The Alumni response to the expanded Monadnock format was very heartening. The overwhelming majority welcomed the innovation of student articles, and found the issue extremely interesting. The editors wish to thank the Alumni for their support, and hope that this issue will be equally well received.

It is perhaps appropriate to examine the role of The Monadnock at this time. No longer can it be regarded simply as a newsletter, though that function is retained in an expanded form. The addition of articles written by present graduate students undoubtedly serves to acquaint our Alumni with current topics of research and interest in the School. In that sense it now promotes a closer contact between the present school and its graduates. It is hoped that the present format will now become a regular feature of the magazine and that interest will continue to grow both in the Workroom and among our Alumni.

The editors would like to express their thanks to the many individuals who have contributed towards the production of this issue. A special vote of thanks must be accorded to Nikki Smith, upon whose shoulders fell the considerable tasks of typing and correcting the material contained in this Monadnock. Without her help, publication would be a still distant prospect.

R. S. Andrew
D. A. Smith
Editors

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GEOPHYSICAL ANALYSIS AND WEATHER MODIFICATION

Lee E. Phillips

The traditional role of the geographer has been to evaluate the relationship between man and his environment. Recently, developments in weather modification research have changed the mode of thought concerning the effect of weather and climate on human activity. Because of the tremendous amount of climatological study that is necessary to gain even a partial understanding of atmospheric processes and because of the refined techniques of benefit-cost analysis that are needed to determine resource allocation, the geographer has discovered that his position of leadership in weather and climate study has been taken by the meteorologist and by the economist.

Keeping this in mind, we must ask a basic question—how can geographic analysis, in this age of specialization and coordination of disciplines, contribute to the study of weather modification? In this report an attempt will be made to answer the question by examining some of the past literature on climate and weather contributed by geographers, citing examples from current studies as to the type of analysis that is needed, and defining the weather modification fields in which geographic methods are best suited.

Trends in Geographic Literature on Climate and Weather Since 1910

Professional studies in Geography on the effect of climate and weather, except for the decade 1928-1937, have declined steadily during the past fifty years (Figure 1). Reasons for this decline can only be hypothesized; however, the reaction against the environmental determinist doctrine that prevailed until the mid-1920's and the increasing attention to the human dimension in geography seem paramount in explaining the relative lack of interest in climatic factors. However, this should not be construed to mean that geographers have relegated weather and climate to the background because most geography texts and articles devote a large portion of introductory material to these factors and regard them as important influences on human affairs. What this means for the purpose of our study is that geographers have given climate an unassailable position and have described temperature, precipitation, wind, etc., in general terms, especially in regional studies.

In a review of three American geographic journals, the trend in thought related to climate was found to be composed of two different approaches. One was the deterministic view, which regarded climatic factors as one component of the aggregate environment that dictates man's role on earth. Another was the possibilistic view, which emphasized human energy in shaping the environment. During the past half century, there is evidence of a continuing interest in climatology and measurement of weather elements. However, the early interest in pure description, measurement, and mapping of
weather phenomena has been replaced by efforts to classify, explain, and establish theories. This change in attitude, from passive description to attempts at understanding, and eventually doing something about the weather, is an example of the positive position which geography can, and must, take before a significant contribution to weather modification can be made.

The past literature includes little of the type of study that is needed today but several articles are important, either for their methodology, subject material, or foresight.

On the physical side of the ledger, original contributions to the field of climatology include the work of Stephen S. Visher and C. F. Brooks, whose correlation, classification, and explanation of meteorological data facilitated exploration into the atmospheric frontier. Climatological studies (dynamic, synoptic and complex) associated with Bergeron, Austin Miller, Hare, Borchert, Koppen, Thornthwaite, and Fedorov have sought to explain climate and weather by theoretical, empirical, and objective means and they stand as reminders of the close connection between physical geography and meteorology.4 Mckie's use of a three-dimensional weather map in 19295; Griffith Taylor and Vischer's use of climate isopleths to show the influence of one control variable;6 J. E. Church's 'snow sample' to determine the water content of a given area of snow in 1933 to forecast run-off is the best method available; and the technique used to try to solve a problem that is still not resolved; and Yun Chang's efforts to determine paleo-climatic conditions in China by tree ring analysis8 are examples of original contributions involving methodology.

A recent article by Leslie Curry notes one of the problems of the geographer—estimating climatic change and its effects.9 He cites the problem of understanding process and the fact that the model building of random change does not correspond with the customary probability thinking about change. Also, a significant attempt by John Leighly to deduce profiles of air temperatures normal to coastlines is the type of study that is applicable to all coastal regions and a step in the right direction for solving the puzzle of circulation patterns in land-water zones.10

Since the research on weather modification has rapidly been transformed from basic scientific inquiry to the estimation of practical application,11 several of the past contributions by geographers concerning the effect of climate on regional growth and economic activity are worthy of mention. W. G. Reed and H. R. Tolley discuss the private benefit-cost decision of the farmer and the risk of loss from unfavorable weather.12 In 1917, Eugene Van Cleef surveyed the influence of weather on street-car traffic in Duluth, Minnesota, noting the traffic reducing capacity of various 'weather units' and the corresponding dollar loss on days of decreased traffic.13 This study is most significant for its precise measurement technique, its foresight, and its value in estimating the economic benefits or disbenefits from weather. Although geographers have generalized about the effect of weather and climate, few have given an incisive look into the problem of actually measuring net benefits and costs.

Other significant pieces include: (a) Mckie's first mention of the weather modification possibility in a geographic journal; (b) the importance of tailoring weather forecasts to user needs; (c) Ackerman's study on the effect of man on nature and the artificial extension of citrus cultivation into temperate zones in an effort to gain proximity to urban markets; (d) the demand factor as the chief determinant of ski geography in New England; (e) the estimation of agricultural hail damage in the United States; (f) the economic and social effect of a severe winter in the Great Plains; and (g) the approach used by Leslie Curry to evaluate the economic timing mechanism, which is a function of climatic factors, and to construct climatic calendars for different industries based on time loss due to weather.14

Geographers have done little work on the social and physiological effects of climate since the Huntington era, excepting the studies of the tropics by Bates and Gourou and the physiological studies for military and civilian affairs by Douglas H. K. Lee.15 The political ramifications of climate and weather have received virtually no attention from political geographers since 1947.16 And, in regional studies, which are perhaps the best medium for analyzing the spatial consequences of weather modifications, geographers have given little indication that climate and weather elements are significant in influencing regional development and urban growth.17 The interdisciplinary approach to regional analysis such as is now practiced in the water resources field is the type of study that can best untangle the maze of problems inherent in weather research. We must first consider these unique problems and then propose the role of the geographer in solving them.

