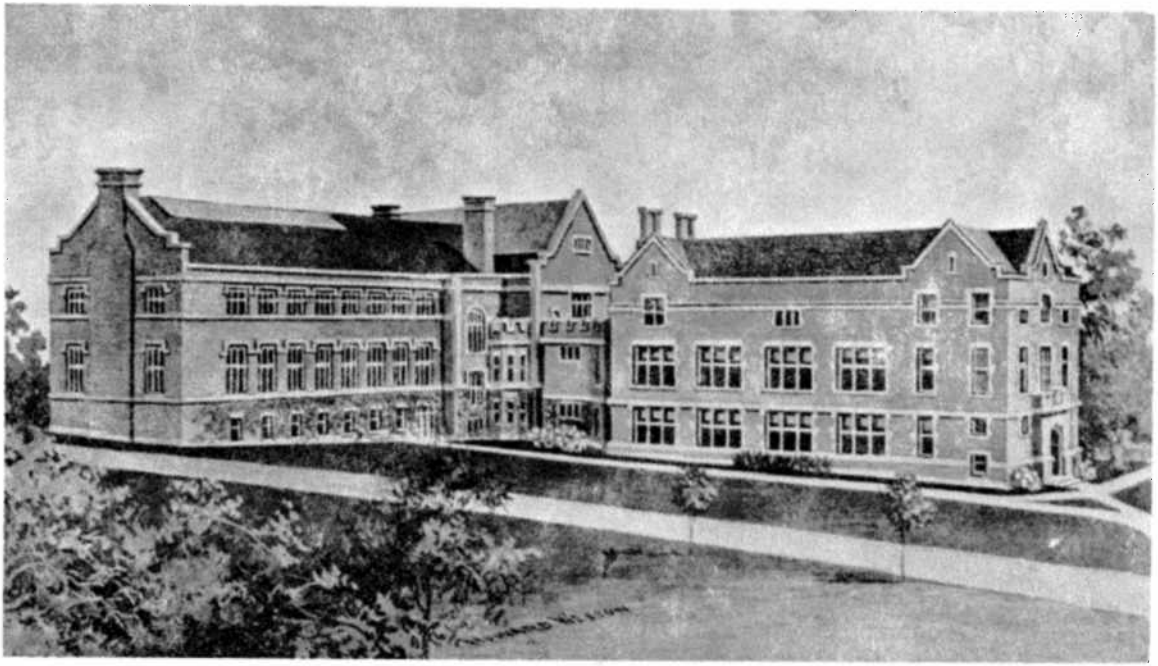
MONADNOCK



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MONADNOCK

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VOLUME 51

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Editor's Note

Once again the graduate students of the School of Geography bring you the Monadnock. Its yearly publication represents the spirit of continuity in the Clark Geographical Community and as such, remains an important part of our tradition. As you may have heard, Dr. Saul Cohen will be leaving the post of director during the summer of 1978. In light of our search for a new director and examination of new directions, traditions such as the Monadnock take on added significance.

In this years issue, we have included the text of the annual Wallace W. Atwood Lecture, given this year by Dr. F. Kenneth Hare and entitled "Climate and Human Response". Three papers by Clark Geography students are also presented. Two of them, by graduate students Steven Sawyer and Bret Halverson, put forth concrete proposals in specific problem areas: the provision of useful information on energy conservation to the general public and the training of teachers for environmental education. The third, by undergraduate Wendy Hussey, addresses itself to a comparison of two views of the general man-in-environment question. A summary of current research being conducted within the department and a list of dissertation abstracts follow the papers. These materials, even when taken collectively, are certainly not representative of the full range of interests of all of us presently at Clark; yet they point to several long-term clusters or areas of concentration - development theory, energy, technology and environment. Clark students and faculty will continue to make contributions in these as well as in other areas.

The editorial staff of Monadnock would like to extend its thanks to those who helped with this issue. To the Secretarial Pool of Clark University for the typing of the text, to Alan Long for the group photograph, to the Cartography staff for their aid with layout problems, to former editor Michael Steinitz for his helpful suggestions and to graduate students Ann Dennis, Joni Seager and Janice Morgan-Jones for their help with assorted tasks we extend our appreciation. Last but not least, we wish to thank our alumni without whose generous support publication of the Monadnock would not be possible.

Director's Message

As preparation for my first Director's report to Monadnock in 1966, I read through its previous issues, starting in January 1927. I was struck, then, as I continue to be now, by the continuity of concerns--all having to do with the strengthening of Geography as a teaching and research field, and with the unique structure that we have developed at Clark to contribute to this strengthening.

My message in 1966 was that we hoped to build on the great traditions of the past to take us to a new and higher plateau of academic excellence. Now, at the end of a thirteen year tour-of-duty as Director, I look back with satisfaction at what has been accomplished. We have achieved this new plateau; we have kept the faith with Wallace W. Atwood, Samuel Van Valkenburg and Raymond Murphy. Clark Geography has continued to pioneer as an international center for graduate research and teaching. Of equal importance, Geography has become a major force in the undergraduate college; it is an exciting, demanding major and it is pointing talented students towards geographically-oriented and academic careers, as well as providing them with a sound liberal educational background.

My message in June 1978, as I prepare to take leave of the Graduate School of Geography and Clark University, and move on to the Presidency of Queens College of the City University of New York, is one of high hopes for the School's future. As we come to the end of our 57th year of continuous activity, our School stands as a leader and beacon for the profession. We have excellent facilities that allow all of us to work in comfort and dignity; a superb student body attuned to some of the major national and international issues to which the science of Geography has much to contribute; and a talented, diversified faculty, large enough to cover most of our specialized learning needs, small enough to work cohesively. We are one of the best geographical centers in the world, and have the base to continue to search out new challenges and new directions.

I depart with great sadness. These thirteen years have been the most meaningful ones of my professional life. The friendships I've made will endure, as will my emotional ties to the School of Geography and Clark. Next year a search will be conducted for a new Director. This individual will have a splendid opportunity to put a new stamp on Clark Geography, as I have had. Whatever new directions the School will take, however, they will have powerful traditions and a meaningful history on which to build.

I leave the School--and I do not leave it. The University has honored me in appointing me a Research Professor of Geography and I shall maintain research and personal ties with many of you. To all Clark alumni, and especially to those with whom I've worked over the

past thirteen years, I extend my warmest sentiments and ask you to keep in touch. I now consider myself an alumnus of the School of Geography, and together with you will do all in my power to support this very special and precious institution.

Saul C.

6/1/78

The Wallace W. Atwood Lecture

Introduction

by ROBERT W. KATES

In the public garden of the United Nations, walking with Ken Hare in a post-lunch break with preparations for the Desertification Conference, I discern the fine line that separates mugs from wumps in geography. Of course most geographers are mugwumps, sitting astride the fenceline of the natural and human sciences, mug on the one side, wump on the other. But there in the garden, we stroll together each in turn fascinated--Ken, identifying plants, spouting Latin botanical names, comparing vegetation worldwide and lecturing on its value or beauty, and I, scanning people--alone, in groups,--reading life-histories, guessing nationality, observing personal space, body language and social interaction. And like loyal mugwumps, we knew of what each other spoke, sufficient to appreciate if not elaborate.

The line for mugs and wumps is quite difficult to delineate along the fenceline of the bio-physical and human atmospheric sciences. Climatology, as all science, suffers from the schizophrenia of social relevance and scientific caution. To have our life work recognized as important to people is an added incentive to our scientific puzzle-solving propensities. Thus the temptation is constant to over-emphasize climatic impacts on society and economy and the prospect of new findings opening up vistas of prediction and even control. But in actuality we serve as witnesses, and not very reliable ones, to the recurrent variations of climate and its poorly understood interactions with economy and society. And over and above any conflict professionals feel, every man and every woman, as Ken describes it, is his or her own climatologist.

In the paper that follows, Ken Hare, our Atwood lecturer for 1977 walks that fine line straying only occasionally beyond the paths along the fenceline. His opinions are balanced, his speculations novel, his presentations eloquent. But what comes through strongest is his commitment to the scientist "using his skills in the political process." A commitment that carries him across the continents, at home in Board Rooms and Arctic, in Council Chamber and Desert, a voice of learning, reason and intelligence.

Climate and Human Response

by F. KENNETH HARE
(Institute for Environmental Studies, University of Toronto)

Climate endures, whereas weather varies incessantly - so says the old usage; which is good only if one averages things over a very long time. The atmosphere varies on all time-scales, from the hour-to-hour changes of a single afternoon to the immensely long variations of the Pleistocene glacial and interglacial epochs. And even beyond - since geological periods like the Pleistocene return perhaps ten times in a billion years. So climate does not endure: it varies endlessly. It is the ensemble of short-term variations over a chosen period of analysis, plus the variations of the ensemble itself over spans longer than the chosen period. What one calls climate is therefore dependent on one's choice of reference period.

In practice meteorologists use the term "weather" to describe the present state of the atmosphere, and that of a short following period (a week or so, perhaps a month in some areas), during which events are mainly determined inertially from the present state. Climate is everything else - all those states, events and transformations that take longer, and that do not seem to be determined by evolution from the present state. One might hence say that the word denotes the longer-term behaviour of the atmoshpere, as measured by parameters (i) of central tendency (like the mean value over a specified period) and (ii) of the frequency spectrum of variations of given magnitudes (U.S. National Academy of Sciences, 1975).

The layman is quite sophisticated in his use of this word climate. He doesn't confuse it with weather, as do so many newspaper and broadcast accounts. He knows that the climate of Worcester, Massachusetts, requires him to own a raincoat, and that there is no season of the year when he can put it away in a remote closet. But he also knows that he will need the coat only on certain wet days (which, however, he can't predict). And in recent years he has suspected that the climate is changing, i.e., that the frequency with which he needs to wear his raincoat is not the same as it used to be. All generations have had this feeling, I suspect. It is based on the reality that the individual person integrates experience over about a sixty-year period. Within sixty years climatic variations - fluctuations we can call them, on this scale - are likely

*This article is similar to the author's Atwood Memorial Lecture, delivered on March 24, 1977. It is not, however, identical, since he spoke without notes.

to reverse within a lifetime. So human consciousness of climatic variation is entirely natural - and unreliable.

