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Editors' Notes

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

It should be noted that the papers presented here were originally written in response to the requirements of course or seminar work and as such are not intended to be finished pieces of research. With this in mind, comments or questions concerning these articles should be addressed to the individual writer, and no part of them may be reproduced without the permission of that writer.

GEOGRAPHICAL 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 1916

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,[1] 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.[2] 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 Federov[3] 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] McAdie's use of a three-dimensional weather map in 1929;[5] 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;[7] and Yun Chang's efforts to determine paleo-climatological conditions in China by tree ring analysis[8] 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 probabilistic 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) McAdie'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 'externalities' 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 much 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.[19]

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.[20]

6. Because everyone is directly connected with the weather, an analysis of what people think about efforts to change it is very significant. Perception varies with age, educational level, economic status, and region[21] 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.[22] 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.[23]

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 can 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 (B).

A. 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 Hibbs are a method of estimating the potential benefit from a certain degree of weather modification.[24]

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.[25] The risk involved under uncertainty can be calculated with the aid of a hypothetical damage potential model,[26] or by consideration of the private and public benefits and costs that would accrue from a given decision.[27]

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.[28]

Finally, there is a question involving space. What areal unit should be given the most attention? Climatologists would say that the hemispheric and continental scope 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.[29]

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 payoff[39] 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]

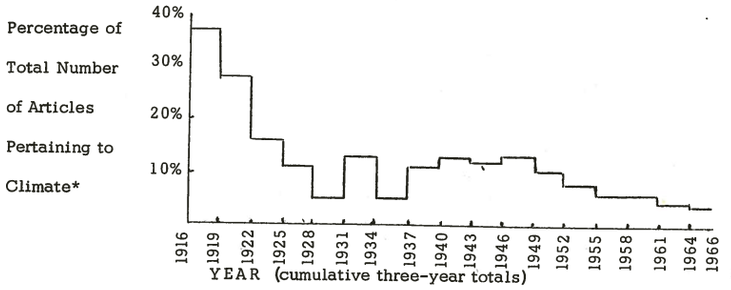
D. Public Policy--Legal and Political Implications

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

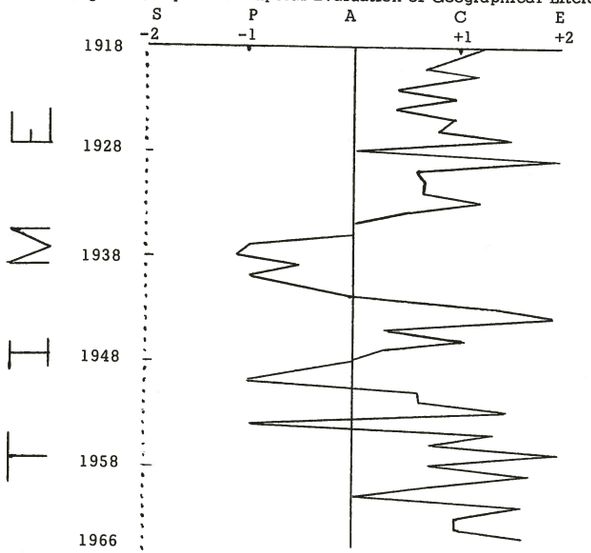
In a comprehensive, balanced approach to weather modification, interdisciplinary cooperation is the best policy. Each discipline is proficient within its area of study and each has an ideology peculiar to it. Conflict may arise and compromises must be made in view of numerous problems and technicalities. 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.

Figure 1. Professional Geographic Literature Devoted to the Effect of Weather and Climate



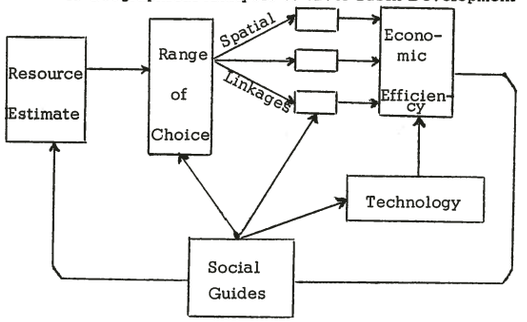
*From major American geographic journals: Annals of the A.A.G., Geographical Review, and Economic Geography since 1925.

Figure 2. Spatial-Temporal Evaluation of Geographical Literature on Climate



Average of numerical rating of subject matter as follows: +2 Hemispheric and Global; +1 Continental; -1 Regional; -2 Local

Figure 3. A Diagram of White's Model of Contributions of Geographical Analysis to River Basin Development*



*From Gilbert White: "Geographical Analysis and River Basin Development" in R.W. Kates and Ian Burton (eds.), Readings in Resource Management and Conservation (Chicago: University of Chicago Press), 1965, pp. 375-390.

FOOTNOTES

1. Annals of the A.A.G., Economic Geography, and Geographical Review.

2. Ellsworth Huntington, Mainsprings 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.

3. Paul E. Lydolph, "Federov's Complex Method in Climatology," Geographical Review (Vol. 49, 1959), pp. 120-145.

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.
F. Kenneth Hare, "Dynamic and Synoptic Climatology," (Vol. 45, 1955) Geographical Review, pp. 152-163.

5. Alexander McAdie, "Daily Maps of World Weather: An Attempt at Three-Dimensional Geography," Geographical Review, (Vol. 19, 1929) pp. 87-93.

6. Griffith Taylor, "Climate and Crop Isopleths for Southern Ontario," Annals of the A.A.G., Vol. 14, No. 1, 1938, pp. 89-97, and S.S. Vischer, "Weather Influences on Crop Yields," Annals of the A.A.G., Vol. 16, No. 4, 1940, pp. 437-443.

7. J.E. Church, "Snow Surveying: Its Principles and Possibilities," Geographical Review, Vol. 23, 1933, pp. 529-563. Problem of determining water content of snow to evaluate cloud seeding experiments in E.T. Beaumont, "Cloud Seeding Analysis in Oregon," Bulletin of American Meteorological Society, Vol. 34, No. 7, September, 1953, pp. 298-304.

8. Chi-Yun Chang, "Climate and Man in China," Geographical Review, (Vol. 36, 1946), pp. 44-74.

9. Leslie Curry, "Climatic Change as a Random Series," Geographical Review (Vol. 52, 1962), pp. 21-32.

10. John B. Leighly, "Profiles of Air Temperatures Normal to Coast Lines," Geographical Review (Vol. 37, 1947), pp. 75-86.

11. Edward A. Ackerman, "Design Study for Economic Analysis of Weather Modification," in U.S. Advisory Committee on Weather Control, Final Report, (Washington, D.C.: U. S. Government Printing Office, 1957) Vol. II, pp. 233-245.

12. W. G. Reed and H.R. Tolley, "Weather as a Business Risk in Farming," Geographical Review (Vol. 2, 1916), pp. 48-53.

13. Eugene Van Cleef, "The Influence of Weather on Street-Car Traffic in Duluth, Minnesota," Geographical Review (Vol. 3, 1917), pp. 126-134.

14. a) Alexander McAdie, "The Commercial Importance of Fog Control," Geographical Review (Vol. 21, 1931), pp. 91-100.
b) Willis Ray Gregg, "Meteorological Service for Airways in the U.S.," Geographical Review (Vol. 20, 1930), pp. 207-223. See the following for a more detailed analysis of tailoring forecasts to the consumer: Richard R. Nelson and Sidney G. Winter, Jr., Weather Information and Economic Decision: A Preliminary Report. Santa Monica: Rand Corporation, 1960; L. L. Kolb and R. R. Rapp, The Utility of Weather Forecasts to the Raisin Industry, Report No. 2748 NASA, Rand Corporation, 1961.
c) Edward A. Ackerman, "Influences of Climate on the Cultivation of Citrus Fruits," Annals of the A.A.G. (Vol. 28, 1938), pp. 289-302.
d) Albert S. Carlson, "Ski Geography of New England," Economic Geography (Vol. 18, No. 3, 1942), pp. 307-320, same as below:
e) Hoyt Lemons, "Hail in American Agriculture," (Vol. 18, No. 4, 1942), pp. 363-378.
f) Wesley Calef, "The Winter of 1948-49 in the Great Plains," Annals of the A.A.G. (Vol. 40, No. 4, 1950), pp. 267-292.
g) Leslie Curry, "Climate and Economic Life: A New Approach," Geographical Review (Vol. 42, 1952), pp. 367-383.

15. Marston Bates, Where Winter Never Comes. New York: 1952, and Pierre Gourou, The Tropical World, New York: 1961. Douglas H.K. Lee, "Clothing for Global Man," Geographical Review (Vol. 39, 1949), pp. 181-213.

16. S. F. Markham, Climate and the Energy of Nations, New York, 1947.

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H. E. Landsberg, "The Climate of Towns," in Man's Role in Changing the Face of the Earth, Chicago: 1956, pp. 584-606.

18. 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.

19. Robert W. Kates and W. R. D. Sewell, "The Evaluation of Weather Modification Research" in Sewell (ed.), Human Dimensions of Weather Modification, pp. 347-362.

20. The general consensus is that the Federal government should take an active role in weather modification to promote basic research, allocate funds, serve as a receptacle of information and prevent irresponsible acts of modification. All agencies should participate with the coordination and supervision of the Interagency Committee for Atmospheric Research.

21. W. R. Derrick Sewell and J.C. Day, "Perception of Possibilities of Weather Modification, and Attitudes Toward Government Involvement" in Sewell (ed.), Human Dimensions of Weather Modification, pp. 329-346.