Problems of Weather Modification Research

Everyone is an authority on the weather, or believes so, because it directly affects the daily behavior and activity of us all. That is why tampering with the weather is such an unenviable task—each alteration may have unforeseen, far-reaching effects, good for some and bad for others. This problem of 'externals' and potential large-scale disbenefits is but one of the many difficulties involved in weather modification. A few of the other problems can be summarized:

1. There is a lack of knowledge about atmospheric processes; consequently, before weather modification becomes practical, a considerable amount of physical data and empirical testing on a broad sample basis must be done. The natural variation of weather elements necessitates such experimentation to learn the true effects of modification in different regions and for various weather types. At the same time, the limitation of peculiar weather phenomena to certain times of the year places a limit on the amount of experimentation.18

2. The concern with the possibility of upsetting a natural system (hydrological or ecological) even though urbanization and agriculture are currently modifying these systems, means that attempts to alter a major component in the natural framework must proceed with caution.

3. Benefit-cost analysis is the most feasible method of estimating the economic value of modification at present, but externalities, intangible benefits
and costs, and economic effects occurring within an area are difficult to measure. With simulation methods these difficulties are reduced; however, the problem of available alternatives, such as preventive measures, relocation, insurance, or improved forecasting, makes detailed analysis extremely time-consuming and tedious.

4. Often there is a long gestation period for many projects between investment and return and between research and payoff.  

5. There is a problem of how much authority should be delegated to the Federal government, which governmental agencies should participate in the program, and how various disciplines should be coordinated in a comprehensive survey.  

6. Because everyone is directly connected with the weather, as analysis of what people think about efforts to change it is very significant. Perception varies with age, educational level, economic status, and region and is important in determining the adoption rate of innovation as well as the level of effort needed to educate the general public before modification begins.  

7. The legal problems of modification (state, national, and international) often constitute an overwhelming obstacle to rational policy.  

8. Finally, the strategy and priorities of a developmental plan for research are difficult to determine. Questions arise as to the type of study which should be promoted and the regions which can most benefit from weather modification. There is a need for forecasts and a strategy of determining future risks. However, we must take care not to be too future-oriented. For, as James Crutchfield mentions in an article concerning weather modification research, proper allocation to present, and practical, activities is as important as preparing for the future.  

Gaps in Geographical Study and the Type of Research that Must Be Done

In a recent article on river basin development for the Mekong Delta, Gilbert F. White drew up a plan of study for geographers mentioning the type of study that geography should contribute and the work that had already been done in the field of resource management. In a diagram of his model (Fig. 3) we shall see how the system works. However, whether this particular model is applicable to weather modification research is subject to question. Range of choice is comparable in both fields although little has been written about programs to modify weather since the science is so recent. A resource estimate can be equated with the physical capacity to modify weather. Technology is self-evident and applicable in both instances. Economic efficiency represents benefit-cost analysis and social guides indicate political, legal, and perceptive implications. Spatial linkages mean externalities on a regional basis, but this concept could be best evaluated in a methodology and economic efficiency categories.

A better approach would be to consider the following categories: (A) Method of Analysis, (B) Effects (physical, capacity, economic, social, physiological and biological), (C) Research and Payoff, (D) Public policy, and (E) Strategy of development. Technology and efficiency will be considered under (E).

4. Methodology

The method of analysis that geographers should cultivate is a precise statistical system that is objective but not so mechanical that it loses the human touch and the feeling for the environment that is so much a part of the geographical tradition. The synthesizing of the physical and the human in weather modification is a gap that has not yet been filled and the capabilities of geography in transcending rigid disciplinary limits places the science in a unique position of being able to fulfill this role. However, synthesis is not synonymous with generalization. The geographer must use the precise analytical tools available to him (benefit-cost analysis, input-output models, simulation) or devise some of his own (sensitivity indexes, etc.). Weather sensitivity indexes as shown by Hulbs are a method of estimating the potential benefit from a certain degree of weather modification.  

Another approach is to ascertain what degree of weather modification is desirable and then determine the effects, possibly by assigning a weather parameter value to be integrated with an input-output model. The risk involved under uncertainty can be calculated with the aid of a hypothetical damage potential model, or by consideration of the private and public benefits and costs that would accrue from a given decision.  

So often geographers have devoted much effort to describe the damage caused by severe storms or freak weather conditions that create havoc among farmers and businessmen. However, the aggregate costs are usually not mentioned and the adjustments that are recommended are often so general as to be meaningless. The precise costs must be included to figure potential risk assuming weather probabilities, and the alternatives must be set out in a way that facilitates comparison.  

Finally, there is a question involving space. What areal unit should be given the most attention? Climatologists would say that the hemispheric and continental scale is most significant; urban geographers, the city; and regional geographers, the natural region. All of these are necessary; however, there should be more effort at the local and small-scale regional levels similar to studies of river basin development. Researchers often encounter difficulties in obtaining data but the effect of weather on a regional economy and social structure is the type of study that is urgently needed. The American Association for the Advancement of Science studies are an example of integrated regional surveys which make notable use of geographical contributions.  

B. Effects

1. Physical. Although meteorological studies have become sophisticated in the past ten years, much work in understanding cloud physics must still be done. Most of the research effort in weather modification since the initial attempt at cloud seeding in 1946 has been directed toward physical problems--however, we are just beginning to scratch the surface.
The only two modifications that are now practical are the dispersion of supercooled fog and the augmentation of winter orographic rainfall, plus the inducement of rain in small quantities in tropical cumulus clouds.30 Other modifications in order of the potential feasibility are: dissipation of warm fog, hail suppression, lightning suppression, inducement of rain in convective systems, hurricane and tornado suppression and/or diversion and large-scale climate modification.31

2. Economic. The role of the geographer in evaluating the economic effects of weather modification lies in four related topics: the sensitivity of different activities to the weather, measurement of impacts, strategy of development, and the evaluation of alternatives to modification.