Most people, for example, were conscious of the upswing of northern hemisphere surface air temperatures between the 1880's and 1940, even though the rise was only about 0.7 deg C. I lived my boyhood in the culminating phase of this warming, and was disappointed by the rarity of snow in my native England. People have also been conscious of the comparable downswing between 1940 and 1965, when the hemisphere cooled by perhaps 0.4 deg C. Individuals who cannot guess air temperature within 3 deg C are quite reliable in estimating that a month is warm or cold when its actual anomaly is only $\pm$ 1 deg C. The general public seems to integrate such experience very well, if subliminally.

But the sharp increase in awareness since 1972 has been of a different kind. There has been a rise in the number of extreme weather events reported in the press, and the statistics confirm this (Angell and Korshover, 1977). Many of these events have had sharp impacts on the human economy. Public, and hence political, concern has risen to the point where the United States has launched a formal climate program. On the world scene, the Global Atmospheric Research Program, jointly administered by the World Meteorological Organization and the International Council of Scientific Unions, is now directed at an understanding of climatic variability.

The year 1972 produced a remarkable set of anomalies (McKay and Allsopp, 1976), affecting perhaps a third of the earth's land areas. In North America, for example, we had severe cold over the north-eastern half of the continent, with killing frost in June in Ontario and New York State, and cool wet conditions in the northern Plains. There was drought in Texas. It was cool or cold over most of the populous parts of the Soviet Union, with severe summer drought and a lack of winter snow. Droughts also occurred in China, India, parts of Australia, South Africa and, of course, the Sahelian zone of north Africa, where the drought was already four rainy seasons old.

There were immediate economic impacts. In 1973 the Soviet Union bought about 28,000,000 metric tonnes of wheat and coarse grains on the world market, largely from the United States. Other nations scrambled for supplies, since the Soviet purchase represented a sizeable part of the entire carry-over from the previous crop year. The result was drastic price inflation - a threefold rise in wheat and rice prices between successive years, a wave that has only recently subsided. This effect preceded, but was compounded by, the energy crisis ushered in by the Arab nations following the brief war with Israel that fall.

The effect on world agricultural affairs was striking. From being a commodity in huge surplus, wheat had suddenly become scarce. The failure of the anchovy catch off the Pacific coast of South

America - also climatically induced - upset the supply of animal feed, as did a sudden shortage of some coarse grains. A rethinking of world food strategy had to be carried through, and with it the tactics of the exporting nations, chiefly the U.S., Canada, Argentina, Australia and Thailand.

The research that has been subsequently conducted has shown that the steady rise in world food production during the 1950's and 1960's, due mainly to increased use of fertilizers and better strains of crop, was also helped by the absence of weather extremes of the grosser kind. (U.S. National Academy of Sciences, 1976, especially figures 1.7 and 1.8). World grain production has twice fallen between successive years in the 1970's - between 1971-2 and 1972-3, and btween 1973-4 and 1974-5) - due in part to climate-induced crop failures, especially in the Soviet Union. Since demand rises with increasing populations, and with rising per-capita income, these small declines have had disproportionate effects on prices.

Climate has emerged, in fact, as a de-stabilizer of the world economic situation. It has hit people's pocket-books, and made headlines in the press. The media have responded by putting climate on their front pages, not always accurately.

One fear, given visibility by professionals as well as by the naive, is that we are sliding back to glacial conditions. Indeed the experience of the past million years suggests that this must soon happen. And the cooling trend from 1940 to 1965 made the fear quite reasonable. But the cooling has stopped, and expert opinion has now begun to ask the opposite question: will man-made gaseous additives to the atmosphere, like carbon dioxide, the halo-carbons and nitrous oxide, acutally warm things up? Such contradictions are familiar enough to scientists who know the limitations of prediction. But they are confusing to the public. And they generally tend to make economists and policy-makers go on doing what they have always done - ignore the climatic factor, on the basis that it is unpredictable - an act of God.

Is this writing-off of predictability justified? And do decision makers use existing data effectively?

Prediction of climatic variations, if we manage it, will be different in kind from existing weather forecast techniques, which make use of computer solutions of the equations governing atmospheric behaviour. Such forecasts have skill out to a few days, but after that we have to fall back mainly on analogue techniques, which are basically statistical: one finds analogous situations in the past records, and then hopes that events will unfold in the same way. Again there is some skill, but we all know that extended forecasting has very limited usefulness. It isn't accurate enough to convince the user - and hence doesn't affect his decision. And at present it is confined to monthly outlooks.

Climatic fluctuations on the seasonal and interannual scale, whose unfolding has such a large economic impact, depend on a different set of controls, and it is conceivable that we shall learn enough about them to achieve some predictive skill. This hope rests on two main props: -

(a) factors external to the climate (i.e. the linked atmosphere-ocean-biota system) include several that are man-induced; and if we can predict our own behaviour we can hope to predict the climatic consequences. Such factors include changes in the atmosphere's optical properties by the release of particles and gases, such as carbon dioxide and the various halo-carbons and compounds of nitrogen. Many of these affect the transparency of the atmosphere to long-wave radiation. Industrial activity is tending to raise their concentration, and if we can predict the level of economic activity we can also predict this increase. Calculations by Kellogg (1976) and others suggest that these effects may raise world surface temperatures by between 1.5 and 6 deg C in the next eighty years.

(b) factors internal to the climatic system are much more difficult. They include slow exchanges of heat, water vapour and carbon dioxide between oceans, atmosphere and biota. We have no comprehensive models that simulate these exchanges, and it is unlikely that we shall - at least for a long time. There are, however, certain statistical aids that partly get us round the obstacle. It is known, for example, that anomalously high or low sea temperatures may persist over large oceanic tracts for months or even years. These anomalies can be shown statistically to be accompanied by related anomalies in the atmospheric circulation, and hence of weather. Many of the shorter-term fluctuations of climate appear to behave in this way. There are teleconnections, in fact - correlations at a distance - between climate and sea-surface temperature, and also between climatic anomalies in one area and those in another. Some teleconnections have time-lags of a few months, and where that happens one can use observations to predict events. For example it has been shown by Markham and McLain (1977) and Hastenrath (1976) that rainfall in the dry belt of north-east Brazil is statistically related to sea-surface temperature anomalies in the tropical Atlantic several months earlier. Observations of these anomalies makes possible a forecast of drought or good rains in Brazil's most vulnerable area.

One can't, therefore, write off the possibility that climatic forecasts a season or two ahead, or perhaps for an entire year, may become available. And one may perhaps be able in very general terms to predict temperature changes on much longer time-scales. The question arises: what use can be made of such forecasts in economic decisions?

The Clark School of Geography knows much more about such questions than I do. But I can at least speculate, on the basis of a career spent in trying to make climatology useful.

If forecast skill does arise, it will at first be ignored. The boy who cried "Wolf!" is a fable with much relevance. But in the end it may be that the forecasts will begin to carry conviction. Probably there will then be overreaction. One can visualize impacts on the commodity markets, on farm policy, on insurance premiums. One can even visualize panic, if the forecasts are gloomy. Many forecasts will, in any case, go wrong, as do short-term forecasts: and no doubt such errors will produce overreaction also. Economic forecasting, which is no more precise, and which works on similar time-scales, displays these effects on a small scale (though its output is still disbelieved by so large a section of the business and bureaucratic communities that the effects are cushioned: bets are hedged!).

One can recognize in these speculations the more general fact that social and economic measures are taken in all societies in ignorance of the future, often with the hope of influencing that future. Climatic foreknowledge, if we come to possess it, will be as hard to use effectively as foreknowledge of economic or social stresses.

In company with Professors Kates and Johnson of this School I have been helping in the preparations for the forthcoming U.N. Conference on Desertification. With some colleagues in Toronto, and with the help of an international team of consultants, I have written a component review (Hare, 1976) examining the rôle of climate in the spread of deserts - which the U.N. General Assembly was convinced was still in progress. This study compelled us to ask these general questions in a specific context.

The Sahelian drought of 1968-73, with its tragic effect on people and livestock along the Saharan margin, was the direct cause of the Conference. Several African republics, barely a decade independent, were brought to the point of tragedy by a desiccation that began much earlier - in the late 1950's. Rising populations, increased head of livestock, and the heady expectations of rulers in the newly created capitals, all combined in time with a prolonged desiccation that is typical of the desert margin. Natural ecosystems take such things in their stride. Human societies, especially those whose people are poor, find this more difficult. The inevitable consequence was overpasturing, over-cultivation, and ultimately the loss of much soil and livestock - as well as widespread human famine.

The Conference will take place, however, under different circumstances. Reasonable rains returned to the Sahel in 1974, and have persisted since. Predictions by some climatologists that drought would endure or intensify have proved groundless - though it is quite certain that other drought episodes will sweep across the region. With the return of the rains much of the political will for drastic measures evaporated. Governments have short memories, especially for difficulties and hazards. The Conference has before it a plan of action that, if adopted, would do much to mitigate the

effects of future droughts, even if their timing remains unpredictable. It may well adopt this plan. But I am sceptical as to the latter's success in application. Even rich, prosperous countries find it hard to provide for an uncertain future. The countries of the desert margin will find it much harder.

Two conclusions emerge in my mind. One is that climatologists must do their utmost to attain some degree of forecast skill on the seasonal and inter-annual scales. This may be impossible. But the value of such forecasts would be so great in the food-production arena that the profession would be guilty if it did not push this kind of research very hard. Fortunately this is happening. Climate and its prediction are now at the centre of our research, nationally and internationally. It is too early to say whether we shall succeed.

The other conclusion is that the entire community, political and economic, as well as scientific, needs to think out how to make better use of climatic information in economic affairs. In retrospect we could have done better, for example, during the 1970's as regards agricultural policy. Perhaps, again, this is part of a larger problem: how on earth does modern society make better use of scientific understanding in its economic and social decision-making? Almost every scientist is dissatisfied with the present rôle of science in public affairs.

The U.N. system is a partial convert to this viewpoint. It is getting ready to hold a world conference on science and technology (in 1979). In preparation for this conference, and in answer to stimuli received from Dr. Kissinger in one of his final acts as Secretary of State, the World Meteorological Organization is planning a two-stage conference on climate as an economic and political factor - one stage involving experts, and the other the statesmen.

One doesn't hope for too much from such conferences. Politics often looks a hopeless business. But without politics the world is lost. I, for one, am convinced that the scientist must continue to plod onwards in search of a better way of using his skills in the political process. Climatology has been a very humble part of science so far. Perhaps we should try, in the next few years, to be a little more aggressive!