22. Ackerman, "Design Study for Economic Analysis of Weather Modification", p. 233-245.

23. James A. Crutchfield, "Investment in Weather Modification Research: Objectives, Incentives and Applications," Human Dimensions of Weather Modification, pp. 363-372.

24. James R. Hibbs, "Evaluation of Weather and Climate by Socio-Economic Sensitivity Indices" in Human Dimensions of Weather Modification, pp. 91-110; also Robert L. Hendrick, "An Outdoor Weather-Comfort Index for the Summer Season in Hartford, Connecticut," Bulletin of the American Meteorological Society (Vol. 40, No. 12, 1959), pp. 620-624.

25. For detailed information on two approaches to weather modification: G.F. White, "Approaches to the Study of Human Dimensions of Weather Modification" in Human Dimensions of Weather Modification, pp. 19-26.

26. Delbert C. Ogden, "Ecònomic Analysis of Air Pollution," Land Economics, Vol. 62, No. 2, May, 1966, pp. 137-148.

27. Ivars Gutmanis and Lester Goldner, "Evaluation of Benefit-Cost Analysis as Applied to Weather and Climate Modification," Human Dimensions in Weather Modification, pp. 111-126.
R. R. Rapp and R.E. Huschke, Weather Information: Its Uses, Actual and Potential (Rand Corporation, 1964).

28. 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.
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Robert L. Hendrick and Don G. Friedman, "Potential Impacts of Storm Modification on the Insurance Industry," Human Dimensions of Weather Modification, 1966, pp. 227-245.

29. Carl Hodge (ed.), Aridity and Man. Washington, D.C.: A.A.A.S., 1963 and Gilbert F. White (ed.), The Future of Arid Lands (A.A.A.S., No. 43), 1956.
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Consoir, Townsend and Associates, Engineering Report: General Analysis and Improvement Plans for New Water Supply Facilities, City of Appleton, Wisconsin, October, 1964.

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

31. P. H. Wycoff, op. cit., pp. 27-39.

32. Several sensitivity studies of considerable interest are:
W.R.D. Sewell, ed., Human Dimensions of Weather Modification (Chicago, 1966), chapters by Beckwith, Castle and Stoevener, Lendrick and Friedman, Von Beckert and Browne, and Eberly.
J. A. Russell and others, "Industrial Operations Under Extremes of Weather," Meteorological Monographs, No. 9, May, 1957.
Traveler's Research Center, The Operational and Economic Impact of Weather on the Construction Industry of the United States (Hartford, March, 1965).
U. S. Weather Bureau, A Preliminary Analysis of the Effects of Weather on Airport Traffic Flows, Airport Capacity and Acceptance Rates (F.A.A., Washington, D.C., 1961).
Center for Agricultural and Economic Development, Weather and Our Food Supply (Iowa State University, 1964).
Mary T. Petty, "Weather and Consumer Sales," Bulletin of the A.M.S. (Vol. 44, No. 2, February, 1963).

33. Ivars Gutmanis and Lester Goldner, "Evaluation of Benefit-Cost Analysis as Applied to Weather and Climate Modification," Human Dimensions of Weather Modification, pp. 111-126.

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

35. Ibid.

36. The Rand Corporation studies include:
"Weather Information: Its Uses, Actual and Potential," 1964.
"The Utility of Weather Forecasts to the Raisin Industry," 1961.
"Weather Information and Economic Decision," 1960.
"A Case Study in the Economics of Information: The Weather Forecasting System," 1963.
"Economic Gains from Storm Warnings: Two Florida Case Studies," 1962.
U. S. Weather Bureau, The National Research Effort on Improved Weather Description and Prediction for Social and Economic Purposes. Washington, D.C.: U. S. Weather Bureau, 1964.

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.

38. R. W. Kates and W.R.D. Sewell, op. cit., pp. 347-362.

39. Jack C. Thompson, "Weather Decision-Making--The Pay-off," Bulletin of the A.M.S. (Vol. 44, No. 2, February, 1963).

40. Report of the Industrial Economics Division (Denver, Colorado: The University of Denver Research Institute).

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PUERTO RICO MAP ANALYSIS PROJECT

R. Muncaster and H. McPhilimy

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 Beed, Visiting Assistant Professor of Geography, and Assistant Professor George McCleary. Participants included the entire group of NDEA 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.[1] 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 intercepted 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 grey 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.

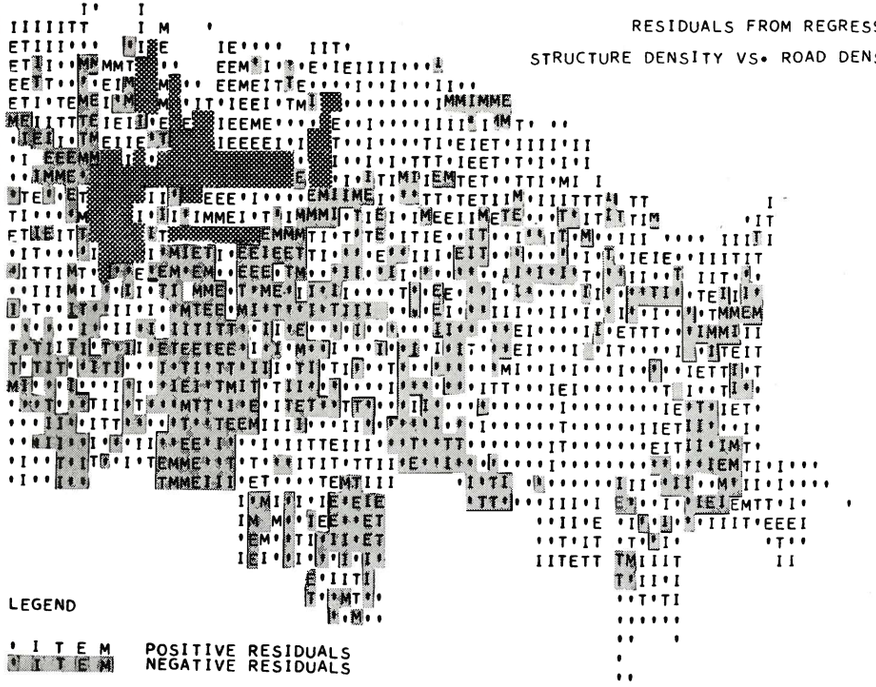
The map of residuals (Figure 4) which was produced from a linear regression analysis of two variables, in this case road density and structure density, provide an indication of those areas which vary from the hypothesized relationship. Further investigation is required in order to determine the reasons 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

PUERTO RICO MAP ANALYSIS

RESIDUALS FROM REGRESSION

STRUCTURE DENSITY VS. ROAD DENSITY



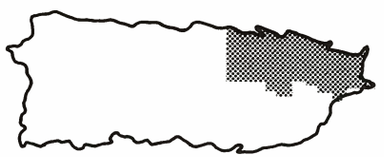
LEGEND

' I T E M POSITIVE RESIDUALS
' I T E M NEGATIVE RESIDUALS

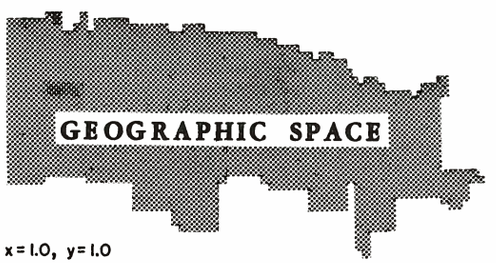
' = 0 TO 14.9
I = 15 TO 29.9
T = 30 TO 44.9
E = 45 TO 89.9
M = 90 AND OVER

▒ EQUALS BUILT UP URBAN AREA

4



LOCATION OF STUDY AREA



x = 1.0, y = 1.0

x = 0.6, y = 1.0

1

PUERTO RICO MAP ANALYSIS

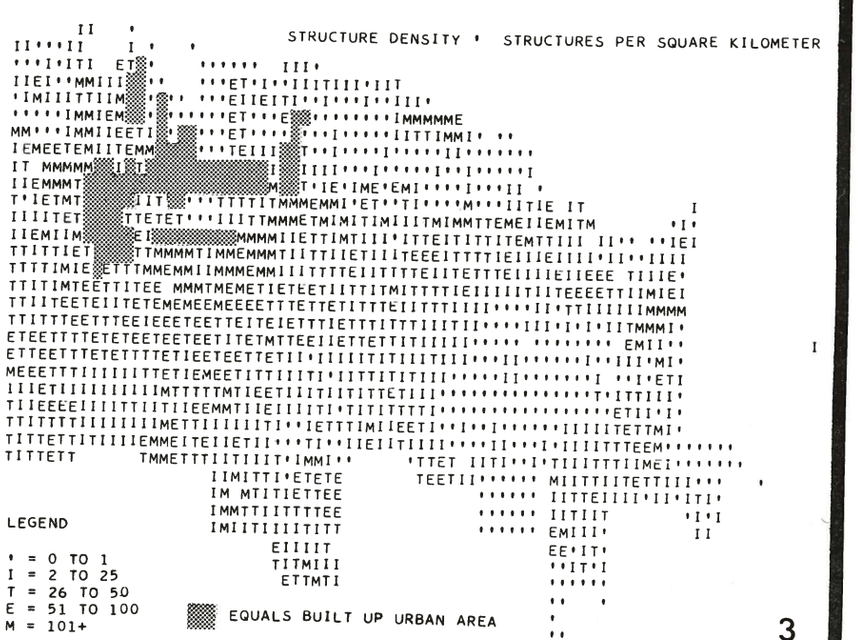
ROAD DENSITY ' HUNDREDS OF METERS PER SQUARE KILOMETER

LEGEND

' = 0
I = 1 TO 5
T = 6 TO 10
E = 11 TO 20
M = 21 +

2

STRUCTURE DENSITY ' STRUCTURES PER SQUARE KILOMETER



LEGEND

' = 0 TO 1
I = 2 TO 25
T = 26 TO 50
E = 51 TO 100
M = 101+

▒ EQUALS BUILT UP URBAN AREA

3

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 Beed, who punched the data cards, and to Mr. Alan Press, who wrote the computer program.

