the enterprises. Then the economic and management forms of the enterprises were diversified, the structure of ownership was readjusted, the collective and private economies in the cities and towns were developed, and the action of economic lever began to perform. At the same time, the policy of opening to the outside world was further carried out, to attract foreign funds, to import advanced technology and know-how, to learn foreign management and personnel training and to start joint ventures and co-production with foreign investment by offering foreign investors special preferential treatment.

The confluence of the two powerful tides of rural and urban reform developed urban-rural relationship and furthered the function of a market town as an intermediary between

the urban and the rural. The market towns in China have a long historical tradition, they are numerous and extensive in distribution. Up to 1986, there have already been more than 50 000 market towns (including 7500 designated towns), and about 76 million of peasants have left their fields and moved to the cities and towns to operate tertiary industries and township enterprises of all kinds, and they themselves have become peasant-workers. It is estimated the tendency will still carry on, and by 2000, there would be 200 million peasants shifting to industry, construction, transportation, services and other professions. The huge influx of peasant-workers into the cities would induce urban explosion, if no preventive measures were taken. In order to curb the rural-urban flux, it is suggested to build up the towns as "antimagnetic poles" or "reservoirs" to accommodate the increasing surplus of rural labourers.

The development of market and designated towns has been very prompt. The towns themselves have transformed from simply commodity exchange centres to complex production centres, from single function to multiple functions, from closed type to open type, from periodical market to permanent market, from village model to urban model. But as the town development is fundamentally spontaneous, it has brought about certain problems. The small industries disorderly mixed up with residential houses, the disposal of polluted water, poisonous gas and wastes, without any treatment, has worsened the environmental quality. And above all, the swelling of towns has taken up much cultivated land. So, planning for their further development and construction is urgently needed. The orientation of development, the adjustment of economic structure, the proper size of population and area, the allocation of industries and infrastructures, the protection of environment, all have to be taken into consideration in the planning, so as to attain the maximum economic, social and environmental benefits.

TABLE 1. Classes of Cities in China According to Population

Class	Population size ('000)	Number of cities	Total population ('000)	Average population ('000)	% of total urban population
Extra-large	> 4000	3	16 180	5 390	13.68
Extra-large	4000 – 1000	19	31 290	1 650	26.46
Large	500 – 1000	30	21 960	730	18.54
Medium	300 – 500	46	16 970	370	14.35
Medium	200 – 300	48	12 020	250	10.16
Small	< 200	178	19 880	110	16.81
Total		324	118 260	370 (average)	100.00

TABLE 2. Hierarchy of Chinese urban system

Extra-large city with international importance (such as Beijing, Shanghai and Hong Kong after 1997)

Extra-large city as centre of big economic region (such as Tientsin, Guangzhou, Chongqing, Xian, Harbin, Shenyang)

Large or medium city as provincial centre

Medium or small city as prefecture centre

Small city or designated town as county centre

Designated town as district centre

Market town

Rural village

It can be predicated that towns and small cities will increase in number and scale. Properly handling the relationship between urban and rural areas is an important issue, the economic, technical and intellectual superiority of the countryside, promoting the various kinds of cooperation between them for mutual prosperity. A sort of loser urban-rural collaboration is taking shape, the disparities between urban and rural are being diminished, and based on these realities, an urban system with Chinese characteristics is in prospect (cf. Table 2).

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TYPES OF ARABLE LANDSCAPE OF THE SLOVAK SOCIALIST REPUBLIC

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The landscape agricultural potential has been studied for several years at the Geographical Institute of Geosciences Centre of the Slovak Academy of Sciences. The studies covered relationships between the landscape components, man's interventions into the landscape agricultural potential and crops of main agricultural products. However, so far, less was made for the study of relationships between the landscape individual components in the agricultural landscape itself. The knowledge of relationships between the landscape individual components enables us to know the laws of distribution of individual components of the agricultural landscape and thus to foresee and to determine the agricultural landscape development.

In the last years several of our authors and from various standpoints delimited the Czechoslovak landscape. From among these works the first were of an analytic character. The landscape delimitation was made on the basis of only one landscape component. Similar character presents the work of M. Konček and S. Petrovič: Climatic areas of Czechoslovakia (1957),¹ E. Quitt: Climatic areas of Czechoslovakia (1971), as well as the work of K. Tarábek: Main climatic-geographic units of the Czechoslovak Republic (1974). The mentioned authors divide Czechoslovakia from the climate standpoint, but each of them his own way.

The division of Czechoslovakia from the soils standpoint is given by the work of J. Hraško et al.: Soil map of the ČSSR (1973). The map is prepared from a uniform standpoint and according to the latest opinions on the Czechoslovak soils.

The first complex approach to the landscape delimitation of the Czech Republic represents the work of J. Demek et al: Physicalgeographical regions of the Czech Socialist Republic (1975). In the division of the Czech Republic the authors start from the landscape geomorphologic development, which they complete by the climate and by the forest secondary structure.