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A National Information Service for Energy Conservation

by STEPHEN W. SAWYER

In October, 1973, the oil embargo dramatized the nation's intensive use of energy and our rapidly declining energy supplies. The four years since the embargo have not been a period of inaction as many have suggested.[1] On the contrary, they have been a time of concerted research into the methods and impacts of various responses to the crisis. Energy conservation has emerged as one of the most essential components of a sound national energy policy. The crucial importance of conservation is one of the few points of agreement in the debate among advocates of different energy technologies and management strategies. This high level of agreement is an important development. Research indicates that present energy use could be reduced from 25% to 40% and future growth rates could be as low as 1.5% to 2% per year without serious socio-economic displacement.[2] Moreover, conservation has been found to be much more cost effective than developing new energy sources.[3] In light of its widespread level of acceptance and its potential contribution to the energy crisis, one would assume conservation to be the area of energy policy where the nation would have achieved the most significant progress.

Here, of course, is the paradox. As the nation's intellectual recognition of the need for conservation grows and as studies report that it could be achieved with minimum of hardship, we continue to use energy as if we had never heard of the word "conservation". In 1977, national energy use is projected to total 76.4 quadrillion Btu - a 3.9% increase over 1976, and a 7.3% increase over 1975.[4]

Clearly, active conservation practices do not flow from the knowledge of the need for them. On the individual level this inaction is most frequently attributed to our general cultural values which evolved when resources were abundant and our ability to use them was limited. This mind set has been graphically described in the phrases 'frontier culture' and 'cowboy economy'.[5] More specific studies attribute the lack of widespread conservation to different economic, institutional, technical, social, and legal constraints.[6] These barriers are being analysed by the Department of Energy, state energy offices, and various industry organizations.

Informational Barriers

The concern here is twofold: First to stress that the lack of adequate information also poses a significant barrier to widespread energy conservation; and secondly, to propose a means of minimizing this barrier by providing an accessible and reliable source of information and technical assistance for the general public. The

significance of informational barriers has been noted in studies of the constraints and incentives to the diffusion of alternative energy technologies.[7] (Since these technologies minimize our use of finite fuel resources, they are considered here to fall under the broad category of energy conservation practices). These studies note that the individual homeowner, small business person, and typical building contractor have few or no effective, reliable, and accessible energy information sources. The majority of these individuals do not have the resources to procure professional engineering advice. Nor do they have the reserve resources and dedication to casually assume the risk and uncertainty associated with the higher initial costs of most energy conserving practices. Effective action is further retarded by the highly fragmented and dispersed nature of each of these groups.[8] Yet much of the burden of implementing the nation's energy conservation efforts will fall upon these individuals. Conservation advocates often subtly imply that it is the duty of each citizen to become an energy expert, informed about government programs, knowledgeable about all the conservation options, and able to evaluate the applicability of each to their personal situation. Unfortunately, these expectations are unrealistic and even arrogant. Even if all the public had the patience to research all the energy programs and conservation alternatives or the aptitude to analyze thermal efficiencies and discount rates, most do not have the excess time to do so. These individuals must, at present, rely on the expertise of private companies that sell products related to energy conservation. Unfortunately, this advice is frequently biased towards the product or services they sell and is often conflicting.[9] Some states and citizens groups have responded to this situation by setting up energy information centers. Montana had an Appropriate Technology Center. Massachusetts is planning two Energy Conservation Extension Service groups to provide technical advice to the commercial sector. But on a national scale, the provision of information services has been haphazard or totally lacking.

A Nation Information Service

Energy conservation is too important to our nation's welfare to proceed in this manner. The significance of the lack of an accessible source of conservation information and technical assistance will increase in the future as more people try to respond to higher energy prices and Federal and state incentives (or penalties). Fortunately, the nation has an organization that is ideally designed to respond to this need. The product of another resource management crisis, the Soil Conservation Service (S.C.S.) has evolved into a highly effective system of providing information and technical assistance to the general public on methods of improving land use. It is proposed that this unique national service be expanded to include an energy conservation branch and be renamed the Resource Conservation Service. The unique qualifications of the S.C.S. as the most appropriate vehicle to provide this essential service will become clear as the S.C.S. is described more fully.

The S.C.S. was established in 1935 as an agency within the Department of Agriculture. The S.C.S. was charged with the responsibility of controlling soil erosion by providing the nation's farmers with information and technical assistance through a network of Conservation Districts and field offices. Over the years, the technical expertise and concerns of the S.C.S. have gradually expanded from erosion control to complete land use planning. Their services now include soil classifications and mapping, soil and water conservation systems, the suitability of various crops and livestock, and forestry management. These services are all offered free and on-site by the field office staff upon request. The staff is likely to have expertise in agronomy, biology, civil engineering, hydrology, and other aspects of land use planning and conservation. (The proposed title, Resource Conservation Service, more accurately reflects its activities even now).

Although the agency has been accused of empire building in the past,[10] it has generally assumed a low profile, responding to requests for assistance from farmers and increasingly from suburbanites, developers, towns, cities and public agencies. All of these activities are directed through the field offices and must be approved by the five locally elected Conservation Supervisors. In many ways, the S.C.S. is a model for combining the vast expertise and financial resources of the federal government with local control and sensitivity. At present, there are 8,964 employees, 2,938 Conservation Districts, and approximately 2500 field offices. Its present budget is $223,144,000.[11]

The Soil Conservation Service and Energy Conservation

The S.C.S. is particularly qualified to provide a national program of information and technical assistance. The incorporation of an energy conservation program into the existing, although renamed, S.C.S. system would allow the needs of the nation to be met with a minimum of bureaucratic expansion. Its national network of field offices and personnel are ideally suited to respond to the need for information, while its decentralized structure and emphasis on local initiative are sensitive to the populist concerns of the 1970's. Whether legitimate or not, the anti-Washington, anti-bureaucracy bias that was revealed in the last election is a phenomena that public policy planners must deal with. Utilization of the S.C.S., which is thoroughly accountable to the community it serves, would reconcile this concern with the need for more active governmental involvement in energy management. The expansion of the S.C.S. would not, of course, be without expense. New personnel would have to be hired and trained, in many cases office facilities would have to be enlarged, vehicles and equipment would have to be purchased. The administrative network will have to be expanded. In particular, new field offices will be needed in urban areas where the S.C.S. has not been as active. However, it should be pointed out that the addition of 100 offices to serve the larger urban areas would increase the number of field offices by only 4%. The relationship of the new agency to the Department of Energy will also have to be

determined. In spite of these difficulties, the system could place a federal energy conservation expert within easy access of the majority of the general public at a significantly lower financial cost than an independent system. Symbolically, it should indicate that as the government was asking the public to make the most out of its resources, the government was willing to do the same.

By utilizing the existing infrastructure of the S.C.S. the Federal government could make energy conservation information, technical assistance, and encouragement available to the public in a minimum of time. It is, of course, self-evident to point out that the bureaucratic infrastructure of the S.C.S. from its national headquarters in Washington to the 2500 field offices, is in place and smoothly functioning. But it is an important element of the overall proposal since time is a critical aspect of our response to the energy crisis. Each year that exponential energy growth is allowed to continue, the more difficult and intractable the problem is to deal with and the more rapidly our traditional energy resources will be depleted. Action can not be delayed any longer. Yet each step involved in the establishment of a new agency requires time for planning and policy design, the congressional debate and resolution, and for internal and interagency relationships to be determined. The S.C.S. itself had to resolve these issues in the early 1930's. By integrating energy conservation information services into the S.C.S., the time lost to such evolutionary problems and conflicts could be reduced to a minimum. The existence and experience of the S.C.S. would accelerate the implementation of the program and increase its near term efficiency significantly.

The field office network and operational approach of the S.C.S. are ideally designed to provide energy conservation information to the average homeowner and small business person. The key to this effectiveness is the Conservation District and field office system. The technical staff of these offices are specialists in adapting theoretical knowledge to fit practical situations. They are continuously adapting national programs to fit the particular needs and characteristics of their region and conservation district. Thus, in energy conservation, they would provide a coordinated national program that would also be responsive to the diverse energy, economic, and climatological situations of the various regions of the nation. The S.C.S.'s tradition of on-site inspection insures that this local sensitivity and practical application of knowledge extends to the individual level. On-site analysis is particularly important in energy conservation assistance since so many variables are relevant to a building's overall energy efficiency. The trained eye will, almost inevitably, spot problems and propose solutions which would not be evident in an off-site analysis.

A related advantage is that below the national level, the S.C.S. is organized on a state by state basis. Each state has a State Soil and Water Conservation Commission that oversees the operation of the field offices, coordinates their activities, and publicizes their services. Because of this operational design, the field offices

could also serve as information centers for each state's conservation programs.

This regional and individual sensitivity would also lead to a higher level of public trust and receptivity to the conservation information than would occur if it originated from a more centralized and impersonal source. Research clearly indicates that individuals are far more responsive to advice from a peer-expert than impersonal advice from an outsider.[12] Much of the advice about different conservation options such as their appropriateness to the individual's situation, their relative effectiveness and the length of their payback periods must be accepted on faith. In this light, maximizing the levels of trust between the conservation specialist and recipient is very important. The confidence levels, and therefore response rates, are also likely to be higher since the field offices' activities are known to be overseen by the Conservation District Supervisors from the community.

A final and important aspect of the proposal is that it does not require the "concerted, national effort" that accompanies most proposed responses to the energy crisis. The magnitude of the effort required to develop new energy supplies is going to seriously tax the nation's financial, human, and institutional resources. Even now the effort is being limited by the large capital investments that are required. In this light, cost effective proposals such as the program outlined above deserve particular attention.

A Challenge to Overcome

One major drawback of utilizing the S.C.S. is the jurisdictional conflict between the new Department of Energy and Department of Agriculture. This problem is, of course, not insignificant. Many of our responses to the energy crisis are plagued by overlapping departmental jurisdictions. Institutional conflicts such as these are frequently sighted as being more significant barriers to conservation than either economic or technical constraints.[13] In this regard, it is vitally important that the conflicting departments or institutions appreciate the seriousness of the energy challenge so that they are willing to make the compromises necessary to maximize energy conservation. The S.C.S., as noted above, has gradually evolved into a highly effective branch of the Department of Agriculture. The Department of Energy will surely require an energy information branch. The argument here is that to maximize efficiency and effectiveness, this information office should work in conjunction with the Department of Agriculture so that energy conservation services can be incorporated as a branch of an expanded S.C.S. It is also recommended that the S.C.S. be renamed the Resource Conservation Service to reflect its new mandate. The new title would also allow it to absorb information and technical assistance programs related to future resource conservation efforts.