REGIONALIZATION OF DANISH AGRICULTURE BASED ON RELATIVE EXPORT CAPACITY

Niels 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.[1] 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 vegetations, 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.[2] Since most of these are derived from livestock a regionalization based on those amter (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,

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[1] Weaver, John C., "Changing Patterns of Crop Land Use in the Middle West," Economic Geography, Vol. 30, No. 1, January, 1964, p. 1-47.

[2] The 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.[3]

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.[4]

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 deduct 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 county[5]

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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.

was compensated for by converting all production in each of the 11 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:

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

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 final 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.

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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 fowl produce, differs considerably in methodology and purpose from the regionalizations of the country's agriculture described by Kampp and Vahl.[6] 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 northwestern 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[7], 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.

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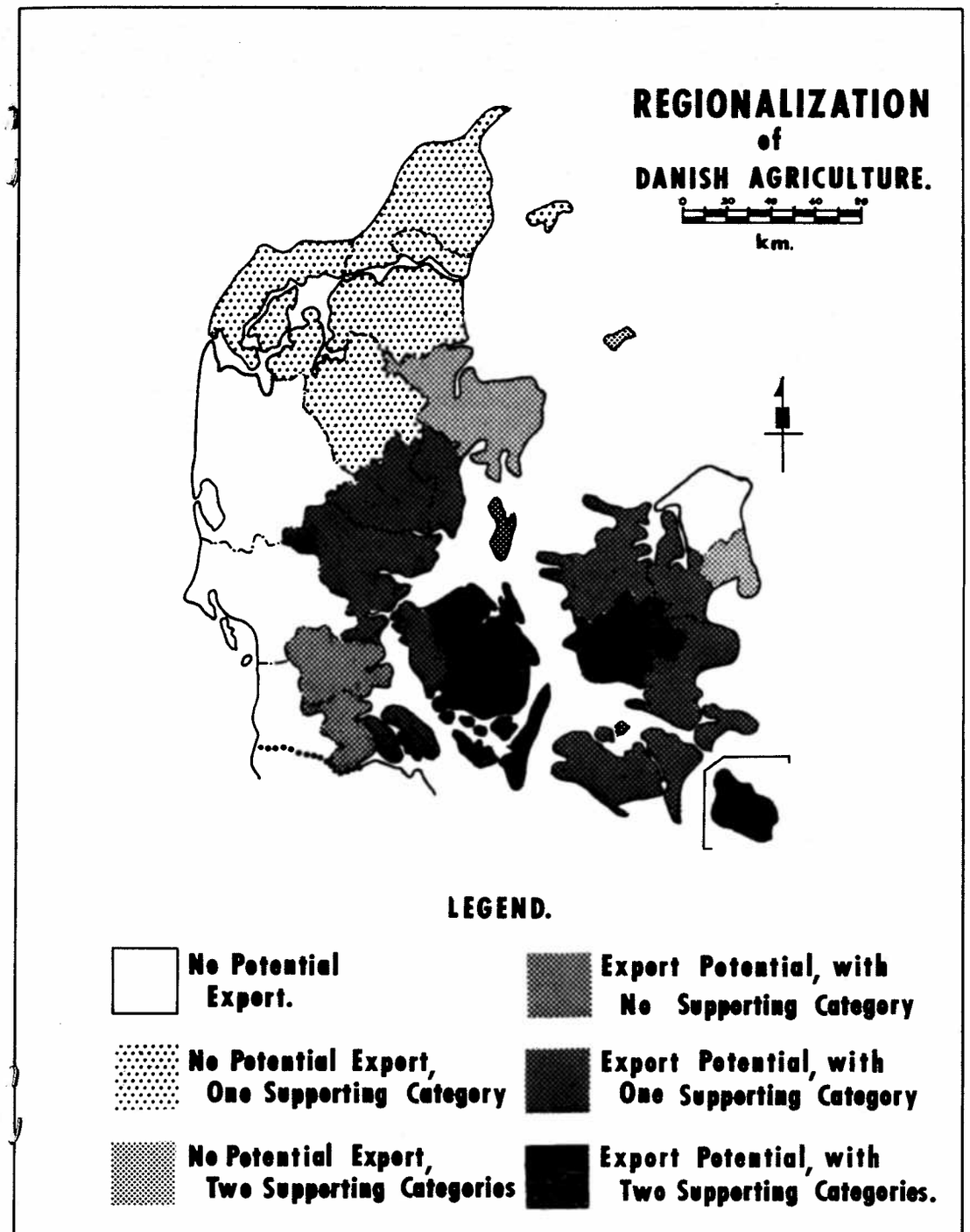
[6]Kampp, A. H., Landbrugsgeografiske Studier over Danmark. C.A. Reitzels Forlag, København, 1959.

Vahl, M., "De Geografiske Provinser i Danmark og Nogle Geografiske Forhold Indenfor Deres Rammer," Svensk Geografisk Aarbog, 1942.

[7]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 Paquett,
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 cartogram 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 several 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.

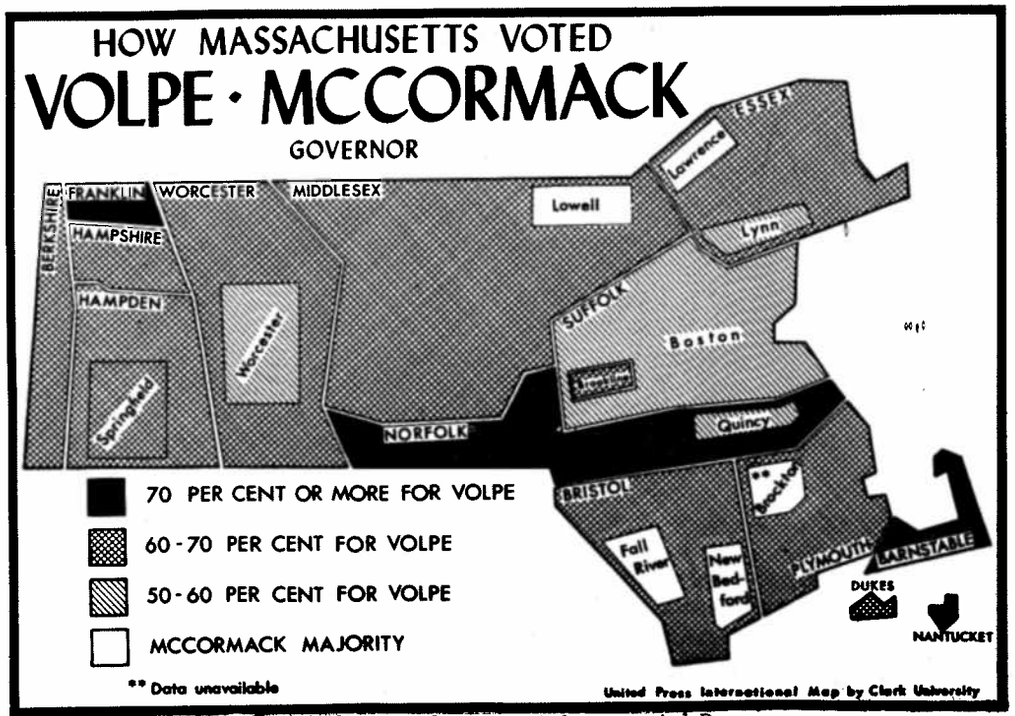
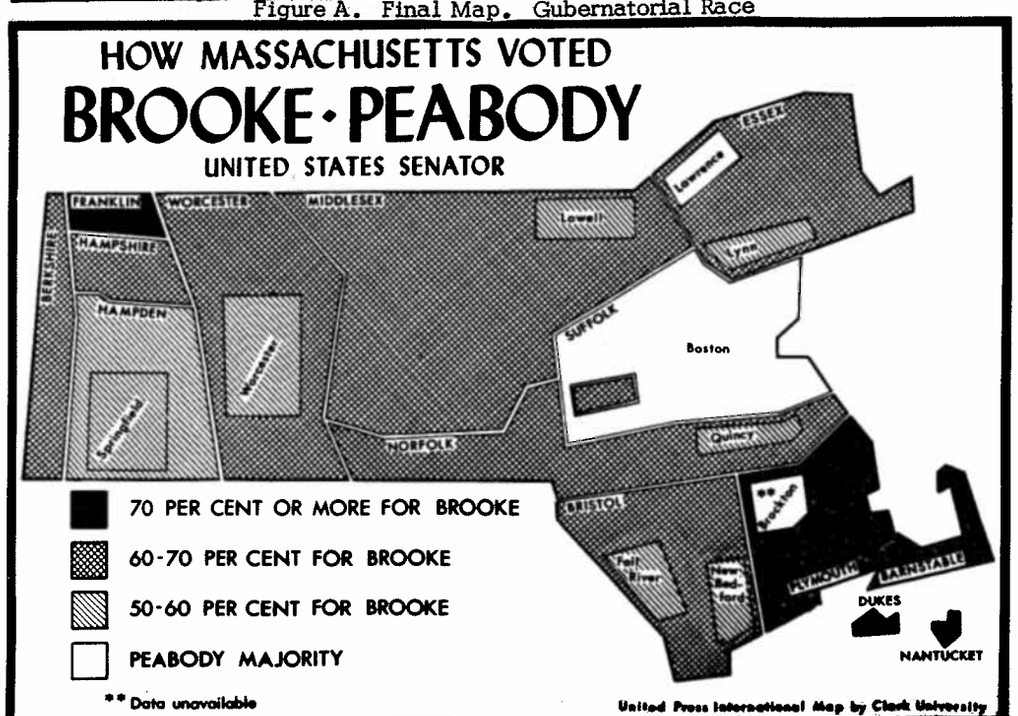


Figure A. Final Map. Gubernatorial Race



GRADUATE SCHOOL AND ALUMNI NEWS

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 plans. 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. Blaut, Visiting Professor of Geography (for a three-year term), and William Koelsch, Assistant Professor of Geography and History. An additional appointment for the year is J. Richard Peet, 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 level commensurate with the School of Geography's needs and responsibilities.