A) Sensitivity. The anticipated benefits from modification must be based on a weather sensitivity analysis of different economic activities. This can be accomplished by measuring the loss due to the weather or by evaluating the expected hazard of various degrees of weather. Because most firms do not keep accurate records of financial losses due to adverse weather, much work remains to be done.32

B) Measurement. Geographers should attempt to refine benefit-cost analysis to determine whether this technique is the best method for analyzing weather modification.33 Also, the efficacy of input-output models in studying weather influence should be questioned.34 Finally, an attempt should be made to evaluate decision making under conditions of risk and uncertainty. Little work has been done in measuring impacts, therefore collaboration with economists in closing this gap would be desirable. A major problem associated with the above is the difficulty of estimating potential disbenefits, relocation, income redistribution, and adverse public opinion incurred as costs of modification.

C) Economic Strategy. Ackerman has introduced a strategy of economic analysis that has received minimum attention since 1957 because of the priority given physical research. He mentions three levels on which analysis should proceed:

1. the economics of near-future practical application;
2. the economic opportunity for the application of known techniques of weather modification;
3. economic considerations related to the character and movement of continental air masses.35

All this is a way of stating that a balanced approach should be maintained with allocation of funds to each project according to its overall economic value.

D) Alternatives to Weather Modification. The type of analytical method used in studies of weather forecasting by the Rand Corporation and the U.S. Weather Bureau are suggestive of the type of approach that might be used to evaluate weather modification. The identification of user groups, responses of these groups to forecasts, and improvements in weather information under uncertain conditions help to formulate a model that is universally applicable.36

The awareness of alternatives is important to decide where benefit-cost analysis should be applied. Here the training of the geographer which transcends specialized study is extremely effective.

3. Social, Biological, Physiological. Studies should be made on the physio-psychological effects of weather on man for determining efficiency, racial character, military operations, clothing and housing preferences, and possible systems distortion. Similar studies should be made for vegetation and animal life. This will require full cooperation between social and natural scientists and the support of professional groups.37 Studies of this nature can perhaps be integrated with perception analysis to judge whether opinion is the result of physical or social phenomena.

C. Research and Payoff

We must gather criteria to answer the question of what kinds of research should be supported. The Research and Payoff model of two geographers, R.W. Kates and W.R.D. Sewell, represents a possible method of answering this question.38 Jack Thompson has mentioned a method for evaluating payoffs39 and the type of research in industrial economics (location analysis, community and regional economic analysis, market research and economic feasibility studies) that includes geographic problems is exemplified by the work of the University of Denver Research Institute.40

D. Public Policy--Legal and Political Implications

With the cooperation of lawyers and public officials, political geographers can evaluate the problems of state, national, and international authority in limiting weather modification schemes as well as estimating the difficulties from unforeseen externalities that cross political boundaries.41

E. Strategy of Development

In a comprehensive, balanced approach to weather modification, interdisciplinary cooperation is the best policy. Each discipline is proficient within its area of study and each has an ideology peculiar to it. Conflict may arise and compromises must be made in view of numerous problems and technicalities. The role of the geographer in this context seems to lie in coordination for his view of the world is the only one which corresponds to the overall problems inherent in modifying the weather. Integrated with the environment yet so close to human problems, he is able to associate with both—helping to raise living standards and increasing man’s ability to control his own destiny.
FOOTNOTES


2. Ellsworth Huntington, *Main springs of Civilization*, New York: John Wiley and Sons, 1945, is the classic example of environmental determinism and his original thought, though controversial, on the relations of climate and man led the way to interest in climatic elements.


4. C. W. Thornthwaite, "Climate and Moisture Conservation," *Geographical Review* (Vol. 37, 1947), pp. 87-101. Work with rainfall and potential evapotranspiration in an effort to classify regions and establish water-budgets. Although criticized for the lack of local variations and numerous types in his scheme, his work has been the only original geographic contribution to climatology and water resource studies combined.


19. There is a wealth of material on the physical capacity to modify the weather with the most illuminating being: National Science Foundation: *Weather and Climate Modification--Problems and Prospects* (Washington, D.C.), 1965.


29. Examples of precise costs and hazards are included respectively in: Stuart G. Bigler, *Tornado Damage Surveys--the Dallas Tornado of 2 April 1957* (College Station: Texas A & M Department of Oceanography and Meteorology), August, 1957.


30. Byers, op. cit., Chapter II.


32. Several sensitivity studies of considerable interest are:


34. Edward A. Ackerman, "Design Study for Economic Analysis of Weather Modification," op. cit.

35. Ibid.

36. The Rand Corporation studies include:


37. Studies such as those by the Quartermaster Climatic Research Laboratory, Douglas H. K. Lee, American Institute of Physics and the Ecological Society of America are the foundations of this type of analysis.


FUERTE RICO MAP ANALYSIS PROJECT

R. Muncaster and H. McPhinley

This paper describes two kinds of activities undertaken as preparation for the geography field camp in Puerto Rico conducted during the January 1967 independent study period. These activities were directed by Dr. Terence Seed, Visiting Assistant Professor of Geography, and Assistant Professor George McCleary. Participants included the entire group of NOA Institute geographers and the graduate students participating in the field course in geography. The project is unique in that it represents the first attempt on the Clark University campus to use the computer as a mapping tool.

In order to develop a series of hypotheses as a basis for field investigation, landscape features were sampled from the large-scale (1:20,000) topographic maps available for northeastern Puerto Rico (most of these sheets were produced between 1957 and 1964). Measurement of the features was the first activity. Each map was divided into a grid pattern of kilometer squares to be used in the sampling process; the grid was based on the Puerto Rico 10,000 meter plane coordinate system. The sample area comprised 1587 square kilometers in the northeast corner of the island in the vicinity of the field camp. (Figure 1)

The elements selected for sampling were:

a. road network density
b. Structure density
c. Cluster density
d. Number of structures per cluster
e. Relief and slope

Sample values for the elements were entered on a Fortran coding form for punching on cards. The road network density is a simple length measurement of all roads within the grid cell, expressed in hundreds of meters of road per cell. Structure density, a surrogate for population density, is a count of the number of structures shown on the map for each grid cell. Similarly, cluster density is a count of the number of clusters in each grid cell; for this purpose a cluster is defined as a group of at least five structures, none of which is more than 50 meters from its nearest neighbor. The number of structures per cluster was determined for the seven largest clusters in each cell. Because many of the grid cells contain areas designated as urban on the map (individual houses are thus undifferentiated), some clusters contain estimates based on the percentage of the cell shown as "urban" and a value has been assigned for the density of structures in such areas.

1 This arbitrary definition of cluster was developed with the assistance of Professor James Blaut, who has had wide field experience in Puerto Rico.