The most complex characteristic of the landscape is given by the work of E. Mazúr et al.: Geoecologic (landscape) types of Slovakia (1976). The map is prepared on the basis of all components of the landscape: relief, climate, soils, groundwater and vegetation.

New opinions on the division of Slovakia brings the work of M. Lukniš: A regional division of the Slovak Socialist Republic from the viewpoint of its rational development (1985), in which the author divides the Slovak Republic into several regions on the basis of the landscape primary potential.

¹ The works indicated in this paper are published only in Czech and Slovak.

The above mentioned complex works characterize and divide the landscape as such without taking into consideration the purposeful use.

From the standpoint of purposeful use of the agricultural landscape of importance are the works of M. Dzatko et al. (1976), Z. Bedrna (1986) and K. Kurpelova (1977). Each of the indicated authors evaluates and divides the agricultural landscape from an individual standpoint. M. Dzatko et al. (1976) characterizes and divides the agricultural landscape from the soils standpoint, their use and yield. Z. Bedrna (1986) divides the soils on the basis of temperature regimes and M. Kurpelova (1977) characterizes and divides the landscape from the climate standpoint.

The agricultural landscape is not homogeneous, but it represents a heterogeneous area, which is purposefully used for agricultural production. Each landscape type is governed by different laws, which do not satisfy all the products in an equal measure. For these reasons the production potential of the agricultural landscape cannot be determined at once. The best physical-geographical conditions of the arable landscape do not satisfy permanent grassland and *vice versa*, the best physical-geographical conditions for permanent grassland do not satisfy field production. For this reason each landscape type should always be evaluated and delimited independently from the given land use system and crop standpoint. For the given reasons only the arable landscape of Slovakia will be purposefully evaluated and delimited. Therefore the object of our study is solely that part of the agricultural landscape, where a substantial part of the agricultural production is presently organized.

I. PROCESS AND METHOD OF ELABORATION

It is possible to compare, evaluate and delimit scientifically the arable landscape solely under the condition that the arable landscape as a whole is divided into the smallest homogeneous units. In Slovakia, based on relief characteristics, climate and soils 395 homogeneous units were delineated for the indicated work, which represent the smallest and unique individuals. Comprehensive homogeneity is a relative conception and corresponds to the map scale at which the delimitation was realized. As our work was carried out at the scale 1:500 000, even the homogeneity corresponds to this scale. For each delineated physical-geographical region 403 values were measured, gathered and calculated, which for 395 physical-geographical units represents a database of 159 185 characteristics. It is the first database of agricultural landscape in the ČSSR, which is completed by a larger quantity of optional programs.

The landscape characteristic was not used directly for the delineation of arable landscape types, but the first transformation of values was made by means of the factor analysis.

Several models of the factor analysis were created. We looked for such a model which would express the landscape most complexly. The highest clarification of relationships was obtained by the model, for which we chose the most detailed characteristics of three basic landscape components: relief (height a.s.l., inclination, and relative altitude), climate (monthly values of temperatures and precipitation) and soil (depth of humus horizon, humus content in the topsoil in per cent, CaCO_3 content in the topsoil, sorption saturation, soil reaction, reserves of accessible phosphorus in the topsoil in mg/kg of earth, reserves of accessible potassium in mg/kg of earth, grain size of the topsoil). The expression of climate by average monthly temperatures and precipitation for 30 years (1930–1960) served to express the total course of climate in the landscape and its relationships with the remaining landscape components.

From 35 variables of the model of factor analysis 6 factors were extracted whose proper value is higher than 1, and which clarify the communality to 84.57%.

First factor — temperature — clarifies 55.24% of the clarified communality.