This year's incoming graduate student body was of high calibre and we are very pleased with those whom we expect to welcome to Clark next fall. We owe 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 NDEA 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 federal 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 $85,000 in student stipends, outside of 21 university and 21 federally-financed tuitions. 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, Sigismond Diettrich and Pedro Parrilla. 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 Barranquitas, thanks to the aid of Prof. Diettrich. Prof. Parrilla 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 "shaken 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 insensitive to our needs.

Grants and awards to the School of approximately $300,000 for 1967-68 will permit us to pursue significant research, training and student support activities. These include an N D E A Institute for Professors of Political Geography and an Experienced 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.

Experimentation with a new undergraduate course, use of visiting lecturers for special-purpose graduate courses (David Lowenthal, James Blaut, Joseph Sonnenfeld), revamping 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 (our NDEA Institute for 24 teachers directed by Henry Warman) all took place this year. Colleagues who visited Clark as faculty for the N. S. F. summer Institute for Southern Colleges included Harold Mayer, James Simmons, and Jack Villmow. 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 Beed, a visitor from Australia, whose departure we all regret, and by our staff newcomers, Professors Jeremy Anderson, George McCleary, and James Blaut (who was 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 unstinting 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 eminence 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.

FACULTY NEWS

Saul B. Cohen

Since last reporting in Monadnock, Dr. Cohen's activities are as follows: The first two months of the summer were spent directing and teaching in the Clark-A.A.G. Summer Geography Institute for Southern College students and faculty. In August, Dr. Cohen and his wife visited Oxford and Norway. Then came the Toronto A.A.G. meetings, with the opportunity to meet many Clark alumni at our first Clark breakfast. This academic year has involved considerable attention to continued development of the School, in terms of faculty additions, new instructional programs, the Caribbean Field Camp, and planning for the future.

Outside professional and academic responsibilities included work with the Commission on College Geography, the United States Office of Education, the National Science Foundation, the National Institute for the Training of the Teachers of the Disadvantaged, and the Consortium of Professional Associations for Evaluating U.S.O.E. Programs. In January, Dr. Cohen was appointed to the chairmanship of a newly-established National Academy of Sciences-National Research Council Committee on Geography.

Outside lectures included appearances at the U.S. Naval War College, the Inter-American Defense College, and the University of Puerto Rico. Problems and Trends in American Geography, which Dr. Cohen has edited, is currently in press, and two scholarly articles were published this past year by him. Current research includes a variety of themes in Political Geography that are aimed at both methodological statements and problem applicability.

Raymond E. Murphy

Dr. Murphy's most important activity of the year was the preparation of an index to Economic Geography, covering 1950-1965. This index was published early in 1967.

Dr. Murphy also taught a course in Urban Geography in a 12-week fall term at Wellesley College.

During Christmas vacation he and Mrs. Murphy drove south, chiefly to see urban centers in the southeastern states. Mrs. Murphy is interested in capital cities and Dr. Murphy, of course, is interested in urban centers in general.

Dr. Murphy also notes that the new index to Economic Geography (Vols. 26-41, 1950-1965, 156 pages) is available from the office of the journal for $6.00, cloth covered. Monadnock readers may be interested to know that copies of the preceding index, too, still are available. The earlier publication, the W. Elmer Ekblaw Memorial Index, covered Volumes 1-25; its price is $5.00, paper covered, and $6.00, cloth covered.

Henry J. Warman

Dr. Warman's major duties and efforts this year have been associated with the year-long Institute in Geography for high school teachers which took as its theme "Spatial Consequences of Urbanization."

This has been a very productive year for Dr. Warman, and both publications and other projects reflect his growing contribution to the field of geography in education. Teaching aids are particularly notable. Scripts were prepared for six films on the Regional Geography of the United States, and three more sets of Map Transparencies for use in overhead projectors were added to a rapidly expanding series of graphic aids.

Dr. Warman continued to serve on the Executive Board of the National Council for Geographic Education, and in the summer of 1966 addressed NDEA institutes at Bakersfield, Cal.; Michigan State; and Bridgewater State in Massachusetts.

Publications in 1966 were "Geographysheds," guest editorial, Journal of Geography, Vol. LXV, No. 9, December, 1966, and "Geography in the Curriculum," The Educational Forum, Vol. XXXI, No. 2, January, 1967.

In his spare time, Dr. Warman continued work on the revision of the White-Renner College Geography text.

Robert W. Kates

During the summer of 1966 Dr. Kates taught in the NSF Institute held at Clark, and contributed to the NDEA 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 Toronto, the University of North Carolina, Rhode Island School of Design, Ohio State University, and Cornell University.

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

His publications appeared in the Journal of Social Issues, Landscape, and three symposia volumes. Dr. Kates' current research interests are associated with a drought impact study, an environmental perception study and bibliography, and the prediction of research success in weather modification. Major writings that are currently in preparation include The Human Ecology of the Alaska Earthquake and a volume of natural resources.

Next year Dr. Kates will be a Research Fellow in Natural Resources at University College in Dar es Salaam, under Rockefeller Foundation sponsorship.

Rodman E. Snead

During the summer of 1966, Dr. Snead, using aerial photographs, 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 several geomorphologists working along the Pacific coast and later attended the I.G.U. meetings in Mexico City.

During the fall of 1966 Dr. Snead helped make preparations for the January field camp in Puerto Rico. Thanksgiving was spent in Puerto Rico making arrangements with Pedro Parrilla. The three week field excursion to Puerto Rico in January kept the staff very busy. The eleven undergraduates who made the trip worked with Dr. Snead 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. Snead 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 Strahler's Physical Geography or Thornbury's Principles of Geomorphology. Work on the atlas will begin immediately with completion anticipated in two years.

Publications in 1966 were, with Mohammad Tasnif, "Vegetation Types in the Las Bela Region of West Pakistan," Ecology, Vol. 47, No. 3, Late Spring, 1966, and Physical Geography Reconnaissance: Las Bela Coastal Plain, West Pakistan, Technical Report No. 15, Part 1, Coastal Studies Institute, Louisiana State University, April 1, 1966 and Louisiana State University Press, Baton Rouge, 1966. In press with the Annals of the A.A.G., "Recent Morphological Changes Along the Coast of West Pakistan."

Jeremy Anderson

Dr. Anderson arrived in Worcester in mid-August "fresh" from directing an NDEA summer institute for Junior High School Geography teachers at the University of Maryland. The fall semester was devoted to getting settled, teaching, and assisting Dr. Snead in the organization of the Puerto Rican field camp. The three-week Independent Study period in January was spent in attempting to "ride herd" (along with Drs. Blaut, Snead and Warman) on 65 students in the wilds of northeastern Puerto Rico. He still marvels that all got safely back to Worcester with no international incidents.

Dr. Anderson's paper, "A Historical-Geographical Perspective on Khrushchev's Corn Program," was published as a chapter in the book Soviet and East European Agriculture (ed. J. Karcz), University of California Press, Berkeley, 1967. A paper, "Fodder and Livestock Production in the Ukraine: A Case Study of Soviet Agricultural Policy," was prepared for a special issue (Geographic Analysis applied to the U.S.S.R.) of the East Lakes Geographer (forthcoming, Spring, 1967). A paper on the role of graphs in Geographic Analysis is in preparation, and Dr. Anderson is continuing his research on Soviet agriculture.

Martyn 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 three semester courses in the regular curriculum and two in the NDEA 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 dasymetric method of thematic mapping (the incomplete dissertation, as yet) and on the relationship and application of psychophysics to cartographic design.

James M. Blaut

Dr. Blaut joined the staff this year after a prolonged period of research in the Caribbean area. As Director of the Caribbean Research Institute, Dr. Blaut is recognized as a leading scholar in the field of Tropical 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 major 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 staff 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 Hawaii, 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 NDEA 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.

ALUMNI NEWS

Lewis M. Alexander (M.A. 1948; Ph.D. 1949, Clark) is Chairman of the Geography Department at the University of Rhode Island. For the past academic year he has been on sabbatical leave as a Research Fellow at Ohio State University, in the Mershon Social Science Program. As part of this program, he has been writing on the United States and Control of the Sea. He is Executive Director of the Law 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. She is now (following an eight-week vacation last summer) devoting 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 1964) is Assistant Professor of Geography at Illinois State University in Normal. He has almost completed the field 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 engagement and planned June wedding to Lynn Waters of Greenville, South Carolina.

George A. Beishlag (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 Boesch (Clark 1934-35; D.Sc.h.c. Clark 1966) is Professor of Geography and Director of the Institute of Geography at the University of Zurich. 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 Southern Asia.