Determination of the most useful indications of slope and relief proved to be a difficult task. Consequently, four different measurements were made: the difference in elevation between the highest and lowest contours within the grid cell (relative relief); the horizontal distance between the highest and lowest elevations; total number of contours intersected by two diagonal lines crossing the grid cell; and a measure of slope in degrees at four sample points within the grid cell.

Although the data were gathered in advance of the field camp period, analysis and mapping of the data were not completed in time for use in the field because of delays encountered in the computer processing of the data. Therefore, this paper presents a sample of the results rather than a comprehensive summary of the project. Two types of maps will result from the project: one type will show the distribution of each of the elements measured; a second, and more extensive, set will portray residuals from simple correlations of paired sample values, i.e., road density vs. structure density, structure density vs. relief, etc.

In order to reduce cartographic effort, it was decided to have all the nearly one hundred maps which are to be produced prepared by machine. It was found possible to prepare a computer program for the IBM 1620 computer and ancillary equipment that would print selected symbols at desired locations on the print-out sheet, each location representing one grid cell from the original topographic map. Figures 2, 3, and 4 are examples of the maps so produced, and two aspects of these maps should be noted. First, the five value symbols were chosen for their intensity of print which results in distribution being portrayed as varying degrees of the gray scale. Second, a degree of distortion in the map has resulted from the difference between the height and width of the printed cell of the IBM printer. Since the print-out cells are not square there is a small degree of scale variation built into the map (the north-south direction is "stretched" in relation to the east-west dimension).

Since the purpose of this exercise was to produce maps which could be used as a basis for field investigation, the maps were evaluated with regard to their worth as field instruments rather than for their cartographic design qualities. The first maps produced (Figures 2 and 3) provided encouragement to continue the project, for it was felt that both road density and structure density were portrayed quite effectively. Other maps are being produced to show the distribution of cluster density, mean cluster size, and the four measurements of landform.

The map of residuals (Figure 4) which was produced from a linear regression analysis of two variables, in this case road density and structure density, provide an indication of those areas which vary from the hypothesized relationship. Further investigation is required in order to determine the reasons for this variation, either by examination of additional variables in the computer analysis phase or by on-site field investigation.

A secondary part of the program came about as a result of the difficulty in choosing a method for slope measurement. Multiple correlation and factor analysis of the four methods of measurement will be conducted in order to
determine the most suitable method for ascertaining an efficient measure of surface form which can then be applied to subsequent mapping projects.

It is hoped that future field camps will have available to them a series of maps which will enable them to make improved comprehensive plans for field activities in the area under study.

Acknowledgment and appreciation are extended to Mrs. Margaret Bead, who punched the data cards, and to Mr. Alan Press, who wrote the computer program.

REGIONALIZATION OF DANISH AGRICULTURE BASED ON RELATIVE EXPORT CAPACITY

Nico West

In the past agricultural regions have been based on the physical geography and the physiological demands of the plants which were either indigenous to the region or imported cultigens. The introduction of new technologies, and their adoption in association with the development of hybrid plants, has changed certain agricultural land use patterns to such an extent that what were previously identified and recognized as distinct crop areas no longer exist as clearly defined geographical regions, except in the mind of man. This is particularly exemplified in the cotton belt, a term which has long since ceased to be of importance agriculturally.

The problems encountered in regionalizing a given area increase arithmetically as the phenomena to be considered increase. The present paper on the regionalization of Denmark is based on the agricultural export potential by county—a somewhat more selective sector of the industry. By basing the agricultural regionalization of the country on one aspect of the industry, the actual regionalization becomes more meaningful if less encompassing. The present paper is an attempt to develop a methodology based on the ability of the individual counties to produce those products from which the country gains most of its export income. No direct attention has been placed on the traditional aspect of agricultural regionalization, such as soil and vegetation, although these in the final analysis tend to influence the end result.

In 1962 more than 50% of Denmark’s agricultural exports consisted of processed dairy products and other high priced agricultural foods. Since most of these are derived from livestock a regionalization based on the same (hereafter identified as counties) which produced relatively more than the country as a whole, was thought justified. The basic comparisons will be made using the county and national mean production figures expressed in livestock units, feed units, and tons per sq. km. for each of the groups of products deemed significant in the entire realm of Danish agricultural exports.

A SUBDIVISION OF THE AGRICULTURAL ECONOMY

Agricultural products were broken down into four major divisions,


2The overall export of Denmark in 1962 amounted to 7.13 billion D.kr. of which farm products constituted 4.6 billion D.kr. or 65% of the total exports. Det Statistiske Departement, Danmarks Statistiske Aarbog 1963-64, Vol. 68, p. 175, Table 122.
namely, livestock, grains, forage crops, and root crops for industrial purposes. The latter division will be disregarded in the study as very few agricultural products derived from this category are exported.4

**Livestock Division**
- Dairy cows, pigs, and hens

**Grains Division**
- Winter wheat, Spring wheat, barley, oats and mixed grain

**Forage Crop Division**
- Hay and swedes

**Industrial Root Crop Division**
- Sugar beets

Livestock is the most important category in the present discussion, due to the substantial amount of exports derived therefrom. Although few dairy cows and hens are actually exported they are important as sources of the country’s major exports. In dealing with the individual animal units it was assumed that the yield of these, whether in dairy products, eggs or bacon, would not significantly differ from region to region.

Grains were converted into kilo feed units which simplified the computation considerably, as the five grain types were reduced to one.5

Forage crops were maintained without any attempt to convert them into a common denominator. These were made up to two crops, swedes and hay, both of which were converted into tons/sq. km. per county. Neither was there an attempt made to deduce the quantity of grains and root crops consumed by the public, since this was assumed to occur on a fairly uniform scale throughout the country. The relationship between grains for human consumption and grains for animal consumption was also assumed to be fairly uniform. Thus it would not significantly impair the relative importance of the county figures.

**METHODOLOGY**

The great range in size between the smallest and largest county5

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3 The largest item in this category was the production of sugar beet, which forms the base of the country’s sugar industry, little of which is exported. Furthermore, this production is centered in the county of Maribo.

4 One kilo feed unit equals one kilo wheat or rye (either Winter or Spring varieties), or 1.2 kilo oats, or 1.1 kilo mixed grain made up of an equal amount of oats and barley.