Conclusion

One of the major challenges to the citizens and institutions

of the U.S. is to complete the design of and actively implement a national energy policy. An adequate response will require a very complex, highly integrated, major national effort. Much of this effort will involve incorporating conservation technologies and practices into every system that uses or affects the use of energy. Large corporations and utilities have the resources and time perspective to encourage adoption of such conservation measures on their own accord. Their prominence, large consumption of energy, and need for Federal regulatory approval insure that additional measures can be effectively applied to them by the Department of Energy.

The more difficult challenge will be to effectively implement conservation practices among the millions of smaller, more decentralized consumers of energy who resent direct federal regulation and politically oppose higher fuel prices or taxes. Fortunately, the nation has an agency within the Federal Government with a proven record of success in assisting Americans in the conservation of scarce resources. The Soil Conservation Service's success and unique strengths in this field are too important to ignore. It is ideally suited to inform, advise, and advocate active energy conservation practices among this vast segment of energy consumers whose millions of daily decisions profoundly affect our total energy consumption.

Notes

[1]These accusations, although not entirely unjust, have been insensitive to the magnitude of the cultural, economic, and technical transformation required by the energy crisis. Those who have expressed impatience with our inaction include almost every segment of our society, ranging from editorials in Science magazine (10 Jan. 1975, 15 Oct. 1976) to the campaign speeches of nearly all non-incumbents.

[2]For two recent studies with specific breakdowns that support the first set of figures see: Marc H. Ross and Robert H. Williams, "The Potential for Fuel Conservation," Technology Review (February 1977) p. 49-57; and Lee Schipper and Allan Lichtenberg, "Efficient Energy Use and Well-Being: The Swedish Example," Science, Vol. 194 (3 December 1976) p. 1001-1013. The latter set of figures are based on studies by the Conference Board, the Ford Foundation, the Institute for Energy Analysis, and the National Academy of Science. See John G. Myers, "Energy Conservation and Economic Growth: Are they compatible?" Conference Board Record (February, 1977) p. 27. The Ford Foundation, Energy Policy Project, A Time to Choose: America's Energy Future (Cambridge, Mass., Ballinger Publishing Co., 1974); and The Institute for Energy Analysis, Oak Ridge Associated Universities, Economic and Environmental Implications of a U.S. Nuclear Moratorium, (Oak Ridge, Tenn.: ORAU., 1976). Preliminary results from the National Academy of Sciences Committee evaluating nuclear and alternative energy sources also support these figures.

[3]ERDA's conclusion that the marginal cost of conserving a given amount of energy is less than increasing supply by an equal amount is one of the reasons for the new Federal emphasis on conservation. See Energy Research and Development Administration, A National Plan for Energy Research, Development, and Demonstration. 1976. (Washington, D.C.: U.S. Government Printing Office, 1976), Vol. 1, p. 43.

[4]U.S. Bureau of Mines. "United States Energy Use Through the Year 2000".

[5]This cultural and economic inheritance is discussed with particular insight by Kenneth Boulding, "The Economics of the Coming Spaceship Earth" in Henry Jarrett, ed., Environmental Quality in a Growing Economy (Baltimore, Johns-Hopkins University Press/Resources for the Future, 1966) and Daniel Luten, "Empty Land, Fall Land, Poor Folk, Rich Folk," Yearbook of the Association of Pacific Coast Geographers, Vol. 31 (1969), p. 79-89.

[6]See Robert H. Williams, The Energy Conservation Papers: Prepared for the Energy Policy Project of the Ford Foundation (Cambridge, Mass.: Ballinger Publishing Co., 1975); and Lee Schipper,

"Energy Conservation" in Jack Hollender (ed.) Annual Review of Energy (Palo Alto, Calif.: Annual Reviews, Inc., 1976). p. 455-517. The latter article contains a lengthy review of energy conservation studies.

[7]The studies that emphasize the effect of informational barriers include: A. D. Little, "Residential Solar Heating and Cooling Constraints and Incentives: A Review of the Literature." (Cambridge, Mass.: A.D. Little Co., 1976), p. 91; and Richard Schoen, Alan S. Hirschberg, Jerome M. Weingart, and Jane Stein, New Energy Technologies for Buildings: A Report to the Energy Policy Project of the Ford Foundation (Cambridge, Mass.: Ballinger Publishing Co., 1975), p. 126-127.

[8]The effect that the small, undercapitalized, and decentralized nature of most contractors has had in retarding innovation in the construction industry is reviewed in Richard Schoen, Alan Hirshberg, Jerome Weingart, and Jane Stein, New Energy Technologies for Buildings: A Report to the Energy Policy Project of the Ford Foundation (Cambridge, Mass.: Ballinger Publishing Co., 1975).

[9]Jerry Flint, "Homeowners Seek Insulation Answers," The New York Times (21 February 1977), p. 33.

[10]Robert J. Morgan, Governing Soil Erosion: Thirty Years of the New Decentralization. (Baltimore, Johns Hopkins Press/Resources for the Future, 1965), p. 1-24.

[11]U.S. Office of Management and Budget. The Budget of the U.S. Government, Fiscal Year 1978, Appendix (Washington, D.C.: United States Government Printing Office, 1977), p. 152-154.

[12]Most of the work in this field is related to innovation research. See Laurence Brown, Diffusion Dynamics, Lund Studies in Geography, Series B, Human Geography (Lund, Sweden: University of Lund, 1968) and Everett Rogers, Diffusion of Innovations (New York: The Free Press, 1962).

[13]Stephen Feldman and Bruce Anderson, "The Public Utility and Solar Energy Interface," (Draft Report to ERDA: Division of Solar Energy, November, 1976); Michael Macrakis, Energy: Demand, Conservation, and Institutional Problems, (Cambridge, Mass.: MIT Press, 1974); and Marc Ross and Robert Williams, "Potential for Fuel Conservation," Technology Review (February 1977) p. 49-57.

James Malin and Aldo Leopold: Contrasting Approaches to Ecology and Man-In-Environment

by WENDY HUSSEY

The ideas that the historian James Malin develops in his works on the Great Plains and methodology of history reveal several themes relevant to geography, of which this paper will develop two: first, Malin's relationship to ecology, and his contributions to an epistemology of man-in-environment; second, his discussion of large-scale human adjustment to the environment--specifically, the nineteenth century pioneer's settlement of the grasslands of North America. These themes accurately reflect what Malin is as an ecologist, as well as provide a valid basis for organizing his more specific ideas. In addition, these themes are helpful structures for comparing Malin with the ecologist Aldo Leopold. While Leopold's description of mechanics of ecology is similar to Malin's his discussion of human adjustment to environment is on a more personal level. Leopold's concern with the role of the individual-in-environment provides a crucial extension to Malin's effort to bring the spirit of ecology to our knowledge of the world.

In Grassland of North America, Malin reveals his model of ecosystem through a discussion of the theoretical contributions of different branches of science--climatology, geography, geology, and soil science.[1] It is not easy to distinguish Malin's own picture of ecosystem because it is immersed in his discussion of other scientists. Perhaps his model is demonstrated most clearly in contrast with the work of the plant ecologist F. E. Clements, who argued that the vegetation of a region is an organism, naturally following developmental laws as does each individual plant. Out of this notion, Clements developed his concept of stages of succession and climax, and therefore concluded that vegetation is a closed system determined primarily by the variable of climate.[2] In contrast, Malin argues that the grasslands have never been in a state of stability. Rather, they are an open system of endless change, accounted for by a constellation of variables of which complementary plant and animal species of varied characteristics provide the most complete interchange of compensations.[4] In arguing against Clements, Malin stresses the inadequacy of a single-factor interpretation of any aspect of a region. He argues that every aspect of a region--its rainfall, animals, insects, soil, micro-organisms, and other elements--must be treated as an independent variable, capable of naturally impacting the generally continuous evolution of the other elements with which it interacts.[5]

Aldo Leopold's understanding of ecology comes from a much different source than Malin's, yet at first sight it seems similar. Leopold's style is Thoureauvian in that he sees in a single phenomenon both a window on its specific ecological relatedness and the ecological principles which it reflects in more general terms. Leopold

relationships among the elements are manifested in the flow of energy--most obviously food. He stresses, like Malin, the complementarity of interracting parts and emphasizes that diversity of species is an important--often crucial--factor in the stability of this interaction. Leopold also agrees with Malin that ecosystems are open, though his usage of the term is different. For Leopold, ecosystems are open because energy is dissipated in decay and added by absorption from the air. However, he argues that a particular system is a sustained circuit, made up of species that are more or less fitting. Leopold believes that indigenous species tend to keep the energy flow open while introduced species may or may not. Therefore, he concludes that not all factors in regional evolution are equally natural independent variables.[6]

The right understanding of man's relationship to the ecosystem is one broad focus for both men, and another point of similarity in their work is the fact that they can be called relativists. In Malin's work, this relativistic theme is revealed in his discussion of the nineteenth century occupation of the Great Plains. Malin argues that the early pioneers, carrying with them a culture that had evolved out of centuries of dwelling in temperate, humid lands, judged the apparently treeless and dry grasslands as deficient.[7] In fact, Malin goes so far as to say that their cultural blinders even prevented them from realizing that trees grew on the plains.[8] Malin writes that "nothing is marginal or submarginal except when measured by a standard that does not fit its natural characteristics," thus, one region should not be defined in terms of another.[9] Value judgements arise with our attempt to live in the world: "regions are adequate for their native vegetation and animal life."[10] Grassland of North America is a comprehensive beginning at a definition of the plains in their own right, in a manner consistent with a multivariate conception of ecosystem.