Clyde J. Bollinger (Clark 1929-1930) now lives in Norman, Oklahoma, where he is Emeritus Associate Professor of Geography at the University of Oklahoma. Mr. Bollinger's wife, Hazel Guest Bollinger, died on May 19, 1966. But he has good news, too: his grand-daughter, Barbara, won the Greater New Orleans Miss America Contest. (Wish she'd visit the Workroom!) Mr. Bollinger recently published Volume V, Atlas of Planetary Solar Climate.

Donald G. Brandon (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.

Dorothea Hawley Burton (M.A. 1947; Ph.D. 1949, Clark) is a Branch Chief at the Department of Defense. She reports on seeing Dr. Savitri (Shibhal) Burman (Ph.D. Clark 1951) of New Delhi, India, during the latter's visit to the U.S. and the Toronto meetings last summer. Dr. Burman was then a team leader of a group of Indian college teachers who were touring the U.S. under the auspices of the Putney, Vt., Institute for International Living.

Robert D. Campbell (Ph.D. Clark 1949) has resigned his position at George Washington University and is now Vice President of the Matrix Corporation (Director of AREA Operation) in Arlington, Virginia. He reports that his trip to India involved many side trips, among them a stop in Indonesia, where Marge Howarth Eliot (M.A. Clark 1934) extended tremendous assistance and hospitality. Dr. Campbell's book, Regional Planning for India (written with V. Nath) will soon be published by Asia Publishing House in Bombay.

Harold F. Creveling (Ph.D. Clark 1951) is Head of the Geography Department at East Stroudsburg, Pa., State College. During the 1966-67 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 recently employed Etha M. Pruser (M.A. Clark 1954) as Associate Professor in his department.

James I. Culbert (M.A. 1938; Ph.D. 1939, Clark) is Head of the Department of Earth Sciences and Astronomy at New Mexico State University. He visited on the East Coast last summer and attended the Toronto AAG meetings. Dr. Culbert is currently planning a new observatory for his Astronomy section. His department now has four astronomers, three geographers and two geologists.

Floyd F. Cunningham (M.A. 1928; Ph.D. 1930, Clark) is Visiting Professor of Geography at Western Kentucky University, having retired from teaching at Southern Illinois University last fall. The fourth book of the Social Studies series he is co-authoring with Clarence Samford and Edith McCall came out this year. In addition, his book, 1001 Questions Answered About Water, will be published this spring by Dodd, Mead, and Company.

Veva K. Dean (M.A. 1940; Ph.D. 1949, Clark) is Professor of Geography at the (Mass.) State College at Fitchburg. She was quite well traveled at the end of last year's sabbatical, having been through the Near East and Africa. She has sent us a detailed account of her trip, which we were pleased to post in the Workroom Lounge.

Aubrey Diem (M.A. Clark 1956) is Associate Professor of Geography at the University of Waterloo. He is now planning a field trip to Eastern Europe to do research on the planning problems of Copenhagen, Zurich, London, Stockholm and Amsterdam.

Sigismond deR. Diettrich (Ph.D. Clark 1931) is Area Chairman of the Department of Geography at the Inter-American University of Puerto Rico. This year he was elected to membership in the academic Senate and Chairman of its curriculum committee. He is conducting a special study on the feasibility of Educational Television and took a field trip to examine outstanding ETV stations and institutions in the Northeast--from New York, via Boston, to Chicago, with a "sentimental journey to Clark."

Bart J. Epstein (Ph.D. Clark 1956) is Manager of Retail Real Estate for B.F. Goodrich, in Akron, Ohio. His part-time activities, however, are extensive. He is teaching Marketing Geography at Kent State University and Market Analysis in the Business College at Akron University. He has written a chapter ("The Trading Function") in Metropolis on the Move (Jean Gottman, ed.), John Wiley and Sons, 1966.

Richard B. Erickson (B.A. 1954; M.A. 1959, Clark) is Executive Director of the Southeastern Connecticut Regional Planning Agency, having just completed the regional plan for that area. He is the co-author of "Regional Resource Planning in Connecticut" in the January, 1967, issue of Soil Conservation. He is in addition the author of "Sounds of a New England Village," to appear in the 1967 winter issue of The New England Galaxy.

Wilma Belden Fairchild (M.A. Clark 1937), Editor of Geographical Review, sent a five-line limerick, which is worth repeating here: "There was a young woman said 'Damn,/I sometimes think that I am/ Just a being that moves/ In predestinate grooves,/ Not a bus, not a bus, but a tram.'"

Bradley Fisk (M.A. Clark 1950) still teaches at Cape Cod Community College in Hyannis and is President of Arey's Pond Boatyard in South Orleans. He reports that due to his wife's serious illness he has curtailed his outside activities.

Roy J. Fletcher (Clark 1959-1960) is still Lecturer at the State University of New York (Buffalo) and spends every spare minute working on his dissertation ("a mammoth undertaking"). Last summer's trip to Japan resulted in marriage--to a Japanese girl in June, 1966--which was followed by a brief tour and volcano climbing in Hakkaido.

Charles N. Forward (Ph.D. Clark 1958) is Associate Professor of Geography at the University of Victoria, British Columbia. He spent four months last summer studying three Canadian Atlantic Coast ports under a research grant from the Canadian Council on Urban and Regional Research.

Edwin J. Foscue (Ph.D. Clark 1931) reports that he and his wife have traveled extensively in the Mediterranean region (during March and April, 1966). In August they attended the Latin American Regional Conference in Mexico City (where Dr. Foscue read a paper on the program) and later that month attended the AAG meeting in Toronto. During the past year Dr. Foscue's article, "La Industria de la Pulpa y del Papel en el Este de Texas," was published in the Proceedings of the Latin American Regional Conference of the I.G.U., pp. 677-687.

Alfonso J. Freile (Ph.D. Clark 1961) is Professor at Universidad Central de Venezuela. During the fall of 1966 he was Visiting Professor at the University of Pittsburgh (Pa.). His book, Regiones Climaticas de Venezuela, will be published this year.

Roland J. Fuchs (M.A. 1957; Ph.D. 1959, Clark) is Chairman of the Department of Geography and Associate Dean of the College of Arts and Sciences at the University of Hawaii. During July, 1966 to January, 1967 he was on sabbatical leave as a Fulbright Research Scholar in Nepal. He is presently engaged (with a colleague at Ohio State) in a joint NSF project which involves preparing a book of readings on "Soviet Economic Geography." He reports the arrival of his son Christopher, who was born in December, 1965.

John L. George (M.A. Clark 1956) is Assistant Professor of Geography at State College in Salem, Mass. He has completed his Ph.D. residency at Boston University and the preliminary exam was completed last December. He will do research and write his dissertation this year.

Janet L. Glen (Clark 1960-62) teaches Cultural Geography and History at Ocean County College in Toms River, N.J. This semester, in addition, she has been teaching three sections of Anglo-America at Glassboro, N.J., State College.

Peter G. Goheen (M.A. Clark 1964) has been writing his dissertation at the University of Chicago Department of Geography. He has accepted a position as Assistant Professor, to begin in September of 1967, at the Geography Department of the University of British Columbia.

Loren Gould (B.A. 1953; M.A. 1959, Clark) is Assistant Dean of Men at (Mass.) State College in Worcester. His travel this year was restricted to the Toronto AAG meetings, but he hopes to take a sabbatical leave during 1968-69 to complete his Ph.D. residency.

Guilbert R. Graham (M.A. Clark 1931) is retired as Associate Professor of Geography at the University of South Carolina. He lives in Columbia and is a real estate salesman for C. D. Allen Company, part-time. He also is a tree farmer and grows strawberries. He was recently the co-author (with Prof. C. M. Gittinger) of "Economic Impact of an Interstate Highway on South Carolina," published by the Bureau of Business and Economic Research, University of South Carolina, 1967 (January), for the Bureau of Public Roads and the South Carolina State Highway Department.

Donald W. Griffin (Ph. D. Clark 1963) is Assistant Professor of Geography at U. C. L. A. He tells us he is joining others at U. C. L. A. in "'Reagan-watching' to see if the University will be here next year." Dr. Griffin hopes to be on sabbatical from September, 1967 to October, 1968, continuing research on the "Transition Zone" of American cities.

Andreas Grotewold (M. A. Clark 1951) is Professor of Geography at the University of Missouri. Last year appeared the first two parts of his paper on "World Exports of Non-Mineral Primary Products" in The American Journal of Economics and Sociology (April and July issues). The third and final part appeared in this year's January issue.

Edna M. Gueffroy (M.A. Clark 1927) retired from teaching in 1964 after 35 years at Illinois State University.

Neil W. Halkyard (M.A. Clark 1951) lives in Boylston, Mass., where he is Headmaster of Shepherd Knapp School, a private elementary school.

Charles Hardy (Clark 1963-1964) is a teacher of Geography and History at Millis (Mass.) Junior/Senior High School. He is working on his Master's thesis and travels extensively in the U.S. to collect slides for classroom use. He is appalled at the inadequacy of secondary level geography texts and would like to find a collaborator with whom to write a junior high school text. He exuberantly reports that he is still single!

Alan Harris (Clark 1951-52) is Senior Lecturer in Geography at the University in Hull, Yorkshire, England. His research on the historical geography of N.W. and N.E. England continues. His papers on the towns of North Lancashire and Cumberland have been published and others are in press.

Sister Mary Ursula Hauk, R.S.M. (Ph. D. Clark 1958) was appointed in August, 1966, President of Mount Aloysius Junior College, in Cresson, Pa. She expects publication this spring by Allyn and Bacon of Books 4 and 5 in a five-book elementary series of geographies (she is the author of Book 4).