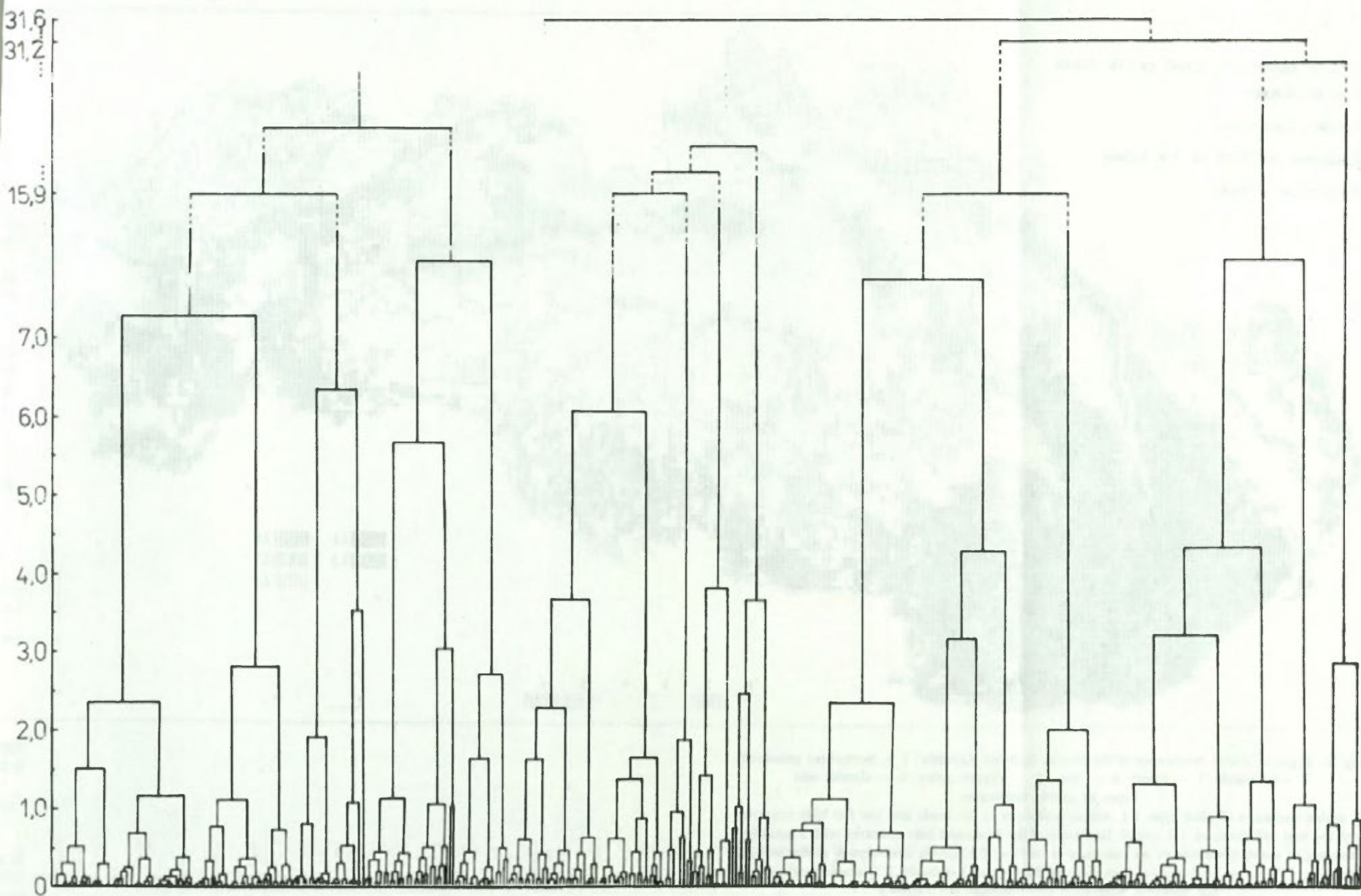


Fig. 1. Dendrogram
<http://rcin.org.pl>

TYPES OF ARABLE LANDSCAPES OF THE SLOVAK
SOCIALIST REPUBLIC

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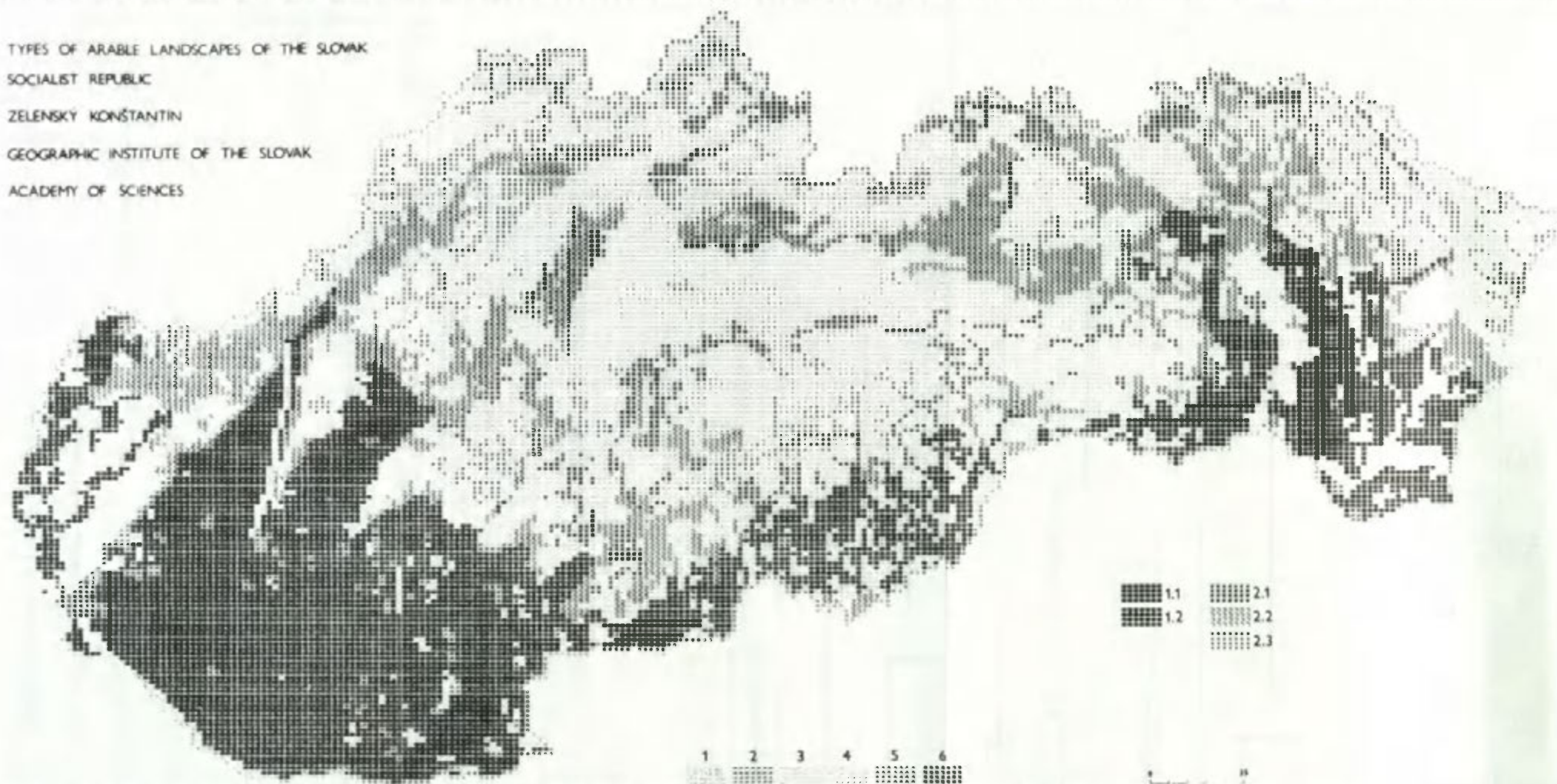


Fig. 2. Types of arable landscapes of the Slovak Socialist Republic: 1 — permanent grassland, 2 — vineyards, 3 — forest, 4 — dam, 5 — klippen relief, 6 — district seat

Types of arable landscapes

1. arable landscape of plain type, 1.1. arable landscape of flat lands and low flat hilly countries with the best soil chemism, 1.2. arable landscape of flat lands and hilly countries with a good soil chemism, 2. arable landscape of the mountain-basin type, 2.1. arable landscape of piedmont hilly countries, 2.2. arable landscape of high situated basins and highlands, 2.3. arable landscape of flat foothills, highlands and intermontane furrows

Monthly temperatures show the closest relationship with this factor. Even summer precipitation show a high closeness, as well as the height a.s.l. and the relative altitude. The relationships between the factor variables confirm the thesis that relief is an important divider of the temperature, as well as of precipitation, in which this influence is manifested mainly in the summer months.

Second factor of the autumn-winter-spring precipitation clarifies 14.35% of the communality. The autumn-winter-spring months show the closest relationships with this factor. The remaining variables show but a very low correlation. From these relationships it results that autumn-winter-spring precipitation are more influenced by other factors than relief.

Third factor — soil chemism — clarifies the communality to 4.76%. In the first place to this factor relates the soil reaction, sorption saturation and reserves of accessible phosphorus. The relationship between the indicated variables is directly proportional.