Leopold also believes that resources are defined by the situation and not by an absolute standard, and echoes Malin's suggestion that it is important to consider the background of any judgement about the natural world. Rather than dealing with large-scale adjustment to an unfamiliar environmental region, however, Leopold discusses the perceptions of plants, animals, and people as individuals. For example, he describes the perception of different sportsmen:

> These categories . . . represent four diverse habits of the human eye. The deer hunter habitually watches the next bend; the duck hunter watches the skyline; the bird hunter watches the dog; the non-hunter does not watch.[11]

Habituality tempers the perception of the sportsmen, fashioning for each type of hunter a different world. Leopold indicates that the sensibility not only of humans but also of plants and animals is intimately tied to way of life. This is suggested, for example, in his description of the varied meanings that a wolf's howl might have:

> To the deer it is a reminder of the way of all flesh, to the [illegible] a forecast of midnight scuffles and of blood upon the snow, to the coyote a promise of gleanings to come, to the cowman a threat of red ink at the bank, to the hunter a challenge of fang against bullet.[12]

Each element within an ecosystem experiences a different perspective on the whole.

In one sense, the message expressed here is comparable to Malin's. The grassland is a different world than the temperate forest says Malin; much of his work attempts to describe the grassland as it is in intself, rather than as a deciduous forest that was sidetracked or stalled along its evolutionary course. Malin succinctly describes this theme: "acutality becomes multiple in character."[13] To know a thing in its own right--be it a grassland or the howl of a wolf--demands a departure from one's taken-for-granted perspective.

Both men, then, share the belief that standards and perceptions are relative to place--Malin in reference to the judgement of one natural region by a culture indigenous to another, and Leopold in reference to the unique experiences of each element of ecosystem. Malin's treatment of cultures in adaptation to place, however, has an absolute reference point. Adaptation must be in conformity with the natural biological system.[14] A culture provides humans with options in ordering their relations with nature. Malin suggests that a methodology of history incorporate in part the ecological competition of cultures. Historically, the successful culture is one with a diverse range of resource utilization.[15]

Leopold takes a similar position. In "Thinking Like a Mountain," says that "only a mountain has lived long enough to listen objectively to the howl of a wolf." Through the perspective of time, the mountain knows things in their relatedness. Leopold suggests that the wise use of an ecosystem requires an understanding of the linkages among its diverse elements. In "Round River", he contrasts current farming techniques with the native flora and fauna. The farmer purges the food chain of all non-conforming links and aims toward economic profit--an effort supported by the importation of plants, animals, and fertilizer. An agriculture stemming from an awareness of the importance in a healthy ecosystem of natural diversity would seek to stabilize itself through a harmonization of wild and tame. "A thing is right," explains Leopold, "when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise."[16]

In examining Malin and Leopold's writings, then, we discover an exposition of ecology which has at least three similar themes: first, a comparable understanding of ecological processes; second, a recognition of the subjectivity of any single perspective on the natural world; third, the belief that this subjectivity can be overcome through a consideration of the ecosystem as a whole. At the same time, however, the perspectives of these two men house a fundamental contrast which ultimately may be more significant than

the similarities because it points toward two radically different futures for ecology and the relationship between man and nature.

To understand the fullness of this contrast, it is first important to recognize that Malin is strongly within the conventional scientific mainstream, while Leopold, who accepts the way of science, incorporates a more intuitive, less readily accessible mode of ecological understanding. Malin's adherence to conventional science is revealed in his discussion of four ways of knowing: scientific, speculative, esthetic, and religious. The historian's quest, Malin believes, lies in the realm of the scientific. Problems in history must be formulated in terms that are explicit and can be submitted to objective verification.[17] These formulations are most useful if they can be investigated through documented facts and expressed in terminology that is empirically verifiable and eventually quantitative. Malin argues that this positivist approach will allow the historian to search for certainty independent of metaphysical implications.[18] While Malin includes the subjective realm in his objects of study (arguing that values are as potent as physical forces) he believes that the method of reconstruction of a people's frame of reference must not differ from that of other historical investigations.[19]

At this point, it is important to understand Malin's notion of the whole-whether that whole be a region in evolution, or a process of adaptation. He states that it is essential in an attempt to study an earth area to avoid the assumption of any "dicta about the whole being greater than the sum of its parts and therefore superior to even the aggregate of the separate parts, especially the human population."[20] Instead, Malin argues that the forces impinging on a situation are to be regarded all as independent variables and natural change to include people and their actions. In describing this unity in environmental history, for example, he argues that the role of aboriginal man in the evolution of the grasslands must be recognized as a major ecological factor. The ecosystem is indeterminant because it can be impinged upon by any of a number of independent variables--including man. The notion of an idealized natural equilibrium, says Malin, is a myth.[21]

Malin extends his notion of ecological indeterminancy forward as well as backward in time. The open system which results is perhaps best understood if we contrast it with F. J. Turner's frontier hypothesis, which argues that the western frontier played a crucial role in shaping American individualism and its expression in government through democracy. Malin argues that Turner's correlation of mobility, opportunity, and democracy is ultimately pessimistic because closed space implies a new role of subjugation for the individual in relation to the state.[22] Malin contends that, among other reasons, this pessimism is unjustified because a new range of space has been created by the communication and transportation revolution of the machine age, which is the new frontier.[23] This new era of communication and transportation exemplifies a dramatic change in our relationship to environment, and Malin suggests that other technological developments may occur: "The key to the situation is not the earth, but the minds of men determined to realize their own potential in act."[24] Malin believes that technology provides a boundless frontier:

> The exhaustion of resources is only a valid term when there is proof that no possible technological 'discovery' can make them utilizable. This proof is impossible.[25]

Malin's optimism is not without qualification. In past eras, time has been one insurance against the spatial breakdown of people, resources, and ideas that were originally contiguous. With the opportunities that arise because of revolutions in speed of communication, however, comes also a changed time element. The settlement of the plains, for example, illustrates the difficulties present in a situation where speed of communication outstrips adjustment. The railroads across the west erased the former time buffer for adjustment: settlers were carried west faster than they could adequately adapt.[26]

Malin writes that one aspect of our being in the world that has especially failed to keep pace with technological change is our social institutions. Most significantly, he says, scientific knowledge has undermined religious knowledge, leaving us with a method "upon which all can agree," but without a sense of First Cause.[27] While scientific methodology will not determine First Cause, Malin believes, a prime aim of the historian should be the extension of certainty and the grounding of historical inquiry in "methodology conceived and applied according to the scientific spirit."[28] Religion, having lost touch with its origins rooted in direct contact with nature, must be restated to fit new human knowledge. The role of religion, Malin says, is to provide not a final answer but one that is "sufficiently satisfying to provide large groups of men with something to live by."[29]

Like Malin, Leopold unifies man and environment through an extension of the natural biotic community to include man, but ultimately this extension is not scientifically based. In Sand County Almanac, Leopold argues that scientific methodology is limited: most fields of science are inadequate because they are fragmented in dealing with a world of relatedness.[30] For Leopold, however, the inadequacies of science in defining our place in the natural world lie even deeper than this. While he believes that an intellectual understanding of the interrelatedness of the elements of an ecosystem is a valid aim of science, he suggests that it ultimately will fail to provide ecological explanations because of natural complexity:

> In human history, we have learned (I hope) that the conqueror role is eventually self-defeating. Why? Because it is implicit in such a role that the conqueror knows . . . just what makes the community clock tick, and what and who is worthless, in community life. It always turns out that he knows neither, and this is why his conquests eventually defeat themselves.[31]

This passage echoes, most dramatically, Malin's belief that science will not reveal certainty. Yet while Malin maintains in the face of this admission that a positivist science is still the

most valuable methodology for coming to know the world, Leopold suggests that there is an alternative. He describes a knowledge based not on a greater quantity of data about the workings of the physical environment, but on a greater sensitivity to one's own membership in a community. One source for this sensitivity is a humility in the person that comes with the recognition of an ecological whole greater than its parts:

> Sit quietly and listen for a wolf to howl, and think hard of everything you have seen and tried to understand. Then you may hear it--a vast pulsating harmony--its score inscribed on a thousand hills, its notes the lives and deaths of plants and animals, its rhythms spanning the seconds and the centuries.[32]

Leopold suggests that this encounter with a unifying whole is inaccessible to scientific inquiry:

> A philosopher called this imponderable essence the numenon of material things. It stands in contradstinction to phenomenon, which is ponderable and predictable, even to the tossings and turnings of the remotest star.[33]

What is involved in an encounter with this essence of an environment or thing? The most important point that Leopold makes is that it incorporates more than intellect. His love for the landscape and his attempts to understand its workings are apparent throughout Sand County Almanac. "We need knowledge--public awareness--of the small cogs and wheel," he wrote, "but sometimes I think there is something we need even more . . . a refined taste in natural objects."[34] This mode of knowing is not just a cataloguing of relatedness, but an experience that touches the whole individual. Leopold most often calls this encounter the land ethic--a compelling ecological perception that is grounded affectively as well as intellectually. "It is inconceivable to me," wrote Leopold, "that an ethical relation to land can exist without love, respect, and admiration for the land, and a high regard for its value."[35]

In the writings of Malin and Leopold are two very different elaborations of what the ecosystem model can mean for modern man. The cleavage between them is clarified in Roszak's discussion of the issues which ecology must face:

> Ecology stands at a critical crossroads. Is it, too, to become another anthropocentric technique of efficient manipulation, a matter of enlightened self-interest and expert, long-range resource budgeting? Or will it meet the nature mystics on their own terms and so recognize that we are to embrace nature as if indeed it were a beloved person in whom, as in ourselves, something sacred dwells?[36]

Malin's thinking is linear in that it defines progress as a broadening of our ability to utilize resources; ecology in this approach is a useful structure for integrating disparate bits of scientific information for the purpose of scholarly description

and explanation. The age of technology and its ramifications for our being in the world--most notably our loss of contact with nature--requires an updating of our ethical and social institutions. "Man is no longer earth bound," says Malin, and even our religion must be modernized to satisfy the new era.[37] In his contrasting vision of ecology, Leopold circles back to nature in a search for the experiential roots of our civilization. He fails, however, to provide a complete basis for--or even a thorough description of--this heightened encounter with nature. If we extend Leopold's indications, one future project is to search out the nature of this encounter and to ask if we might foster it in ourselves and others. Ecology can become a comprehensive science only through an acceptance of the full range of human relatedness to nature. Through a consideration of man's multifaceted ties with the natural world, we might ground ecology in nature itself and re-establish a more compelling contact with the natural environment and ourselves as its reflection.[38]

FOOTNOTES

[1]James C. Malin, The Grassland of North America: Prolegomena to its History (Lawrence, Kansas: privately printed, 1947).

[2]Grassland, p. 8.

[3]The two positions are contrasted in Robert G. Bell,"James C. Malin and the Grasslands of North America," Agricultural History, 46 (1972), 414-24.