5 The range between the size of the counties varies from 441 sq. km. to 4,647 sq. km.
namely, livestock, grains, forage crops, and root crops for industrial purposes. The latter division will be disregarded in the study as very few agricultural products derived from this category are exported. 3

Livestock Division

Dairy cows, pigs, and hens

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Winter wheat, Spring wheat, barley, oats and mixed grain

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METHODOLOGY

The great range in size between the smallest and largest county. 5

was compensated for by converting all production in each of the eleven categories described above into a per county sq. km. average. This figure was arrived at from the following formula:

\[
\text{Pr. sq. km./Co. prod.} = \frac{\text{Total Production of Variable A}}{\text{Area of County in sq. km.}}
\]

In addition to computing the per county production per sq. km. for the eleven categories, the production per sq. km. for the country as a whole was computed following the same procedure.

The next computation transformed the per county average for each variable into a uniform scale by dividing the average for the nation into each category. Depending on the size of the production for a given county, the resulting figure would indicate the intensity of production for any category in a given county relative to the nation as a whole. A figure below 1.0 would indicate the production below the average for the nation, and a figure above 1.0 a production above the average. The relative size of the individual figures indicates the intensity of production of a crop or livestock in a given county. The complete relative production intensity formula (R.P.I.) appears as follows:

\[
\text{R.P.I.} = \frac{\text{Total Production of Variable A in County I}}{\text{Area of County in sq. km.}} \div \frac{\text{Total Production of Variable A in Denmark}}{\text{Area of Denmark in sq. km.}}
\]

The measures of relative production intensity formed the basis for the process of regionalizing the Danish counties according to their export participations. Six classifications were chosen, based upon the hierarchy of the relative production intensity ratios which resulted. The regionalization was based on the degree to which a given county was able to produce: a) livestock, and b) the grains and forage crops characterized here as supporting divisions. This necessitated that a preferential position be given to livestock divisions relative to the grains and forage crops. The classification was based on the following criteria:

a) Export Potential with Two Supporting Divisions

All three divisions (livestock, grains, and forage crops) produce more than the average for the nation.

b) Export Potential with One Supporting Division

Livestock division and one of the two supporting divisions (either grain or forage) are above the nation's average.

c) Export Potential with No Supporting Division

Only livestock division produces more than the average for the nation. The R.P.I. for the two supporting divisions falls below the nation's average.
d) No Potential Export, Two Supporting Divisions

Livestock production falls below, but both supporting divisions produce more than the average for the nation.

e) No Potential Export, One Supporting Division

Only one supporting division (either grain or forage crops) is above the average for the nation.

f) No Potential Export

The average production in all the three divisions falls below the nation's average.

AN EVALUATION

The proposed regionalization of the country (Fig. 1), based on its potential to produce agricultural export products, notably dairy and meat products, differs considerably in methodology and purpose from the regionalizations of the country’s agriculture described by Kampp and Vahl. Both authors base their regions on domestic agricultural criteria, in particular the pedology of the country. The earlier and present regionalizations recognize the distinctively infertile Western Jutland area which herein has been designated as a region with no export potential. The northern and northeastern parts of Jutland are only in a slightly better position agriculturally, both being in the category where one or two supporting crops (either grains or forage crops) are above the nation’s average. The surprise in the present study is in southwestern Jutland, where the forage and feed unit ratio indicates a position above the average. The cause of this lies in the inability of the two counties to convert these products into the more profitable livestock units. This may be further explained through a cultural factor rather than a possible physical limitation of the area. The two counties in question were part of Nordslesvig which was returned to Denmark under the Article 5 ruling of the Versailles Treaty following World War I. A much greater number of state subsidized tenant farms have since been established in this area than in the remainder of the country, a factor which again may explain the low classification given this otherwise fertile area. A parallel explanation to the lower ratio of livestock units may be explained by the marginal agricultural practices carried out while the area was part of Germany during the period extending from 1864 to 1920.

Kampp, A. H., **Landbruggeografiske Studier over Danmark.** C.A. Reitzels Forlag, København, 1939.


Kampp, Ibid., p. 140.
The most fertile counties, comprising areas "above the average" in all three divisions or deficient in only one of the supporting crops, follow closely the more productive areas of the country. These are located in the eastern part of Jutland, all of Fyn and nearby islands, as well as the southern part of Sjaelland. One anomaly is found in Copenhagen County which falls into the category entitled "Export Potential with no Supporting Division." When analyzing the raw data it appears that this is due to the high relative production intensity ratio encountered in the case of hens. The number of hens in Copenhagen County is three times greater than the nation's average, which more than makes up for the deficiencies in the case of pig and dairy cattle categories.

CONCLUSION

The advantage of the present methodology is believed to lie in its attempt to concentrate on one particular aspect of the agricultural economy. In this case the capacity of the different counties was regionalized according to their relative ability to produce those crops or products from which the country gains most of its export revenue. Other regional systems, not necessarily associated with agriculture, could be developed, using appropriate data. A more detailed picture would have been obtained had the statistical unit been the municipalities, of which there are some 1300, instead of the 25 counties used in the present paper. It is believed, however, that this would only have indicated a refinement in the location of the boundaries of the different regions and would not have significantly altered the findings. The present paper is, however, intended as an illustration of a method rather than its product, the agricultural regionalization of Denmark as such.

THE UPI MAPS: HOW MASSACHUSETTS VOTED

Borden Dent, Arthur Paquette, Lewis D. Rosenthal and Professor George F. McCleary, Jr.

The 1966 November general elections in Massachusetts were the center of much attention, both locally and in the nation as a whole.

United Press International approached Clark and its School of Geography with a query: How could the results of the contest between Edward M. Brooke and Endicott Peabody, as well as those of the race for governor, between incumbent John Volpe and Edward McCormack, be portrayed for newspaper readers in cartographic form? It was agreed that these maps should differentiate the results by counties and major cities. The map was to be produced at election return headquarters in Boston during the night of the election.

It was decided to present the election returns on a population chartogram of Massachusetts rather than a map of geographic space. The principal reason for the selection of the population base was that it would convey to readers the preponderance of voters located in Eastern Massachusetts better than would a map showing geographic space. Counties and city areas would be drawn proportional to 1960 total population; hence, Suffolk County would be represented by a space seven times as large as Worcester County, and so on. (A map reader could thus not only see where a contestant received his votes, but also get some notion of the importance of the vote.)