Richard D. Hecock (Ph.D. Clark 1966) has been appointed Assistant Project Director of the Commission on College Geography and is serving as a member of the Michigan Conservation Education Committee. He is Assistant Professor of Geography at Eastern Michigan University and will supervise 24 students on a field trip in Europe this summer. He and John F. Rooney are doing a study on the cost of living differential among large U.S. cities.

Willard C. Hessen (M.A. Clark 1950) enthusiastically reports on life in Minnesota, where he is Director of Education and Enrollee Activities Supervisor at Tamarac Job Corps Conservation Center. His wife Pat has gone into partnership in a beauty shop and says all alumni wives are welcome. Will promises a good time to any alumni (and their wives, of course) who can get to his part of Minnesota.

Joseph E. Hickey, Jr. (B.A. 1954; M.A. 1958; Ph.D. in progress, Clark) works for the State of Connecticut as a State Open Space and Recreation Planner. He is married and has a son (Joseph E. Hickey III) almost two years old. Some of his recent publications include: "A Scenic Approach to Scenic Road Building," Traffic Quarterly, October, 1965; "The Man-Land Relationship," Journal of the American Institute of Architects, July, 1965; "The Green Land," Connecticut Interregional Planning Program Summary Report, February, 1967.

Joseph B. Hoyt (Ph.D. Clark 1954) is Director of Social Science Division and Chairman of the Geography Department at Southern Connecticut State College in New Haven. He has been doing research on 19th Century West Africa Geography for the Essex Institute Historical Collections: "Salem's West Africa Trade 1835-1865," published in June, 1966. He has also done a revision of Man and the Earth, 2nd edition, published by Prentice-Hall in March, 1967.

Bert Hudgins (Ph.D. Clark 1930) lives in Detroit, having retired from Wayne State University. He spends much of his time keeping his publications revised: The Geography of North America, Miller and Hudgins, John Wiley Press; and Michigan--Geographic Backgrounds, Edwards Brothers, publishers. Visiting with his grandchildren provides relaxation for Dr. Hudgins.

Esther Kinch Hunter (M.A. Clark 1940) lives in Rochester, N.Y. and is fully occupied in keeping track of her five children and her husband Lloyd, Professor of Electrical Engineering at the University of Rochester. Her oldest son is doing graduate work at Tufts, while another son is a junior at Earlham College, and still another (!) is a sophomore at M.I.T.

Gilbert J. Hunter (M.A. Clark 1959) is Assistant Professor of Geography at Kutztown (Pa.) State College and he sends the following news: "Most of my energy is expended perpetuating geographic scholarship to undergraduates and planting a fellowship of committed Christians on campus. Professional Geography and non-professional Christian ministry are complementary. My book review of Urbanization in West Africa was published in May, 1966, in The Professional Geographer."

Harry K. Hutter (M.A. Clark 1930) is Associate Professor of Geography at the University of Toledo (Ohio). His retirement will come in June, 1967. Meanwhile, in addition to teaching two courses in physical geography, he is the counselor to more than 150 foreign students. Last summer he and his wife drove west after summer school and toured the parks and points of interest.

Albert H. Jackman (Ph.D. Clark 1953) is Chairman of the Geography Department at Western Michigan University in Kalamazoo. He is collaborating in the development of an introductory course in Physical Geography which will employ the Audio-Tutorial method. He has recently submitted to The Professional Geographer a review of the book Military Geography, by Peltier and Pearcy. During the summer of 1966 Dr. Jackman traveled in Europe, spending nine weeks in England, the Low Countries, West Germany, Austria, Switzerland, Italy, France, Spain and Portugal.

Preston E. James (Ph.D. Clark 1923) is Maxwell Professor of Geography and Chairman of the Geography Department at Syracuse University. Last August he delivered the banquet address at the Toronto AAG meeting. Its subject was The Origin and Persistence of Error in Geography, and it was published in the March edition of the Annals. On December 1, 1966, Dr. James was presented the David Livinstone Centenary Medal by the American Geographical Society.

J. Granville Jensen (M.A. 1942; Ph.D. 1946, Clark) is Professor of Geography at Oregon State University.

Jessie Thornton Jesseman (M.A. Clark 1941) is retired and seems to enjoy her occupation of "homemaker." She and her husband spend winters in Florida and summers in their new home on Welch Island, in Lake Winnepesaukee, N.H. They have 35 acres there and suggest that we all buy some lots from her and start a "Clark Community."

William L. Jeyasingham (M.A. 1951; Ph.D. 1958, Clark) has been appointed President of Jaffna College, in Vaddukoddai, Ceylon. He continues to lecture in Geography, although to a lesser extent. His appointment to the Presidency precluded his intended visit to the U.S. on a teaching appointment, for which he and his family (wife and five children) are sorely disappointed.

Edward S. Kersch (M.A. Clark 1958) is the Senior City Planner for the Detroit City Plan Commission. He is currently working on a comprehensive reappraisal of Detroit's master plan. He and his wife are expecting their third child this summer.

E.J.C. (Coen) Kewiet de Jonge (B.A. 1947; M.A. 1949; Ph.D. 1951, Clark) is Assistant Professor of Geography at San Diego State College. He is working on English translations of J. Tricart and A. Cailleux's Traite de Geomorphologie. The first volume to be published will be Volume I, Introduction to Climatic Geomorphology, and the second one, Volume V, Geomorphology of the Humid Tropics, Forests and Savannas, will follow.

Harry B. Kircher (Ph.D. Clark 1961) is Associate Professor, Earth Science faculty, Southern Illinois University, in Edwardsville. He attended last year's AAG meeting in Toronto and this year's St. Louis meeting as the S.I.U. Edwardsville principal representative and treasurer. He delivered a paper last October at the West Lakes Division meeting in Des Moines. Dr. Kircher will devote full time this summer to research on the Central Mississippi Valley.

William A. Koelsch (M.A. Clark 1959) is currently doing research on the history of 19th century American geography. He reports: "Have accepted joint appointment at Clark beginning Fall 1967 in the graduate program in early American history and the Graduate School of Geography. I suspect that the old axiom 'no man can serve two masters' still holds, but it ought to be fun trying it back at Clark."

Richard J. Kopec (Ph.D. Clark 1965) is Assistant Professor of Geography at Wayne State University in Detroit. He reports much activity in the past year: a Vietnam map prepared for and published by the Detroit News and Boston Globe; a July 1966 Population Distribution Map of Detroit Metropolitan Area produced for Chatham Foods Company; an article, "Effects of the Great Lakes' Thermal Influence on Freeze Free Dates in Spring and Fall as Determined by Hopkins' Bioclimatic Law," Agricultural Meteorology, April, 1967. Dr. Kopec attended the Cartography Institute (NSF) last summer at the University of Washington. He was Regional Editor for the Tribow Map Series (AAG) and a Consultant for the Trippensee Planetarium Company.

Mary MacDonald Kramer (M.A. Clark 1941) lives in Dallas, Texas and is teaching part-time at the new Dallas County Junior College in El Centro. She sent us an interesting report on her visit last summer to Churchill, Manitoba, which was posted in the Workroom Lounge.

George Langdon (Ph.D. Clark 1952) is Professor of Geography at West Chester (Pa.) State College. Last summer he conducted a study tour in Puerto Rico. His textbook, Exploring Earth Environments--A World Geography (Thomas Y. Crowell, Co.) is in its second printing this year. He is also involved in the production of educational filmstrips.

Louis E. Leipold (M.A. Clark 1946) is Technical Writer and Editor for Environmental Science Services Administration, Department of Commerce. He is the Project Coordinator responsible for publishing the various volumes dealing with the Prince William Sound, Alaska, Earthquake of 1964. Volume I, primarily Coast and Geodetic Survey Operations in Alaska, has been published. It is available from the Government Printing Office. Volume IIA, Engineering Seismology, is in final page proof. Volume IIB, Research Studies: Seismology and Marine Geology, is in various stages of production and should be out by the end of 1967.

Minnie E. Lemaire (M.A. 1932; Ph.D. 1935, Clark) is Chairman of the Department of Geology and Geography at Mount Holyoke College. Last summer she attended the Latin American Regional Conference of the I.G.U. in Mexico. She is currently serving on the Standards in Higher Education Committee of the A.A.U.W. and the Board of the N.C.G.E.

Trevor Lloyd (Ph.D. Clark 1940) is going on leave for the second semester of the 1966-67 academic year and will spend most of the time in Scandinavia, with some time also in the United Kingdom and on the Continent. His main interest is in study of development of the higher latitudes, the so-called "Middle North", and the Greenland-Canadian relations. As Chairman of the Board of Governors of the Arctic Institute of North America, he will also be making contact with comparable organizations in Europe.

Miriam Levo Lockhart
Richard A. Lockhart (both M.A. Clark 1957) live in Cambridge, Mass. Mr. Lockhart is Project Director for the Boston Redevelopment Authority.

Richard F. Logan (B.A. 1936; M.A. 1937, Clark) is Professor of Geography at U.C.L.A. He was the speaker at the centenary celebrations of Stellenbosch University in South Africa in June of 1966. He ran the field camp at U.C.L.A. this year for the 18th year and did research on a bibliography of S.W. Africa, carried on in Germany, South Africa, South West Africa and the U.S. The bibliography will be published soon.

Harriet Ruth Long (M.A. 1941; Ph.D. 1955, Clark) is Director of the Liberal Arts Program and Head of the Geography Department at Edinboro (Pa.) State College.