[4]Grassland, p. 120.

[5]For a discussion of the impact of the individual on continuous change, see James C. Malin, Essays in Historiography (Lawrence, Kansas: privately printed, 1946), p. 129.

[6]These principles are drawn from Aldo Leopold, A Sand County Almanac (New York: Sierra Club/Ballantine Books, 1966); they come from different essays in the book: land as mechanism and the relationship of natural species and open energy from "Land Ethic," complementarianism from "A Mighty Fortress," and the relationship of diversity and stability from "The Round River."

[7]Martyn J. Bowden, "The Environmental Brink and Ecological Overkill" (paper presented at the meeting of the American Historical Association, New York City, December 30, 1971), p. 3.

[8]Grassland, p. 83. Malin argues that the pioneers were accustomed to thinking of trees as commercial saw timber and sometimes were oblivious to their growing along streams.

[9]James C. Malin, "'Grassland,' 'Treeless,' and 'Subhumid': A Discussion of Some Problems of the Terminology of Geography," Geographical Review, 37 (April 1947), 249.

[10]Ibid., 242.

[11]Sand County, p. 223.

[12]Ibid., p. 137.

[13]Essays, p. 161.

[14]James C. Malin, "Ecology and History," Scientific Monthly, 70 (May 1950), p. 295.

[15]The point is made, among other places, in "Pioneering Towards Grassland Regionalism," in Malin, Grassland, p. 173.

[16]Sand County, p. 262.

[17]This idea is stated strongly in the essay,"The Turner-Mackinder Space Concept of History," Essays, pp. 1-44, which criticizes Turner partly on the basis of his arbitrary delineation of historical phenomena.

[18]For the specific statement, see "Science and Social Theory," Essays, p. 93. The metaphysical assumptions of a positivist inquiry are discussed in Theodore Roszak, Where the Wasteland Ends (Garden City: Doubleday and Co., 1973), esp. pp. 68-71.

[19]Other statements of methodology can be found in "Certainty and History," Essays, pp. 109-68, and in two articles already cited: "Ecology and History," and "'Grassland,' 'Treeless,' and 'Subhumid'."

[20]James C. Malin, Grassland Historical Studies, Vol. I: Geology Geography (Lawrence, Kansas: privately printed, 1950).

[21]"Soil, Animal, and Plant Relations of the Grassland, Historically Reconsidered," Scientific Monthly, 76 (April 1953), 207-20.

[22]Essays, pp. 1-44.

[23]Both "Mobility and History," and "Space and History," suggest this. James C. Malin, "Mobility and History," Agricultural History, 17, pp. 177-91; and "Space and History," Agricultural History, 18 (July 1944), pp. 107-26.

[24]James C. Malin, "Soil, Animals, and Plant Relationships of the Grassland Historically Reconsidered," Scientific Monthly, 76 (April 1953), p. 219.

[25]"Ecology and History," p. 296.

[26]James C. Malin, "The Adaptations of the Agricultural System to Subhumid Environment," Agricultural History, 10 (July 1936), pp. 118-41.

[27]Essays, p. 167.

[28]Ibid., p. 167.

[29]"Space and History," p. 123.

[30]The potential of ecology to bring the different branches of science into a whole is discussed, among other places, in Sand County, pp. 202-10.

[31]Sand County, p. 240.

[32]Ibid., p. 158.

[33] Ibid., p. 146. Susan Flader points out that the philospher spoken of here by Leopold is the Russian Peter. D. Ouspensky, who discusses the terms in his Tertium Organum: a Key to the Enigmas of the World (New York: Random House, 1970) pp. 131-39. See Flader's Thinking Like a Mountain: Aldo Leopold and the Evolution of an Ecological Attitude Toward Deer, Wolves, and Forests (Columbia: University of Missouri Press, 1974), p. 18.

[34] Sand County, p. 194.

[35] Ibid., p. 239.

[36] Roszak, Wasteland, p. 370.

[37] Mobility and History," p. 190.

[38] Phenomenology offers one effective framework for the concretization of this suggestion. For a discussion of the phenomenological method and an example of its use in a specific study, see David Seamon, "Movement, Rest, and Encounter: A Phenomenology of Everyday Environmental Experience," unpublished Ph.D. dissertation, Clark University, Worcester, Massachusetts, 1977. Chapter four of the dissertation provides an experientially based discussion of the varying nature of encounter with the physical world, and offers a more thorough description of the man-environment relationship that was so crucial to Leopold. A further elaboration can be found in David Seamon, "Extending the Man-Environment Relationship: Wordsworth and Goethe's Experience of the Natural World," Monadnock 50 (1976), pp. 18-41. Theodore Roszak in Where the Wasteland Ends contrasts conventional scientific understanding with more intuitive forms of encounter, and discusses the wider historical significance of the two ways of knowing (see footnote 18 for the full reference). The scientific work of Johann Wolfgang von Goethe provides an example of the application of a phenomenological method to a study of elements of the everyday world--for example, color, plants, clouds, rocks--and offers a guide for the student who wishes to foster in himself moments of heightened encounter with nature. See, for instance, his Theory of Colors (Cambridge: MIT Press, 1970) and his "Metamorphosis of Plants" in Goethe's Botanical Writings, translated by Bertha Mueller (Honolulu: University of Hawaii Press, 1952). Theodore Schwenk's studies of water follow a similar approach and point to an understanding of water and other fluids that is considerably different from the conventional scientific picutre. See his Sensitive Chaos (New York: Schocken Books, 1961).

A Community Oriented Teacher Training Model for Environmental Education

By BRET HALVERSON

Environmental Education was officially recognized in 1970, with the enactment of legislation, as a process by which the quality of the environment could be maintained. This idea is basically not new, for prior to 1970 the nature study movement, conservation education and outdoor education were all advocated as effective means of improving environmental quality. As Terry points out "it is interesting to watch how long our intentions have been good, our proclamations have been published yet our habits have gone unchanged".[1] How is the latest effort to explain and understand environmental phenomena and problems likely to be anymore successful than its predecessors? Certainly it is more broadly based in that it claims to focus not only on the physical rural environments but also on the social and built urban environments. But the developments over the last seven years indicate that many of the weaknesses remain - the narrowness, the superficiality, the lack of school and community interaction and the resistance of school systems to these new ideas. One of the prime reasons for labelling many past programs failures is that basic attitudinal and behavioral patterns toward the environment have not changed, causing a continuing decline in environmental quality. This can be partially explained by the fact that many programs have been based on a false premise: that if the right information is presented to people they will be persuaded to modify their life styles accordingly.

If the environmental crisis has proved nothing else it has proved that knowledge alone gained by scientific analysis does not lead to rational, moral and humanitarian behavior.[2]

One of the major concerns of this paper is to examine the translation process whereby research findings on environmental phenomena are made accessible at all levels of education. This process has been very much taken for granted by people involved in education. Any study of such a process is, of course, complicated by the fact that environmental phenomena particularly the linked problems of the physical, social and built environments, cannot be adequately analyzed from the viewpoint of any single discipline. This is because no single discipline has the necessary synoptic and synthesizing qualities to truly reflect the complexity, uncertainty and externalities of environmental phenomena and problems. Information and methods therefore need to be drawn from a number of disciplines. A standard response to this difficulty is to advocate the adoption of integrated or interdisciplinary studies of the environment. The basic problem with these efforts is the traditional lack of interaction between disciplines, especially between the sciences and the humanities. Its proponents maintain that the lack of disciplinary

interaction can be overcome by establishing environmental institutes which provide a more appropriate means of educating the public. In theory such institutes would conduct research on environmental phenomena and problems which could in turn be translated into a form that is palatable for students of different levels of sophistication. In terms of meaningful learning this particular strategy seems to have accomplished very little in practice. It becomes increasingly apparent that other alternatives need urgent consideration. One of the most promising, and definitely more pragmatic measures would be to place more emphasis on developing low cost teaching models for environmental education within existing departmental structures. This would enable diminishing financial resources to be used more efficiently in developing curricula within existing institutional frameworks rather than creating new bureaucracies. By shifting the emphasis away from the pointless circular debates on the appropriate goals for environmental education to the implementation and processes by which programs may be put into practice a positive step can be taken to overcoming many of the shortcomings which have plagued environmental education in the past. This paper presents a description and evaluation of one possible university based teacher training model which was developed as a course at Clark University during the fall semester of 1976, and which revealed sufficient promise to warrant further experimentation.

The Course Model

The course was offered as a workshop for juniors and seniors with either a background in environmental disciplines or in curriculum development and with an interest in the environment. The result was a class drawn from a number of interest areas including biology, earth science, geography, outdoor education, history and journalism. Participants' teaching experience varied from none at all to nine years.

(a) Course Objectives and Philosophy

The primary objective of the workshop based course was to develop a teacher training model which would encourage each participant to rethink and eventually utilize the basic elements of the learning process and the content which underlie the ways in which learners interpret their environments. Such a model would encourage teachers to assist students to develop ability "to think, to synthesize, to learn to see the world about them in more holistic terms than before. This requires teachers to encourage students to share their separate experiences with one another, to bring the specific experiences to a more general level in other words to balance learning by the group with individualized learning".[3] The initial approach to accomplishing these objectives was to examine the relationship between the teacher and the learner and to come up with some basic statements on the nature of the learning process, which included:

(i) Learning is basically innate, as humans from an early age seek to make progressively more and more sense of the world that surrounds them by generating and testing hypotheses. This problem solving process involves building on what is already known. A learning situation arises whenever the learners cognitive structure (i.e. the theory of the world in a learners head) proves inadequate for making sense of the world the learner is confronted with noise or nonsense.[4] The implication of this statement is that the learner should be envouraged to seek solutions to problems rather than merely memorizing content, which has traditionally tended to be the focus in most classrooms.

(ii) Learners do not see the world around them in the same way. The cognitive structure of the learner is shaped not only by knowledge but also by opinion, preference, prejudice, taste, habit, hope, fear, love, hate and expectations.[5] Variations in the way in which learners view the world are considerable. Therefore instructional strategies for individuals must vary within a group, as it is important to relate new information to what the learner already knows, rather than what seems elegant and rational to the instructor.

(iii) The learners' relationship with their environment should be an active, as opposed to a passive, one. This can be accomplished by direct investigative contact of environmental phenomena rather than merely discussing such features.