The two maps, when completed the same morning, were immediately handed over to UPI and were transmitted to UPI subscribers that day. At least three newspapers in the state reproduced the Brooke-Peabody map which was, as stated previously, the contest of major interest in the state.
THE GRADUATE SCHOOL OF GEOGRAPHY: 1967

Report from the Director

Last year's message, my first, was devoted essentially to a review of our School's development plan. Because we are still preoccupied with this process, this year's will follow the same theme. Geography at Clark, in the last analysis, will reflect the quality and concerns of its faculty. We are making every effort to add sub-field depth and intellectual strength at the staff level and are pleased to report two new additions for next year: James M. Blewet, Visiting Professor of Geography (for a three-year term), and William Koalsch, Assistant Professor of Geography and History. An additional appointment for the year is J. Richard Poert, whose specialty is economic geography, as Assistant Professor of Geography. A visiting professor of climatology is also anticipated, as we seek to achieve the staffing levels commensurate with the School of Geography's needs and responsibilities.

This year's incoming graduate student body was of high caliber and we are very pleased with those whom we expect to welcome to Clark next fall. One does much of our recent success in attracting high quality students to interested and loyal alumni and are grateful for your efforts. Our ability to support graduate students continues to be of major concern: for 1967-68, we have been awarded three three-year NDAA fellowships, one NSF internship, and four two-year H.E.A. Master's Degree fellowships. All told, we expect to have from 45 to 50 fully-enrolled graduate students in the Workroom next year, and 21 of them will have completely financed fellowships that extend for two to three years and include tuition and generous stipends. We are using university and other funds to support substantial numbers of additional students. In all for 1967-68, we expect to award approximately $80,000 in student stipends, outside of 21 university and 21 federally-financed stipends. There remain serious difficulties in two areas of student support: post-doctoral awards and foreign student stipends. These areas relate to our research needs and to our tradition as a major international center.

Establishment of the Field Camp in Puerto Rico provided a useful cross-cultural training experience and an opportunity to renew friendships with such Clark alumni as Rafael Pico, Elpisoni Dietrich and Pedro Porrillas. This group performed yeoman service in helping to make the camp a success and we expect to return to Puerto Rico next January, probably to a new camp site at Baracoa, thanks to the idea of Prof. Dietrich. Prof. Porrillas served as affiliate Professor for the Field Camp, and Dr. Pico's lectures were widely appreciated.

The new Cartography Laboratory and the remodeled Workroom have "choked down" after the expected "unforeseen" delays and tribulations and are being utilized to the hilt. We remain cramped for space and the University administration is not immune to our needs.

Grants and awards to the School of approximately $200,000 for 1967-68 will permit us to pursue significant research, training and student support activities. These include an NDAA Institute for Professors of Political Geography and an Expanded Teacher Fellowship Program which will bring ten geography teachers and supervisors to Clark next year (jointly with ten history teachers). In a joint program with the Department of History.

Experiments with a new undergraduate course, use of visiting lecturers for special-purpose graduate courses (David Lowenthal, James Buck, Joseph Bivins), reengineering of our M.A. and Ph.D. requirements to achieve greater breadth at the M.A. and greater depth at the Doctorate level, and a major program in Geography and Its Teaching (NDAA Institute for 24 teachers directed by Heavy Wangman) all took place this year.

Colleges who visited Clark as part of the H.E.A. Summer Institute for Southern Colleges included Harold Meyer, James Simons, and Jack Vilemow. We are anticipating having the membership of the Commission on College Geography on campus for the Commission's spring meeting, to augment the ranks of our visitors.

Our program this year was considerably enhanced by the presence of Dr. Terence Reed, a visitor from Australia, whose departure we all regret, and by our staff newcomers, Professors Jeremy Anderson, George McCleary, and James Shuf (who will be with us part-time). Dr. Howard Jefferson is vacating the presidency of Clark University this year, and it is appropriate that Clark Geography alumni be reminded of the warm and unassuming support that he has provided the School of Geography in its most recent development efforts. Dr. Jefferson has fully demonstrated his belief that Geography's future is as much a part of Clark's future as it has been of its past. We are confident that his successor, Dr. Frederick Jackson, who assumes the presidency this July, will be equally supportive of Geography at Clark.

[Signature]
Robert W. Gates

During the summer of 1966 Dr. Gates taught in the NSF Institute held at Clark, and contributed to the NDIA Institute for high school teachers during the regular school year. A number of guest lectures were given at various colleges, including Pennsylvania State University, the University of Denver, the University of North Carolina, Rhode Island School of Design, Ohio State University, and Cornell University.

Dr. Gates served on the NAS-NRC Committee on the Alaska Earthquake and the NCAI Task Group on Human Dimensions of the Atomsphere. In addition, he was President of the Clark Chapter of the Association of American University Professors.

His publications appeared in the Journal of Social Forces, Landscape, and three symposia volumes. Dr. Gates' current research interests are associated with a drought impact study, an environmental perception, and the pre-1940 research on current in preparation include The Human Ecology of the Alaska Earthquake and a volume of natural resources.

Next year Dr. Gates will be a Research Fellow in Natural Resources at University College in Daresalem, under Rockefeller Foundation sponsorship.

Robert B. Snodgrass

During the summer of 1964, Dr. Snodgrass used aerial photography, worked with student assistants on the interpretation of coastal landforms along the Makran coast of West Pakistan. In July he drove to Mexico to visit present geomorphologists working along the Potosi coast and later attended the I.G.U. meetings in Mexico City.

During the fall of 1966 Dr. Snodgrass made preparations for the January field camp in Puerto Rico. That spring he spent in Puerto Rico making arrangements with Pedro Pallota. The three week field excursion to Puerto Rico in January kept the staff very busy. The eleven undergraduate who made the trip worked with Dr. Snodgrass on beach rock found along the coast.

In March, 1967, he received a two-year extension on the contract with the Geography Branch of the Office of Naval Research for study of desert coastal morphology. Field work along the south coast of Iran is planned from July, 1967, through January, 1968.

Also in March, Dr. Snodgrass signed a contract with John Wiley and Sons to prepare an Atlas of World Landforms. This small atlas will accompany leading geomorphology texts such as Shelfar's Physical Geography of Thomson's Principles of Geomorphology. Work on the atlas will begin immediately with completion anticipated in two years.

Publications in 1966 were, with Mohammad Tursafi, 'Vegetation Types in the Las Bela Regas of West Pakistan,' Ecology, Vol. 47, No. 4, Late Spring, 1966, and Physical Geography A Socioeconomic: Las Bela Coastal Study. Technical Report No. 12, Part 2, Coastal Studies Institute, Louisiana State University, April 1, 1966 and Louisiana State University Press, Baton Rouge, 1966, in press with the Annals of the AAG, "Recent Morphological Changes Along the Coast of West Pakistan:

Jeremy Anderson

Dr. Anderson arrived in Worcester in mid-August "fresh" from directing the NDIA summer institute for junior high and high school geography teachers at the University of Maryland. The fall semester was devoted to getting settled, teaching, and assisting Dr. Snodgrass in the organization of the Puerto Rico field camp. The fall independent study period in January was spent in attempting to "rove here" along with Drs. Baint, Snodgrass and Wurzak on 65 students in the wilds of southeastern Puerto Rico. He still marvels that all got safely back to Worcester with no international incidents.