Fourth factor — reserves of accessible potassium in the topsoil — clarifies 4.16% of the communality. Solely the reserve of potassium shows the highest closeness with the factor. From the high relationship it results that the reserves of accessible potassium are not conditioned by the model variables.

Fifth factor — topsoil grain size — clarifies 3.15% of the communality. In the first place the topsoil grain size and then the depth of humus horizon show the closest relationship with the factor. Between these variables there exist a relatively high and directly proportional relationship, which confirms the thesis that the depth of humus horizon is strongly conditioned by the topsoil grain size.

Sixth factor — CaCO_3 content in the topsoil — expresses only 2.8% of the communality. The CaCO_3 content and the humus content show the closest relationship with the factor. Their mutual relationship is relatively high and directly proportional: the higher the CaCO_3 content, the higher is the humus content (see Table 1).

II. CALCULATION OF THE FACTOR SCORE

In fact the extracted factors express the laws of distribution of the model landscape elements in space. In order to express these laws in space the matrix of factors was calculated to the model starting variables by the following equation:

$$Fs_i = Z_{ij} \cdot K_{ij}$$

where

$$Fs_i = \text{factor scores of } i\text{-th factor,} \tag{1}$$

$$Z_{ij} = \text{standardized } j\text{-th variable of } i\text{-th unit,}$$

$$K_{ij} = \text{coefficient of } j\text{-th variable, } i\text{-th factor.}$$

The above equation was used to calculate 6 scores. The calculated factor scores represent new, complex values of the model, which became the starting values for the delineation of the arable landscape types.