Aleta and Robert Looker (both M.A. Clark 1960) live in Cheshire, Connecticut. Bob is Principal Planner for the city of Hartford and Aleta is Assistant Instructor in Geography at Southern Connecticut State College.

Arthur C. Lord, Jr. (M.A. Clark 1959) is Assistant Professor of Geography at Millersville State College in Pennsylvania.

John C. Lowe (Clark 1960-62, Ph.D. pending) is the Economic Geographer for the Appalachian Regional Commission in Washington, D.C. He hopes to complete his dissertation on "Economic Diversification and Metropolitan Growth" sometime this year. He had planned to spend his March vacation in Martinique.

Neva McDavitt (M.A. Clark 1929) lives in Normal, Illinois, and has retired from the faculty at Illinois State University.

Wallace Edward McIntyre (M.A. 1947; Ph.D. 1951, Clark) lives in McLean, Va., and works for the U.S. Government. He has completed a year of independent study at Harvard and planned to embark for travel in the Middle East this spring.

Maria B. Maso (M.A. Clark 1964) is a Visiting Professor at the Escuela de Geografía, Facultad de Humanidades, Universidad Central de Venezuela. In September, 1967, she'll "go to Chicago for good."

Wilhelm Matzat (Clark 1951-52) is Wissenschaftlicher Assistant at the Geography Institute, University of Frankfurt/Main. From September, 1965 to April, 1966 he did research in Thailand, also visiting Malaysia, Cambodia and Burma. In Rangoon he met two Clark alumni: Professor Daw Thin Kyi and Professor Thein Maung.

Michael G. Mensoian (B.A. Clark 1949) is Associate Professor of Geography at Massachusetts State College in Boston. He wrote Massachusetts--The Bay State and several minor articles appearing in the 1967 edition of the World Book Encyclopedia. Dr. Mensoian is currently engaged as a co-author in writing a textbook, World Cultural Geography, to be published in the spring of 1968.

Andrew S. Moreland (M.A. Clark 1951) is President of Ocean County College in Toms River, New Jersey, where he is now living. This is a new two-year college which he has been organizing for the past two years.

Benjamin Moulton (B.A. Clark 1939) is Professor and Chairman of the Department of Geography and Geology at Indiana State College in Terre Haute. He sent no news, but we assume his NDEA Institute of last summer was successful.

Richard E. Murphy (Ph.D. Clark 1957) is Professor and Chairman of the Department of Geography at the University of New Mexico in Albuquerque. At the Toronto AAG meeting last summer he presented a paper entitled "A Spatial Classification of Landforms Based on Both Genetic and Empirical Factors--A Revision."

Salvatore J. Natoli (M.A. Clark 1957, Ph.D. pending) is Geography Consultant to the Social Sciences Branch of the Division of Educational Personnel Training, U.S. Office of Education in Washington. His research continues on zoning problems in American cities and he submitted a paper to the AAG on "Geographic Effects of Zoning on Urban Land Uses" which was accepted and read by him at the St. Louis AAG meeting. Mr. Natoli is a member of the subcommittee for Washington Atlas for Washington Center for Metropolitan Studies.

Harry C. Neal (Clark 1957-59) now lives in Sarasota, Florida, having moved "further south than ever, from Atlanta." To quote further: "Hoping to become established in this lovely resort community after the first of the year. Tried one position with a restaurant supply business--of all things--which was not satisfactory."

Herman L. Nelson (Ph.D. Clark 1954) is Professor of Geography at Iowa State College in Cedar Falls. He has written a short book on the Geography of Iowa, published by the University of Nebraska Press, which should be available this spring.

Bobbie G. Newman (M.A. Clark 1965) is studying at the Department of Geography of the University of Tennessee in Knoxville.

Norton Nichols, Jr. (M.A. Clark 1950) is Assistant Superintendent for Educational Services of the Antelope Valley Union High School District, in Lancaster, California.

Bruce C. Ogilvie (M.A. 1949; Ph.D. 1956, Clark) has been promoted to The Geographer for Rand McNally, with company-wide responsibilities. During June and July of 1966 he participated in 16 NDEA Institutes for teachers of Geography. During the 1966-67 academic year he was a Lecturer in Cartography at the University of Chicago. Dr. Ogilvie now has two children in college: his son, B. Campbell, at Monmouth (Ill.) College, and his daughter, M. Leigh, at the University of Denver. His wife Martha has a new position as Library Consultant for Field Enterprises Educational Corporation (as of July, 1966).

Robert F. Perry, Jr. (Ph.D. Clark 1957) is Professor and Chairman of the Department of Geography at Mass. State College in Worcester. Last spring he worked with Henry Warman on the Alpha Map Transparencies for North America. Dr. Perry spent June and July of 1966 doing research, with the benefit of an NSF grant, in Mississippi and the Gulf of Mexico. During August he was in Quebec studying land use changes on the Gaspé Peninsula.

Rafael Pico (M.A. 1934; Ph.D. 1938; LL.D., Hon., 1962, Clark) is a Senator of Puerto Rico and Director and Chairman of the Finance Committee of the Banco Popular in Puerto Rico. His busy year included attendance at the annual meeting of the Latin American Development Bank in Mexico City and the World Bank in Washington, D.C. He was appointed a member of the visiting Committee School of Planning, M.I.T.

Theodore S. Pikora (M.A. Clark 1964) is an Instructor in the Geography Department at Salem (Mass.) State College. Last summer he attended the Arctic Institute at McGill University.

Richard E. Preston (Ph.D. Clark 1964) is Associate Professor of Geography at San Fernando Valley State College, in Northridge, California. He spent last summer in Moscow, Idaho, where he offered a course in Urban Geography in the University of Idaho's summer NDEA Institute in Geography.

George B. Priddle (M.A. Clark 1964) is Lecturer in Geography at Waterloo Lutheran University in Ontario. He is currently working on his dissertation and getting involved with educational T.V., with a focus on urban problems. This year he spent two weeks in Puerto Rico and the Virgin Islands.

Etha M. Pruser (M.A. Clark 1954) now lives in Butler, N.J., and is Associate Professor of Geography at E. Stroudsburg (Pa.) State College. Her summer last year was full of travel--to Yucatan and West Central Mexico, as well as attendance at the I.G.U.-Latin America meetings in Mexico City in August. Dr. Pruser will be teaching this summer at Inter-American University in San German, Puerto Rico.

Louis O. Quam (Ph.D. Clark 1938) is Director, Earth Sciences Division, Office of Naval Research. He has been elected a Vice President and Chairman of Section E (Geology-Geography) of the American Association for the Advancement of Science. He has written the Vicennial Article on Arctic Basin Research, Naval Research Reviews, October, 1966, pp. 1-15.

Erwin Raisz (Clark faculty 1945-59) lives in Cambridge, Mass., and devotes his time to a variety of activities. He is employed half-time by the U.S. Geological Survey, on the National Atlas Project, and part-time by GIMRADA (studying Gemini pictures). The rest of his time is spent in running his own Cartographic Workshop. Last year he was engaged in a geological cross section of the U.S. and the State of Massachusetts, for Ginn & Company and the University of Massachusetts, respectively, and constructing views of what the early explorers must have seen in America, for a museum in Wilmington, Delaware.

Richard B. Randall (Ph.D. Clark 1955) is the Washington, D.C., representative for Rand McNally & Company.

Edward Risley (B.A. Clark 1946) has been with the Earth Sciences Division of the National Academy of Sciences since October of 1966. He is serving as the Executive Secretary to two committees: The Committee on Remote Sensing of Environment and the Committee Advisory to the U.S. Geological Survey on Space Programs for Earth Observation.

Walter W. Ristow (Ph.D. Clark 1937) is Associate Chief of the Geography and Map Division, Library of Congress, in Washington, D.C.

J. Lewis Robinson (Ph.D. Clark 1946) is head of the Geography Department of the University of British Columbia, in Vancouver. During this year he received the A.A.G. Meritorious Service award for "his interpretation of the physical, economic and human geography of Canada over a period of more than 20 years and for his services to the growth of the discipline in Canada." While on leave of absence in Ottowa this year, Dr. Robinson continued his writing on Canada. When his current works are published, his professional writings in Geography will total 100 published items, excluding minor notes and book reviews.

Frederick S. Sanford (Clark 1948-1950) is a Systems Analyst for Sikorsky Aircraft in Stratford, Connecticut. He is currently researching business games and simulation.

Barbara T. Saydam (M.A. Clark 1963) is a Research Officer for the Providence Redevelopment Agency. She is now living in East Greenwich, R.I., and has three sons at home -- Perry, 15; Eugene, 10; and Erol (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 insurance industry of Des Moines and Hartford, Connecticut.

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

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

Marjorie Shank (M.A. Clark 1923) lives in Apache Junction, Arizona, and has been retired since 1964.

Earl B. Shaw (Ph.D. Clark 1933) is Professor of Geography at Assumption College here in Worcester. His recent travel includes the South Pacific during July and August of 1966. During December, 1966 and January, 1967 he traveled through the Caribbean by Royal Netherlands Freighter. He has a light teaching load and does research and writing.

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

James A. Shear (Ph. D. Clark 1952) is Professor of Geography at the University of Georgia in Athens. He is currently doing research in hydroclimatology and published an article, "A Set Theoretic View of Köppen's Dry Climates" in the Annals of the A.A.G., September, 1966.

Julia Shipman (M.A. 1923; Ph.D. 1928, Clark) 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 1938) is living in Cincinnati, Ohio.