Marvin J. Bowden

Professor Bowden has developed an introductory course for undergraduates and has worked with David Lowenthal and Robert Kates on a bibliography of Environmental Perception. In the Independent Study period, a report was prepared on the probable impact of a limited access highway on the town of Oxford, Massachusetts.

George F. McCleary, Jr.

Since his arrival from the University of Wisconsin in September, Professor McCleary's time and energy have been devoted to the development of an expanded cartographic curriculum; further, new facilities and equipment have been organized (including a modern laboratory and conversion of a portion of the old laboratory to a reproduction center). Classroom activity has been divided between these semester courses in the regular curriculum and two in the NDIA Institute.

Other activity included participation on the Worcester Census Tract Committee, in the Special Media Institute at Michigan State University, and on research into the diagnostic method of thematic mapping (the isochromatic parcelation of land) and on the relationship and application of psychomapping to cartographic design.

James M. Blaut

Dr. Blaut joined the faculty this year after a prolonged period of research in the Caribbean area. As Director of the Caribbean Research Institute, Dr. Blaut is recognized as an expert in the field of Tropics Studies, particularly social and economic development programs. As a member of the Virgin Islands Economic Development Board, his concern has been to secure federal aid to the islands. Dr. Blaut also participated in the planning of two conferences: Second Caribbean Conservation Conference (Barbados, May, 1967) and the Second International Conference on Socio-Cultural Factors in Work and Employment (St. Thomas, Fall, 1967).

During the School's field camp in Puerto Rico, Dr. Blaut took time off to address the Conference on Geography and Planning at the University of Puerto Rico on the subject of "Geography and Social Development."

A new research program on geographic perception in children was initiated this year. Dr. Blaut presented his preliminary results at the Association meeting in St. Louis.

Terence W. Beed

Dr. Beed joined the School as a visiting assistant professor for the academic year 1966-67. He is a graduate of the University of Sydney, Australia, and is currently on a Visitor Exchange program of teaching in U.S. universities. The first year of this program was spent at the University of Lowell, and during the summer of 1966 he was awarded a stipend to attend the N.S.F. Summer Institute on Introductory College Courses in Geography, held at the Ohio State University.

Prior to his departure for the United States, Dr. Beed was Research Manager of News Limited of Australia, a large-scale newspaper, television, and radio organization. His interests lie in marketing geography, and in the second semester at Clark, he offered an unusual research seminar on the geography of mass media. He was also attached to the NDIA Institute, in which he offered urban geography.

Dr. Beed will teach economic and urban geography at the University of California in Berkeley, before his return to Australia by way of Europe in late 1967.

Lewis M. Alexander (M.A., 1949; Ph.D., 1949), Clark is Chairman of the Geography Department at the University of Rhode Island. For the past academic year he has been an Assistant Professor, Research Fellow at Ohio State University, in the Marshall Social Science Program. As part of this program, he has been working with the United States Air Force and the States of the Sea Institute.

Agnes Morgan Allen (M.A., 1934; Ph.D., 1937, Clark) has retired as Dean of the College of Arts and Sciences at Northern Arizona University, where she is now following an eight-week vacation. She has devoted full time to teaching geography. Her department has just begun a major in geography and plans soon to develop a graduate program.

Robert H. Arnold (M.A., Clark 1944) is Assistant Professor of Geography at Illinois State University in Normal. He has almost completed his formal investigation for his doctoral dissertation on Commercial Recreation in the Urban Environment. He hopes to begin writing very soon, although the press of time has become greater since his appointment and planned June wedding to Lynn Waters of Greensboro, South Carolina.

George A. Belzinger (M.A., Clark 1937) lives in Baltimore and is Professor of Geography at Towson State College. This year he has written a chapter on teaching geography in the Outdoor Laboratory for a forthcoming volume, The Teaching of Geography, soon to be issued by the National Council for Geographic Education. His articles on Maryland appeared in both the World Book and the Book of Knowledge last year.

Hans Beeseck (Clark 1934-35; D.Sc.h., Clark 1956) is Professor of Geography and Director of the Institute of Geography at the University of Sarbin. He is also Secretary-General of the I.G.U. and Vice President of the International Council of Scientific Unions. In the last year he has done research in economic geography and regional studies in the Far East and Southeast Asia.

Clyde R. Bolinger (Clark 1929-1930) now lives in Norman, Oklahoma, where he is Assistant Professor of Geography at the University of Oklahoma. Mr. Bolinger's wife, Hazel Guest Bolinger, died May 19, 1966. But he has good news, too: his grand-daughter, Bethan, won the Greater New Orleans Miss America Contest. [With this last, the Workroom] Mr. Bolinger recently published Volume V, Atlas of Sooner Climate.

Donald G. Brandow (Clark 1946-1947) is Chairman of the Geography Department at Morgan State College in Baltimore. During the summer of 1965 he toured Western Europe and portions of the Mediterranean. In the last year he has been a member of the Executive Committee, Maryland State Geography Teachers Association.

Dorothy Honfley Burton (M.A., 1947; Ph.D. 1949, Clark) is a Branch Chief at the Department of Defense. She reports on seeing Dr. Sakiw (Shabab) Buhari (Ph.D. Clark 1931) of New Delhi, India, during his latter's visit to the U.S. and the Toronto meetings last summer. Dr. Buhari was then a team leader of a group of Indian college teachers who were touring the U.S. under the auspices of the Fulbright, N., Institute for International Living.

Robert D. Campbell (Ph.D., Clark 1940) has resigned his position at George Washington University and is now Research President of the National Corporation (Director of RESA Operations) in Arlington, Virginia. He reports that his trip to India involved many side trips, ending with a stop in Indonesia, where Marge Howarth (B.A., Clark 1934) extended tremendous assistance and hospitality. Dr. Campbell's book, Regional Planning for India (written with N. Bath) will soon be published by Asia Publishing House in Bombay.