III. DELIMITATION OF ARABLE LANDSCAPE TYPES

The arable landscape of Slovakia represents a surface of 1517 million ha. It is a large and multiform landscape, which cannot be evaluated by the current method from the 35 factors standpoint. It is why we used the cluster analysis for the delimitation of the arable landscape types. Though the cluster analysis is well elaborated in the world literature, it is weakly represented in the Czech and Slovak geographical literature. It is worked out in more detail in the Research Institute of Soil Science and Nutrition of Plants in Bratislava (M. Prachárová, I. Prachár, and M. Džatko 1979).

There are several cluster analyses worked out. From among tested was the Ward method (J. H. Ward 1963), it is the optimalization process based on the minimization

TABLE 1. Rotated Factor Matrix

	F ₁	F ₂	F ₃	F ₄	F ₅	F ₆	R ²
1	2	3	4	5	6	7	8
I. Relief							
1. Height a.s.l.	0.843	-0.270	0.197	0.097	-0.124	0.167	0.857
2. Inclination	0.567	-0.308	0.498	-0.223	-0.058	0.106	0.730
3. Relative altitude	0.451	-0.356	0.487	-0.263	0.036	0.224	0.689
II. Climate							
Average monthly temperatures							
4. October	-0.941	0.145	-0.215	-0.047	0.078	-0.042	0.965
5. November	-0.925	0.085	-0.288	-0.071	0.061	-0.041	0.958
6. December	-0.795	0.023	-0.326	-0.089	0.088	0.041	0.757
7. January	-0.881	-0.065	-0.313	-0.081	0.019	0.070	0.890
8. February	-0.933	-0.001	-0.266	-0.017	0.018	0.077	0.949
9. March	-0.959	0.107	-0.195	-0.016	0.063	-0.013	0.974
10. April	-0.944	0.214	-0.138	0.000	0.090	-0.063	0.969
11. May	-0.929	0.243	-0.125	0.011	0.117	-0.098	0.961
12. June	-0.918	0.259	-0.124	0.015	0.114	-0.081	0.946
13. July	-0.917	0.254	-0.091	0.018	0.128	-0.069	0.936
14. August	-0.926	0.243	-0.107	0.008	0.120	-0.068	0.948
15. September	-0.943	0.188	-0.161	-0.013	0.103	-0.042	0.964

Average monthlv precipitation							
16. October	0.263	-0.913	-0.011	-0.105	-0.006	-0.018	0.915
17. November	-0.030	-0.876	0.328	0.157	-0.021	0.123	0.916
18. December	-0.017	-0.932	0.197	0.012	-0.008	0.027	0.908
19. January	0.218	-0.917	0.058	-0.051	-0.033	-0.100	0.907
20. February	0.160	-0.956	0.052	-0.060	-0.026	-0.013	0.948
21. March	0.288	-0.904	-0.041	-0.055	-0.088	0.080	0.920
22. April	0.523	-0.784	0.088	-0.063	0.000	-0.108	0.912
23. May	0.537	-0.584	0.235	0.134	-0.095	0.109	0.725
24. June	0.844	-0.217	0.196	0.007	0.018	-0.157	0.824
25. July	0.852	-0.272	-0.101	-0.211	-0.045	-0.169	0.886
26. August	0.864	-0.237	-0.003	-0.156	0.008	-0.244	0.889
27. September	0.801	-0.434	0.062	-0.104	0.051	-0.221	0.897
III. Soils							
28. sorption saturation	-0.449	0.177	-0.618	-0.045	0.120	0.216	0.680
29. soil reaction	-0.431	0.201	-0.667	0.003	0.048	0.274	0.750
30. reserves of accessible phosphorus	-0.460	0.190	-0.520	0.361	0.067	0.231	0.707
31. reserves of accessible potassium	0.037	0.031	-0.092	0.909	-0.018	-0.079	0.844
32. topsoil grain size	-0.152	0.099	0.016	0.140	0.818	0.042	0.725
33. humus horizon depth	-0.251	0.013	-0.164	-0.332	0.602	0.051	0.567
34. humus part in soil in %	0.307	-0.153	-0.034	0.066	0.260	0.591	0.540
35. CaCO ₃ content in the topsoil	-0.238	0.076	-0.306	-0.226	-0.116	0.622	0.609
proper values	19.411	4.940	1.669	1.457	1.108	1.010	29.596
part in the communality in %	55.461	14.116	4.7768	4.164	3.166	2.887	84.566

of the inner-cluster sums of square deviations from the average. By connecting clusters into bigger units this sum increases. It matters that by connection in each step a minimum increase of inner-cluster sum of squares be obtained. The minimum increase will be attained by connecting such clusters, for which the square of distance between their averages, weighted by the harmonic average extent of these clusters is minimum.