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

Frank J. Sparicio (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 1955) is Professor of Geography at Kansas State University in Manhattan. He spent the summer of 1965 traveling in Scandinavia and Germany.

Robert G. Stone (Clark 1931-32) is Chief of the Scientific Information and Publications Branch, Hqs. Air Weather Service, U.S. Air Force. He lives in Belleville, Ill.

John L. Taylor (M.A. 1940; Ph.D. 1953, Clark) 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 flag areas of the U.S.

R. Paul Terrell (Ph.D. Clark 1949) is Head of the Department of Geography and Geology at Western Kentucky University, in Bowling Green. He has recently welcomed a Clark alumnus, Floyd F. Cunningham (Ph.D. Clark 1930) to his department, forming a staff of ten geographers and one geologist. Dr. Terrell reports that his new program in earth science for teachers is now fully operative. Moreover, he expects to inaugurate a new major graduate program (M.S. and M.A.T.) in Geography, beginning this June.

Grady O. 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 Van Cleef (Ph.D. Clark 1926) is Professor Emeritus at the Ohio State University. He has published several articles in the past year and presented a paper, "Seventy-five Years of Geography --Some Recollections and Comments," before the Ohio Academy of Science. In March and April of 1966 he traveled through Sardinia, Northwest Italy and Czechoslavakia. His research on "The 500-Mile Circle" is completed and it will be published soon.

Charles B. Varney (M.A. 1953; Ph.D. 1963, Clark) is Professor of Geography at Wisconsin State University in Whitewater, as well as being Director of the Honors Program there. He was Director of the NDEA Institute for Advanced Study in Geography last summer.

Paul Vouras (M.A. Clark 1950) is Associate Professor of Geography at Paterson State College, in Wayne, 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 (M.A. Clark 1941) lives in Westfield, Mass., and has retired from teaching at Westfield State College.

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

Katheryne Thomas Whittemore (M.A. 1925; Ph.D. 1936, Clark) is Professor Emeritus of Geography and Director of Arts and Sciences at State University College at Buffalo. She and Melvina Svec have completed the revision of The United States and Canada, an elementary geography text first published in 1957.

David C. Winslow (Ph.D. Clark 1948) is Professor of Geography at Indiana University of Pennsylvania. He is the editor of Geography, Geology, Earth Science and Meteorology College Workbook Series, William C. Brown, Co. He is also the editor of Pennsylvania Geographer and assistant editor of Pennsylvania Junior Geographer. Dr. Winslow was a Visiting Professor last semester at Bloomsburg (Pa.) State College and is currently doing field work in Puerto Rico centering on urban studies.

A. Joseph Wraight (Ph. D. Clark 1951) lives in Washington, D. C., and is Chief Geographer, Environmental Science Services Administration. His new book, Our Dynamic World, for college, junior college, secondary school or junior high school, was released last September by Chilton.

Graduate School, 1966-1967

First Row: Professors George F. McCleary, Jr.; Terence W. Beed; Saul B. Cohen (Director); Jeremy Anderson; Rodman E. Snead; Henry J. Warman

Second Row: William Perry Eisman; James Barbato; David Hathaway; Suk-Han Shin; Nora Gildemeister; Margaret M. Kingman; Nancy Burns; Mary Lank; Merrie Muir; Ali Pourabbas; Robert Thompson; Kang-Tsung Chang.

Third Row: Harry McPhilimy; Joseph R. Kettish; Henry McCutcheon; Michael Schwartz; Russell Muncaster; Richard Jackson; Gordon Hinzmann; Thomas R. Lewis, Jr.; Ranganathan Ramachandran.

Fourth Row: Ronald O. Ahlers; Merlin P. Lawson; David A. Smith; Gary Whiteford; Leroy Durham; John Jacobs; Fred Oxtoby; Johnny Holmes; Chelvadurai Manogaran.

Fifth Row: Joseph Flaherty; Jerry Hall; George Downey; Gregory Pierce; Bruce Ryder; Alan Muir; Duane Baumann; Robert L.A. Adams.

Sixth Row: John Gannon; Bryan Thompson; Thomas Kinsey; George Coules; Paul Prusinski; Lewis Rosenthal.

Seventh Row: Niels West; Rohan Andrew; William Carolan; Jack Perry.

THE WORKROOM TODAY

NAME UNDERGRADUATE INSTITUTION	PROGRAM	GRADUATE MAJOR	OBJECTIVES
Robert L.A. Adams Williams College	Ph.D.	Resource Management	College teaching Has accepted position at University of New Hampshire, 1967-68
Ronald O. Ahlers Shippensburg State Teachers College Pennsylvania State Univ.	NDEA Institute	History	Secondary level teaching
Rohan Stewart Andrew University of Nottingham, England	M.A.	Urban Geography	University teaching and research
David Gordon Arey Denison University	Ph.D.	Resource Management	College teaching Has accepted position at University of Pittsburgh, 1967-68
James P. Barbato Assumption College	M.A.	Undecided	College teaching
Nancy S. Burns Emmanuel College Boston State College	NDEA Institute	Social Sciences	Junior College teaching
William B. Carolan, Jr. University of Arizona	Ph.D.	Undecided	Undecided
Kang-Tsung Chang	M.A.	Undecided	Undecided
Borden Devon Dent Towson State College	Ph.D.	Urban Geography Cartography	College teaching and Government research
Leroy Durham Coppin State College	NDEA Institute	Geography	Grade school teaching
William Perry Eisman University of Maryland	NDEA Institute	Geography	Junior College teaching
Nora A. Gildemeister University of Geneva, Switzerland	M.A.	Urban Geography	Research
Edward James Hall, Jr. Boston University	NDEA Institute	Historical Geography	Secondary school teaching
Jerry Alan Hall University of Buffalo	Ph.D.	Physical Geography	College teaching
Andrew Dewey Hastings, Jr. University of New Hampshire	Ph.D.	Undecided	Federal Government military Geography research
David Phillips Hathaway Mass. State College at North Adams	NDEA Institute	Geography	Secondary school teaching
Gordon Alfred Hinzmann, Jr. Wayne State University	M.A.	Economic Geography	College teaching or marketing research
Richard A. Jackson Brigham Young University	Ph.D.	Cultural-Historical Geography	College teaching

NAME UNDERGRADUATE INSTITUTION	PROGRAM	GRADUATE MAJOR	OBJECTIVES
John B. Jacobs, Jr. Clark University	M.A.	Political Geography	College teaching
Brian A. Johnson Indiana State University of Pennsylvania	NDEA Institute	Geography	College or high school teaching
Maryann M. Johnston Keene State College	M.A.	Urban Geography	College teaching
Joseph Richard Kettish Pennsylvania State Univ.	NDEA Institute	Geography	College teaching Has accepted position at University of Georgia, 1967-68
Thomas Joseph Kinsey Northeastern University	NDEA Institute	Geography	Secondary school teaching (Social Studies)
Merlin Paul Lawson University of Buffalo	Ph.D.	Historical Climatology	College teaching Has accepted position at Northeastern University, 1967-68
Jonathan Alan Leach Dartmouth College	M.A.	Economic Geography	Undecided
John G. Lehew, Jr. Indiana State University of Pennsylvania	NDEA Institute	Geography	Senior High School teaching
Thomas Reed Lewis, Jr. Central Connecticut State College	NDEA Institute	Geography	College teaching
Henry R. McCutcheon McMaster University	Ph.D.	Economic Geography Resources	Undecided
Harry S. McPhilimy George Washington Univ.	Ph.D.	Resources	Research Management
Alan Philip Muir Castleton State College	M.A.	Urban Geography	Senior High School or College teaching
Merrie Ellen Muir Clark University	M.A.	Geography in Education	Secondary Education
Russell W. Muncaster Waterloo Lutheran Univ.	M.A.	Urban Economic Geog.	University teaching
Frederick Edward Oxtoby University of British Columbia	M.A.	Political Geography	University teaching
Jack R. Perry Queens College	NDEA Institute	Geography	Secondary school teaching
Lee Edwin Phillips Dartmouth College	M.A.	Marketing and Economic Geography	Planning
Ali Asghar Pourabbas Teachers College of Tehran University, Iran	M.A.	Geomorphology	College teaching
Ranganathan Ramachandran Madras University, India	Ph.D.	Resource Management	University teaching Will return to teaching at Karnatak University, Dharwar, India

NAME UNDERGRADUATE INSTITUTION	PROGRAM	GRADUATE MAJOR	OBJECTIVES
Richard O. Riess University of Rochester	Ph.D.	Settlement and Historical Cultural Geog.	College teaching
Lewis Daniel Rosenthal City College of New York	Ph.D.	Undecided	College teaching
Michael Schwartz Harpur College	M.A.	Political Geography	Peasant farmer
Shyam Sundar Sharma Banaras Hindu University, Varanasi, India	Ph.D.		University teaching
Suk-Han Shin Seoul National University, Seoul, Korea	M.A.	Resource Management	University teaching in Korea
David A. Smith Clark University	M.A.	Industrial Location	Location Consultant
Bryan Thompson University of Toronto	Ph.D.	Urban Geography	Teaching and Research
Robert William Thompson Worcester State College	M.A.	Urban Geography	Teaching
Augustus Keith Van Winkle Middlebury College	M.A.	Undecided	Secondary School teaching
W. Davis Van Winkle Middlebury College	M.A.	Political Geography	Secondary School teaching
Niels West Boston University	M.A.	Resource Management	College teaching and Research
Gary Thomas Whiteford University of Toronto	M.A.	Political Geography	University teaching
Robert H. Willoughby University of Chicago	NDEA Institute	Geography	Secondary School teaching