Harold F. Crewdson (Ph.D. Clark 1951) is Head of the Geography Department at East Stroudsburg, Pa., State College. During the 1965-66 academic year second semester he has been on sabbatical leave, traveling in North Africa, the Middle East and in Southern, Central and Western Europe. He has just employed Bha M. Prater (M.A., Clark 1954) as Associate Professor in his department.
Frederick B. Sanford (D.A., Clark 1949) is a Systems Analyst for Sikorsky Aircraft in Stratford, Connecticut. He is currently researching business games and simulation.

Barbara T. Seydel (M.A., Clark 1963) is a Research Officer for the Providence Redevelopment Agency. She is now living in West Greenwich, R.I., and has three sons at home—Perry, 15; Eugene, 10; and Erik (7).

Gerald W. Schultz (Ph.D., Clark 1964) is Assistant Professor in the Geography Department at Drake University in Des Moines, Iowa. A research grant is providing him the opportunity to study the in- fluence of Great Lakes on Des Moines and Hatchett, Connecticut.

Joseph R. Schwendenman (B.A., 1927; Ph.D. 1941) is Chairman of the Department of Geography at the University of Kentucky in Lexington. He is doing research on "Cold Wave Patterns of Kentucky, Lexington and Orlando, Florida."

Hartley E. Scott (M.A., Clark 1963) is a Geography teacher at Col. E. Brooke Lee Junior High School in Winston, Maryland. He teaches seventh and eighth grade Geography there.

Marjorie Shanks (M.A., Clark 1925) lives in Apache Junction, Arizona, and has been retired since 1964.

Earl B. Shaw (Ph.D., Clark 1939) is Professor of Geography at Armstrong College in Vancleave, Miss. His recent travel includes the Spanish Pacific during July and August of 1964. During December, 1966 and January, 1967 he traveled through the Caribbean by Royal Netherlands Freighter. He has a light teaching load and does research on current world maps.

Ada M. Shawkoy (Ph.D. 1947-48, summer 1952) is Associate Professor and Chairman of the Geography Department at (Mass.) State College in Amherst. She spent June traveling in Europe and traveled for a week in Canada following the Toronto AKG meetings.

James A. Shaw (Ph.D., Clark 1952) is Professor of Geography at the University of Georgia in Athens. He is currently doing research in hydroclimatology and has published an article, "A Set Theoretic View of Koppen's Dry Climates" in the Annals of the American Geophysical Union, Volume 46, Number 2, 1966.

Julia Shipman (M.A., 1923; Ph.D. 1928) is presently retired and living in East Arlington, Vt. She spent last summer traveling in Europe, chiefly in Scandinavia, during which time she took a cruise to the North Cape. "I have now bowed to King Neptune at both the Equator and the Polar Circle."

Robert B. Simpson (M.A., 1933; Ph.D. 1941, Clark) is Visiting Associate Professor of Geography at Dartmouth College.

Helen Boyer Smith (M.A., Clark 1958) is living in Cincinnati, Ohio.

John A. Sobol (M.A., Clark 1949) is Associate Professor of Geography at Memphis State University.

Frank J. Spornick (M.A., Clark 1963) is a Real Estate Representative with Stop & Shop, Inc., in Boston. He reports "nothing significant during the past year."

Karl Stacey (Ph.D., Clark 1951) is Professor of Geography at Kansas State University in Manhattan. He spent the summer of 1965 traveling in Scandinavia and Germany.


John L. Taylor (M.A., 1949; Ph.D. 1957) is Consultant on Territorial and Indian Affairs for the Committee on Interior and Insular Affairs, House of Representatives. Last fall his article, "Indian Land Questions," was published in the Arizona Law Review. He continues his visits to Indian reservations and off-shore Arogo areas of the U.S.

R. Paul Terrell (Ph.D., Clark 1969) is Head of the Department of Geography and Geology at Western Kentucky University, Bowling Green. He has recently welcomed a Clark alumnus, Floyd C. Cunningham (Ph.D., Clark 1930) to his department, former chief of the United States Geological Survey. Dr. Terrell reports that his new program in earth science for teachers is now fully operable. Moreover, he expects to inaugurate a new major graduate program (M.S., and M.A.T.) in Geography, beginning this June.

Grady G. Tucker, Jr. (Ph.D., Clark 1957) lives in Rockville, Maryland, and is Regional Vice President of Larry Smith & Company, a real estate consulting firm in Washington, D.C. Eugene Yee Cloud (Ph.D., Clark 1938) is Professor Emeritus at the Ohio State University. He has published several articles in the past year and presented a paper, "Sokunka-Way of Geography - Some Recollections and Comments," at the Ohio Academy of Science. In March and April of 1966 he traveled through Sweden, Norway, and Denmark. His research on "The 500-Mile Circle" is completed and will be published soon.

Charles B. Varney (M.A., 1963; Ph.D. 1963), Clark, is Professor of Geography at University of Wisconsin in Madison, as well as being Director of the Horace Mann Institute there. He was Director of the NDEA Institute for Advanced Study in Geography last summer.

Paul Varney (M.A., Clark 1950) is Associate Professor of Geography at Pennsylvania State College, Ioway, N.J. He has been awarded a travel grant by the American Philosophical Society to conduct research in Greece and his article on Cyprus appeared in the October, 1966 issue of Social Studies.

Lillian Holland Wallace (B.A., Clark 1941) lives in Westfield, Mass., and has traveled from teaching at Westfield State College.

Robert S. Wagner (Clark, summers 1951-57, 1964-65) is Professor of Geography and Chairman of the Division of Science and Mathematics at Bridgewater College. He has been responsible for establishing a new undergraduate major in Geography and Cartography.

Katharine Thomas Whitemore (B.A., 1950; Ph.D. 1956, Clark) is Professor Emeritus of Geography and Director of Arts and Sciences at State University College at Buffalo. She and Mrs. Cloud have completed the revision of The United States and Canada, an elementary geography text first published in 1937.

David C. Winslow (Ph.D., Clark 1968) is Professor of Geography at Indiana University of Pennsylvania. He is the editor of Geograpy, Earth Science and Technology College Workbook Series, William C. Brown, Co. He is also the editor of Pennsylvania Geograpy and assistant editor of Earth in Motion, an Junior Geograpy, Dr. Winslow was a Visiting Professor last semester at Bloomington (Ill.) State College and is currently doing field work in Puerto Rico centering on urban studies.

A. Joseph Wright (Ph.D., Clark 1951) lives in Washington, D.C., and is Chief Geographer, Environmental Sciences Services Administration. His new book, Our Dynamic World, for colleges, junior colleges, secondary school or junior high school, was released last September by Clinton.
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<th>NAME</th>
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