The cluster analysis was not made by absolute values of 35 factors, but for the starting values of cluster analysis we chose the values of factor scores, which are not only retransformed, but they represent already a higher, more complex degree of values of the landscape.

The result of the whole mathematic-statistics process is the agglomerative dendrogram, on which the hierarchic structure of clusters is drawn (Fig. 1).

IV. TYPES OF ARABLE LANDSCAPE

The dendrogram was the starting point for delimitation of arable landscape types. The arable landscape of Slovakia is understood as one unit, which on the basis of similarity of clusters of the highest degree can be divided into two independent types of the first order:

1. plain type
2. mountain-basin type

The two indicated types are divided into 5 subtypes and the subtypes into districts and subdistricts. The delimited types and subtypes, as well as the lower taxonomic units are neither exclusively based on climate, nor soil, but they always express the landscape as a complex and they differ from each other in the whole complex (Fig. 2).

1. ARABLE LANDSCAPE OF PLAIN TYPE

It is situated mainly in the three plains of Slovakia (Danubian, Záhorská and East Slovakian), but also in the low situated and warm basins. It divides into 2 subtypes:

1.1. Arable landscape of flat lands and low flat hilly countries with the best soil chemism

This landscape in its substantial part is observed in the Danubian Plain, but also in the East Slovakian and Záhorská plains and in low, warm basins. The area of this type is characterized by the highest and the most effective agricultural production in Slovakia. Potentially it is ranged to the maize production type.

The landscape of this subtype has the most suitable climate for plants cultivation. It is a landscape with the shortest and the most moderate winter. The continuous frost period begins on December 20 and ends on February 16. In the 58 days of this period the sum of frosts attains -72°C .

Due to short winter period the shortest period out of vegetation (126 days) or the longest vegetation period is noticed. The vegetation period (with average day temperature above $+5^{\circ}\text{C}$) begins on average on March 19 and ends on average on November 12. The vegetation period lasts 239 days; 3441°C accumulate for this period.

The landscape is characteristic also by the longest period of daily temperatures above $+10^{\circ}\text{C}$ and above $+15^{\circ}\text{C}$. The period of the temperature sum above $+10^{\circ}\text{C}$ (TS_{10}) begins around April 15, ends on October 13 and lasts 181 days. For the 181 days 3032°C accumulate in the landscape. The period of the temperature sum above $+15^{\circ}\text{C}$

(TS₁₅) begins on May 15, ends around September 16 and for 125 days of duration 2328°C accumulate in the landscape.

When speaking of the climate suitability for agriculture, we mean the temperature. However, the warmest landscapes are simultaneously also the driest. Lack of moisture is the main factor of irregular crops of agricultural products. Even the arable landscape of this subtype suffers from shortage of moisture. In order to evaluate the shortage of moisture with regard to the subtype temperature, we calculated for the main crops the need of moisture beginning from their sowing to their reaping. The moisture need was calculated for individual months and for the whole vegetation period. For wheat we calculated the moisture need only from the beginning of the vegetation period (from +5°C in spring) till harvest.

To calculate the moisture need we used the following formula:²

$$\text{where } V_c = k_b \cdot \sum D \quad (2)$$

V_c = moisture need for the product in mm,

k_b = coefficient of biological curve (it is established for each product)

$\sum D$ = sum of daily saturation complements for the studied period.

This calculation made possible to identify not only the total moisture need of individual agricultural crops, but also the critical period of moisture need of these crops. The landscape evaluation according to moisture need is considered to be a more precise factor of the landscape than evaluation of the landscape solely according to precipitation. The moisture need is of a more complex character than precipitation. It expresses not only the precipitation, but also the evaporation at the daily temperature.

The moisture need is only one index. To know the landscape complexly from the climatic humidity standpoint, we need to know the difference between the moisture need and precipitation, or to what extent can the landscape precipitation irrigate the plants at a given temperature. We calculated two kinds of moisture need. In the first case the share of precipitation in the vegetation period was calculated. In the second case the share of winter and vegetation period precipitation in the moisture need of individual plants was calculated. For the first case the following formula was used:

$$\text{where } HTK_1 = \frac{\sum Z}{V_c} \quad (3)$$

HTK_1 = hydrothermic coefficient of the given plant

$\sum Z$ = sum of precipitation for the plant's vegetation period

V_c = plant moisture need for the vegetation period

For the second case one half of winter precipitation and the total vegetation period precipitation were taken. The following formula was used:

$$\text{where } HTK_2 = \frac{0.5(Z_{10-3}) + Z}{V_c} \quad (4)$$

HTK_2 = hydrothermic coefficient of the given plant

Z_{10-3} = precipitation for the winter period

Z = precipitation for the vegetation period of a given plant

V_c = moisture need of a given plant for the vegetation period

The results of the indicated hydrothermic coefficients are considered to be a more precise expression of climatic humidity, than the generally calculated hydrothermic coefficients. The hydrothermic coefficients HTK_1 and HTK_2 express the share of climatic humidity in the moisture need of concrete plants.