(b) Course Implementation

The workshop endeavoured to implement the above objectives and philosophy by involving a group of teachers and prospective teachers in the same type of learning experience that they could try to implement in a classroom situation. Initially the course was designed with two major sections:

1. A group workshop session which met twice a week for an hour and a half throughout the semester to explore the wide range of strategies, sources of information and specific examples which have and can be used to explain the environment.

2. A design exercise of an environmental education program by each individual involved in the workshop. However, very early in the course a clear split emerged between those with teaching experience and those with no teaching experience as to the practicality of certain approaches to classroom implementation. In an effort to partially resolve this split, one of the students investigated the possibility of actually establishing and teaching a program in a neighborhood school. The result of this investigation was LIVE (Living in Various Environments), a program for fifth and sixth graders held twice a week after school for one hour. The course therefore had three major sections, all of which merit some description and explanation.

1. The Group Workshop Sessions

The bi-weekly workshop sessions were designed to identify, outline and critically examine the application of the elements which have and could be used to explain the environment which surrounds us. The approach taken to implement this was a rather arbitrary one - a four part structure:

(a) Overview
(b) Content
(c) Process
(d) Specific Illustrations

(a) The introductory section was largely an attempt to acquaint participants with each others' interests and backgrounds, and to examine the literature on past, present and future trends in environmental education.

(b) The fundamental aim of this section was to examine, as a group, individual sources of environmental information (e.g. ecological, political, geographical and economic) in an effort to find ways to integrate concepts from a variety of sources to reflect more fully the nature of the environment. The approach taken to accomplish this aim was for each individual to outline in one workshop section his/her personal view of the fundamental concepts and domains of interest characterizing the perspective in which he/she had been trained. This had a two fold purpose. Firstly, it forced the presentor to examine at a very fundamental level the basic tenets of his/her discipline, something that most had probably always taken for granted in the past. Secondly, the translation process enabled the other participants to gain an insight into some of the concepts and skills from other disciplines which may be integrated into their own programs to provide a more holistic view of environmental phenomena and problems. It is this ability of instructors to recognize the links between environmentally focused disciplines, as well as possessing competence in anyone of these disciplines, which should help avoid the communication of misleading statements to students, which has marked many earlier unsuccessful environmental programs.

(c) Process

The basic format of the process and content sections of the course was very similar, in that they both stressed the individual participants' ability to assess the suitability of particular strategies in light of their own strengths and weaknesses, and in terms of their particular views of the nature of learners. The way that this was to be achieved was by devoting each session to looking at one strategy at a time - examples included role playing, simulation and encounter groups. Although the focus for each session was a single strategy, the ultimate concern in these sessions was to develop a more holistic view, as opposed to an isolated unconnected one, of the environment, by integrating the strong features of each

strategy into the whole experience of education. The availability of a rich range of community resources, especially people within the university with particular expertise in specific strategies, provided a worthwhile input to sessions in this section of the course.

(d) Specific Examples

The last section of the workshop was originally designed to be integrative and illustrative of the previous sections, particularly the individual design exercise. By working in small groups (two or three people) students would endeavour to integrate the content and process around one specific aspect of the environment (e.g. waste recovery) in a mini program. The rationale was that by involving students with different interests and backgrounds in the group process, they would be encouraged to examine a wide range of strategies and sources of information in order to explain the environment from more than one perspective. [Originally the section was specifically designed to complement the individual design section of the course.] Although this section of the course was superceded by the LIVE program, this type of approach would in other situations provide a positive means of helping teachers to design more holistic programs.

2. Individual Program Design Exercise

Education has traditionally emphasized the importance of a product (e.g. tests, papers) at the expense of the process by which the product has been formed. This course endeavoured, particularly through the workshop sessions, to shift this emphasis by making students more aware of the process by which programs could be put together. Because of institutional product requirements it was felt that the product which emerged at the end of the course should be useful in the future for the individual, rather than being, merely sufficient to fulfill course requirements and then relegated to the box of useless past projects. The workshop sessions were designed to provide a range of approaches and sources of information which could be integrated with students' own individual programs. Students were given considerable freedom as to the form the program could take. For example the program could be a detailed two or three mini programs on one aspect of the environment or it could be a preliminary outline for a years' program, to be developed at a later date. In this way students could develop the type of program that best fitted their own needs. Students seemed to appreciate this freedom of choice, a feature which was evident in the wide range of approaches adopted in the "completed" exercises. In this way, this section of course endeavoured to blend effectively an understanding of the process of program development with a tangible environmental program product.

3. Woodland Street School Project

One of the basic problems which seems to arise in curriculum

developments efforts, is whether designed activities will or will not work in a classroom situation. This particular problem emerged very early in the workshop sessions during discussions of the effectiveness of exercises in classroom situations. A frequently heard comment was "that's a great idea but it won't work in the classroom". The split which emerged over the effectiveness of certain exercises seemed to be closely linked to the amount of students' previous teaching experience. Those who had teaching experience tended to adopt a more pragmatic approach, some may call it cynical, whereas those without teaching experience tended to be more idealistic about the practicality of specific exercises. The central question which emerges from this dichotomy relates to the possibility of balancing the idealism and pragmatism of the two groups. The LIVE program represents an effort to resolve this split by enabling students with little or no teaching experience to develop and teach a program in a classroom situation. By participating in the workshop and at the same time teaching in a classroom it was hoped that students would become more aware of the gap between the ideal situation and what is possible to put into practice at a particular time in a specific location.

The LIVE program represented a specific example of an outdoor education perspective through which it is possible to foster increased understanding of the environment which surrounds us all. By focusing on a single concept (the "web of life" idea) it was felt that this maximized the instructor's ability to involve students in direct investigative contact with the environment. The rationale for such a focus was the belief that students would respond more positively to a program of short duration (ten weeks) held after school, if it was very different from their everyday routine. The guiding principle for individual activities was to begin with simple and concrete phenomena, rather than with those which were more abstract and complex, so that students could relate new information to what they already knew. The major support for this type of approach is that the learner is able to make more sense of new information if he/she can relate it to his/her individual view of the world. An example in the program was a simulation exercise to explain the nature of soil processes. This involved students' using individual sandboxes to construct simulated physical landforms (mountains, river valleys) with soil. By pouring water over the landforms from various heights, students were able to duplicate physical processes at an easily observable scale. The principles that the students see at this scale can then be applied to larger more complex real world situations. This emphasis on observation was continued throughout the course by using plants, animals and other samples of the natural world inside and outside the classroom.

The sequence of LIVE was to work through the web of life idea, in order to emphasize the inter-relatedness of the physical environment. It involved beginning with a number of sensitivity activities (blind walks) in an effort to make students more aware of how their individual senses can be used and to show them the extent to which they take their environment for granted. The focus then shifted to

the non-living elements of the natural environment, such as weather and soil. In examining the elements of weather, emphasis was placed on monitoring individual aspects of the weather. This was accomplished with extensive use of low cost "waste" materials like cardboard boxes, used milk cartons, scrapwood and styrofoam to construct simple weather instruments, allowing students to monitor weather elements such as humidity and windspeed. It was firmly believed that programs could be developed without relying on expensive monitoring equipment. The next step was to examine the living elements of the natural environment, which complete the web of life: plants, insects, birds and various types of animals. Particular attention was concentrated on growing plants, examining and collecting small samples of flora which surrounds the school. First hand observation of the elements of the natural environment, is crucial if a learner is to be able to increase his or her understanding of many of the things that are often taken for granted.

The response of the fifth and sixth graders to the program was extremely positive. An outside evaluator found that students' understanding of some of the fundamental concepts improved throughout the course. Although aware of the fact that some of the activities may be difficult to implement successfully in certain single teacher situations, owing to the time needed for preparations and control problems, LIVE can be considered to have been a significant success on four major grounds. Firstly, it gave the workshop participants with little previous teaching experience, an opportunity to develop and teach their own programs in a classroom. Secondly, it provided workshop participants with classroom experience with a chance to observe other teachers teach, and to evaluate the effectiveness of specific teaching strategies and to apply them to their own programs. Thirdly, for the fifth and sixth graders, it represented a chance to interact with a small group of university students who share a neighborhood with them and to learn in an informal and enjoyable atmosphere. For the school system itself it represented an educationally valuable program at a very low cost.

(c) Course Evaluation and Implications for Environmental Education

Two general questions seem important in evaluating the strengths and weaknesses of this type of course: (A) How successful was the course for those who participated in it; (B) What are the implications of such an approach for other environmental education programs?

(A) An evaluation session in the latter part of the course saw a re-emergence of the basic dichtomy between two groups of participants. On the one hand some of the participants felt the course should adopt a "cookbook approach", i.e. how you should teach environmental education in 28 easy lessons. This group was a little disappointed that it did not have a recipe, or step by step directions, for implementing environmental programs. A feeling existed amongst this group that many of the outside experts used in the strategies section of the course could have directed their comments more towards environmental education rather than focusing on the strategies per

se. On the other hand some favoured an approach which presented a diverse set of concepts and skills from which individuals could select, modify and use the most appropriate in developing their own programs. This group found the framework of the course and the diversity of approaches provided by individual participants and outside experts enabled them to do this effectively. Both groups found the adoption of a disciplinary focus as a starting point much easier to operationalize than integrating disciplines around specific phenomena - an approach which is often presented as an alternative.

Participant interest and involvement tended to fluctuate towards the end of the semester. This was due to the unevenness in the quality of speaker presentations (both group participants and "outside experts"), the build up in the pressure of work from other courses and because of the novelty of the first part of the course, which meant some drop off in interest was inevitable. Despite this, attendance was generally very good. The freedom of choice, especially in the form of presentations and assignments, was well received by all participants. Some expressed regret that they had not used the discussions from the workshop sessions to develop individual program designs throughout the semester, because they tended to leave the work in the latter part of course until the end of the semester. This was not so with those who participated in the LIVE program who found the preparation for their bi-weekly classes encouraged them to incorporate successful ideas into their own programs and rethink those which did not work as well as originally planned. The LIVE program on the whole was considered a rewarding experience. A certain amount of frustration arose out of the difficulties in resolving variations in personality, disciplinary background and educational philosophy. But, the benefits according to participants definitely outweighed the weaknesses.

(B) The implications of a workshop course such as this one for that field that has become known as environmental education are numerous, but three major points seem very important.