The evaluation of the climatic humidity by using one half of the winter precipitation is suitable only for cereals and perennial fodder crops. Cereals and perennial fodder

² Formula for calculating the moisture is elaborated according to the works of V. Slama (1967) and M. Pycha (1966, 1971).

crops, as well as permanent grasslands use directly the winter precipitation. However, root crops, which begin to use only the May rains, use the reserves of winter precipitation only very little. It is why the evaluation of climatic humidity by means of precipitation during the vegetation period is considered to be more correct.

The landscape of this subtype (1.1) suffers from the shortage of water — cereals less than root crops and perennial fodder crops. Cereals need 288 mm of water in a normal year. When taking into consideration only the vegetation period rainfall — without the winter reserves — cereals are short of 102 mm water during the vegetation period, but when considering also one half of winter precipitation, cereals show an equalized balance in normal year. Maize for grain needs 517 mm of water. There is a shortage of 181 mm for a complete water balance. A still greater water shortage shows the sugar-beet. The sugar-beet needs here 559 mm of water. There is a shortage of 222 mm.

The year round shortage of moisture in the subtype is best shown by the moisture need of permanent grasslands, which need moisture throughout the entire vegetation period. The permanent grasslands in the subtype need 598 mm of water, however, there is a shortage of 261 mm ($HTK_1 = 0.78$). The water need of permanent grasslands is not balanced ($HTK_2 = 0.87$) even when we consider one half of the winter water reserve in soil.

A great influence on the stability of crops has not only the quantity of precipitation, but its distribution in time, mainly a sufficient quantity during the critical period, when the plant needs water the most. Unfortunately, not one plant is sufficiently supplied in the critical period.

Two pedogenetic processes predominate here: organogene (chernozem) and hydromorphous (alluvial)³. All soils in the topsoil are calcareous, fully saturated and the soil reaction is neutral. Soils have medium reserves of accessible phosphorus and potassium in the topsoil. They are loamy soils (40% silt particles) with a deep humus horizon (more than 50 cm) and with a great content of humus (2.43%).

1.2. Arable landscape of flat lands and hilly countries with a good soil chemism

It is an area which, in the plains as well as in the warm basins opened to the south, covers medium high hilly countries and in the Záhorská and East Slovakian plains also the flat lands with a good chemism of soils. The height ranges from 153 m to 229 m a.s.l. The landscape is of a moderate inclination and relative altitude. The hilly countries attain an average slope gradient of 3° and a relative altitude of 50 m.

The climate is not suitable for maize cultivation, but due to the fact that the period with daily temperature above 10°C attains about 2900°C, this area is ranged to the sugar-beet production type. The climate of this subtype differs from the first subtype not so much in the summer temperatures and precipitation, but by the winter period. The winter frosty period begins here on December 12 and ends on February 23. It lasts on average 74 days and -171°C accumulate during this period. The frosty period is on average by 21 days longer than in the first subtype. This prolongation of the winter period is manifested in the total vegetation period. It begins on average on March 24 and ends on November 7 and lasts 229 days; 3279°C accumulate during this period. The period with daily temperatures above +10°C begins on average on April 19, and ends on October 9 and lasts 173 days; 2864°C accumulate during this period. A shorter period is also that with daily temperatures above +15°C. It begins on May 20, ends on September 13 and lasts 116 days; 2110°C accumulate during this period.

From the moisture need standpoint this subtype area is ranged among deficient. Cereals, due to longer vegetation period, need more moisture than in the first subtype

³ The names of pedogenetic processes are according to Z. Bedrna (1977).

(283 mm). However, the climatic humidity is higher here. For the whole vegetation period there is a lack of 62 mm of water. But when we consider also half of the winter moisture reserves, the area from the standpoint of moisture needs by cereals, it is moderately in excess ($HTK_2 = 1.22$). Maize, which is still grown here, needs 474 mm of rainfall during the vegetation period, there is a shortage of water of 95 mm. Even sugar-beet has a moisture shortage. The sugar-beet needs 507 mm water. There is a shortage of 127 mm. Insufficient moisture in the vegetation period refers also to the permanent grassland, which need 548 mm of water. There is a shortage of 169 mm during the vegetation period, but due to considerable winter moisture reserves this shortage is almost balanced.

The soil cover in the given subtype is varied. Three pedogenetic processes predominate here: hydromorphous (alluvial), claying process (saturated brunification) and translocatory (illimerization). Represented here are the alluvial and grasslands, but also chernozem and illimerized soils. The characteristic feature of these soils is their moderate acidic reaction with the predominance of a small reserve of accessible phosphorus, but with a good reserve of accessible potassium. With small exceptions there predominate loamy soils, which in spite of a deep humus horizon (67 cm), content only 1.88% of humus and no carbonates in the topsoil.

2. ARABLE LANDSCAPE OF THE MOUNTAIN-BASIN TYPE

It covers the largest area of Slovakia. Ranged to it are the higher situated piedmont hilly countries, medium high to high situated basins and the arable landscape in mountainous areas. It is a very heterogeneous area from all standpoints (relief, climate and soils). Due to this heterogeneity the type is divided into three subtypes.

2.1. Arable landscape of piedmont hilly countries

This subtype covers the area of piedmont plain hilly countries, as well as hilly countries of medium high basins and intermontanes with drier climate. The landscape presents a great altitude range. The average height reaches 360 m a.s.l. The landscape is a moderate inclination and relative altitude. The average slope gradient attains the value 5.11° and relative altitude 80 m.

The climate is moderately cold. From its potential standpoint the subtype is ranged to the cereal-potato production type. Relatively long and cold winters predominate here. The continuous frost period begins on December 8, ends on February 28 and lasts 83 days; -221°C accumulate during this period. Due to this long winter period the spring vegetation is delayed. The period without vegetation lasts 147 days and the vegetation period 218 days. The vegetation period begins on March 30 and ends on November 3; 2967°C accumulate during this period. Short is also the period of temperature sum above $+10^\circ\text{C}$. This period begins on April 26, ends on October 4 and lasts 161 days; 2530°C accumulate during this period. The period of temperature average above $+15^\circ\text{C}$ lasts only 94 days, i.e. from June 2 to September 3; 1671°C accumulate during this period. These low temperature sums predetermine cultivation of only more cold-loving plants.

This subtype landscape is moisture balanced, for cereals and for potatoes. The potatoes show even an excess balance. They need 374 mm of water and rainfall exceeds the need by 54 mm. Also the permanent grassland show an equalized balance. The landscape forms a passage between the dry and wet one.

This subtype is characterized by the soils with weak saturation, weak acidity and a small reserve of accessible phosphorus, but a great reserve of accessible potassium. Then there predominate loamy soils with shallow humus horizons (27 cm) and with

relatively high content of organic matter (2.16%). In the subtype, in the lower parts there predominates a translocatory pedogenetic process (illimerization) and in a higher degree the pedogenetic process of claying (acid brunification).

2.2. Arable landscape of high situated basins and highlands

To this subtype we include the higher situated and wetter basins, as well as part of the highlands. The average altitude attains here 519 m a.s.l. The inclination becomes the limiting factor of arable land. The average slope gradient exceeds 7° and relative altitude 118 m.

The landscape is ranged to the cold and wet areas. The continuous frost lasts 93 days. It begins on December 3 and ends on March 6; -276°C accumulate during this period. The vegetation period is only a little longer than the one without vegetation. It begins on April 4, ends on October 29 and lasts 209 days; 2728°C accumulate. The period with temperature from $+10^\circ\text{C}$ to 15°C is short. It begins on May 2, ends on September 29 and lasts 151 days; 2287°C accumulate. This period gives conditions mainly for potato growing with a medium long vegetation period. In the subtype there predominates the pedogenetic process of claying, i.e. its subtype of acidic brunification.

2.3. Arable landscape of flat foothills, highlands and intermontane furrows

Each landscape type is situated in different altitude a.s.l. Common for the subtype is the great inclination. The average slope gradient ranges around 10° and the relative altitude attains on average 248 m.

The landscape is ranged to the coldest and wettest areas of Slovakia. The continuous frost begins already in the first decade of December and ends in the first decade of March. This long winter period affects also the vegetation period which begins on average on April 13 and ends on October 24. It lasts only 195 days and 2324°C accumulate during this period. Short is also the period of temperature above $+10^\circ\text{C}$. It begins on average on May 13 and ends on September 22. For the 134 days of this period 1861°C accumulate. The period with average daily temperatures above $+10^\circ$ does not even occur in the intermontane furrows. It is noted only in the highlands and on flat foothills. This landscape is characteristic for the excess of precipitation. The precipitation exceeds the moisture need in all months and for all plants. The potatoes need on average 287 mm of rainfall, however, the precipitation during the vegetation period attain the average sum of 472 mm.

In the subtype landscape there predominates the pedogenetic process of claying, i.e. the acidic brunification and the slightly acidic humus podsolization.

V. CONCLUSION

The presented work represents a new objective view on the arable landscape of Slovakia. The work is of a complex character. It evaluates the arable landscape from the standpoint of three basic components: relief, climate and soils. It does not represent the evaluation of the landscape, but the delimitation into homogeneous units, in which similar yields of agricultural crops should be attained. For this reason the work is important for the agricultural planning and managing practice.

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