(i) One of the most justified critiques of environmental education in the past has revolved around the nature of the content of many programs. Critics have labelled programs as one sided, cosmetic and superficial.[6] The accuracy of such labelling is evident in the dual focus of most environmental programs which represent the two extremes of the environment; the ugliness and degradation of environmental pollution and the pristine beauty of the natural world. The result is that students tend to become very "turned off" by the constant emphasis on negative or ideal aspects of the environment because of the difficulty for students of seeing their role in improving the situation. Therefore it is vital that programs endeavour to achieve balance between the "good" and "bad" features of the environment. This is usually much easier to achieve if the environment (i.e. the neighborhood) that the student knows is used as a starting point. This focus can be

carried too far and as Bruner points out become an itinerary rather than a point of departure. It is important that programs encourage students to investigate a range of environmental phenomena, particularly those at a local scale, rather than focusing on the extremes of the various environments.

A prime concern of program developers should be to achieve a better balance between the content of programs and the process by which this is communicated to the learner. Traditionally the emphasis in education has been on the presentation of content, which has been assumed to be sufficient to promote desirable social ends. Such an emphasis has been one of the major reasons for the past lack of success of environmental education programs.[8] This program attempted to overcome this past lack of success by initially examining the two major parts of any program (content and process) and then endeavouring to integrate these parts into a whole through a number of different experiences (the LIVE program, the specific issue group analysis and the individual design exercise) and in this way achieve some degree of balance of content and process and integration of parts into a whole.

(ii) For a variety of reasons, teachers have tended to become more and more isolated, not only from their colleagues, but from the community which surrounds them. In developing environmentally sound programs, it is very important to re-establish communications, within the school and with the community, in order to maximize the use of the rich array of community resources (people and artifacts). Networks need to be established to enable environmentally conscious people (e.g. planners, architects, local historians, conservationists) to communicate with each other. Such community resources, which until now remained largely untapped, provide a very positive mode of learning by which it is possible for students to understand the phenomena and problems in real, as opposed to abstract, terms. The course, by means of an analogy, demonstrated to prospective teachers one way in which community resources can produce a very stimulating learning experience. It also demonstrated the value of a two way interaction experience between a university and a neighborhood school, and between a group of prospective teachers and elementary school children, in translating theory into practice.

(iii) The success of the LIVE program, which can be partially explained by the positive interchange of ideas in the workshop sessions, emphasizes the importance of designing programs which involve students as active, as opposed to passive participants in the learning process. By involving students in direct investigative activities within the classroom, the school grounds and the community, learning

becomes more meaningful and relevant. Unfortunately, the advances of science and technology have resulted in an increased reliance on the written word at the expense of an individual's senses. In order to counter this move towards environmental numbness the environment should be "met, listened to and worked with rather than relegated to ditto sheets and textbooks."[9] This does not mean that such an approach is pursued at the expense of instruction in basic skills. The basic skills, specially the 3 R's, should and can be woven into every activity. This has the advantage of making such activities more meaningful because they are being studied in order to solve a relevant problem as opposed to being treated in a separate and mechanical way. The integrative learning approach advocated here can be fostered by not only using outside resources, but also by making classrooms more varied and attractive environmentally, by removing what Sommer calls the "look but don't touch message" that classrooms tend to have.[10] As Hawkins[11] points out it is rather incongruous to teach about the environment yet not have living things or samples of materials in the classroom. Classrooms should be used to stimulate student interest in the environment as well as developing a feeling of home with their learning environment. By fostering such feelings, education becomes more relevant to students' own life styles, by providing explanations to phenomena and problems that they see, hear, feel, touch and smell.

Conclusion

It seems very clear from the experience of this three part course that a strong case can be made for much more emphasis to be placed on designing teacher training models which make teachers more aware of the process by which meaningful environmental education programs are put together. Obviously the task of designing such courses is not an easy one and definitely not something that can be accomplished in one semester. It is however essential that those who call themselves environmental educators talk less about what should be done and actually do it. This course endeavoured, with some success, to do this in a way which seemed to best fit a particular group of participants interests. In other locations, with different people, the structure of the course may vary significantly but the principles outlined in the last section of this paper appear to be essential to any holistic study of our environment.

FOOTNOTES

1 Mark Terry, Teaching for Survival (Ballantine Books, New York 1971), p. 49.

2 Carl Reidel, Education in Environmental Interdisciplinary Approaches ed. Albert E. Utton et al. (Educational Media Press, Costamecca, California 1974), p. 49.

3 Bettison Shapiro, Tiorati: Educational Philosophy, Goals and Means of Implementation for Participating Schools, unpublished, 1976.

4 Frank Smith, Comprehension and Learning - A Conceptual Framework for Teachers (Holt Rinehart & Winston, New York 1975), p. 138.

5 Ibid. p. 11.

6 An excellent review of these types of criticisms can be found in David Sills, Critique of the Environmental Movement in Human Ecology, Vol. 3 No. 1, p. 1-41.

7 Jerome S. Bruner, On Knowing (Atheneum, New York 1965), p. 117.

8 Gerald Schneider, Why Conservation Organizations Fail to Educate Part 1., American Forests, April 1974, p. 73.

9 Terry, op. cit., p. 129.

10 Robert Sommer, Design Awareness (Rinehart Press, San Francisco 1972), p. 37.

11 David Hawkins, The Informed Vision: Essays on Learning and Human Nature (Agathon Press, New York 1974), p. 155.

Environmental Issues and Trends in Eastern and Southern Africa

by CINDI KATZ

The Program in International Development and Social Change has been working on a study of the environmental context of development in Eastern and Southern Africa. This work has been underway since the spring of 1976 and is funded by US-AID. The research has been directed at identifying any underlying trends in the use of environmental resources in eastern and southern Africa which may now or in the next decade, seriously affect national development efforts. Students and faculty have been working with representatives of participating institutions in Botswana, Ethiopia, Kenya, Malawi, Tanzania, and Zambia.

In the design of the project, we intended that the first year would accomplish the following preliminary tasks:

1) the identification, through literature review, professional assessment and other means, a first assessment of the most important and pressing environment/people problems in the region and in each country;

2) an outline of the historical evolution of these problems;

3) The inclusion of African personnel and institutions in these tasks, both to insure national perspectives and to help increase awareness of environmental issues;

4) a review of current and proposed institutional responses in Africa;

5) an outline of proposals for future activities which African institutions and personnel deem appropriate to increase environmental awareness and to incorporate environmental perspectives in development policy.

To this end, preliminary analyses of the environmental context of development and of the historical evolution of environmental problems have been completed for each of the six countries. In addition, contact, often involving close collaboration, has been made with people and institutions in the public and private sectors in each country. In October of 1976 a workshop was held at Clark which brought together 15 Africans from 5 countries (Malawi could not send a representative) and 17 faculty and research assistants from Clark. The workshop participants reviewed and discussed a considerable volume of reports, background papers, and graphic materials. In small country working groups plans were made for further work to continue both in Africa and at Clark.

At the end of the first year of work on the project the principal findings were:

1. African governments and people are increasingly recognizing the importance of environmental issues, especially as these impact directly upon food production, health, and energy;

2. African institutions are giving priority to action oriented, applied studies and policies in respect of the environment, and positive attitudes exist towards collaboration on environmental questions which can bring together Africans from various nations, as well as African and European/North American environmental specialists;

3. The current status of information, resources, and available personnel within African institutions to undertake such work varies with some institutions being well developed and others in need of additional resources;

4. In the six eastern and southern African countries under consideration, the most important environmental concerns affecting development involve:

   a. Soil losses (Ethiopia, Kenya, Tanzania, Botswana, Malawi);
   b. Water quality and quantity (Kenya, Tanzania, Botswana);
   c. Forest and woodland deterioration (Kenya, Zambia, Botswana, Ethiopia);
   d. Human disease (especially Ethiopia);
   e. Pests and animal diseases (Tanzania, Zambia, Botswana, Ethiopia);
   f. Pollution (Kenya and Zambia);
   g. Urban/industrial concerns (Botswana and Zambia).

5. Vital components of future work involve the sharing of information to increase environmental awareness and the integration of such information into long-range policies. Key institutions include those of the government ministries and development agencies, government and university research organizations and various educational institutions.

6. Potentially useful techniques of information collection, analysis, and dissemination include easily understood environmental maps, comparative charts which highlight environmental situations, design of national environmental systems, national symposia, and village level data collection efforts.

7. Success for any of the above points assumes and depends upon full participation and follow through by national institutions, activities that are compatible with and can

become integral parts of national development plans and programs, and endeavors which can yield tangible results within a five to ten year period.

The Societal Management of Technological Hazards

by JULIE GRAHAM

Clark University has received a National Science Foundation research grant of approximately $260,000 to study the management of technological hazards. The principal investigators for the project are Roger Kasperson and Robert Kates of the Geography Department, Christoph Hohenemser of the Physics Department, and Robert Harriss, Professor of Oceanography at Florida State University. A group of behavioral psychologists at Decision Research in Eugene, Oregon have a companion grant of approximately the same size.

The project addresses four major questions:

--What technological hazards do we face and how should they be conceptualized in terms of their actual and perceived characteristics?

--How can we determine acceptable risk levels?

--How does the process of managing hazards work today; in particular, what blockages are there in it and how can it be improved?

--How can technical information be presented to non-experts to facilitate their constructive participation in hazard management?

We cannot hope to answer all these questions in this 17-month phase of funded research, but we shall try to lay a groundwork for more complete solutions through the following contributions:

(1) Formulation of a structural taxonomy for ordering hazards, based upon their observable characteristics. Such a taxonomy could provide a general predictive theory for identifying, monitoring and controlling hazards and allow deeper understanding of the hazard phenomena as well.

(2) Definition of the hazard management process within society and government, both as it is currently practiced and as it might be. An empirical data base of case studies will be created, and systematic means will be found for characterizing the societal response to different classes of hazards.

(3) Clarification of the feasibility and normative implications of different proposed methods of determining risk acceptability. Two extant major approaches--revealed (i.e., in the marketplace) and expressed (directly stated) preferences--will be explored through behavioral research;

we have also defined a third approach--implied preferences--which we intend to develop through the analysis of public processes (e.g., laws, regulations, court cases, etc.).

(4) Creation of a social/psychological taxonomy of hazards, based upon public perceptions. This is a continuation of the work on expressed preferences of groups for acceptable risk and their perception of risk characteristics, as evidenced by experimental and survey research. These perceptions can be systematically compared with the observable characteristics of hazards.

(5) Development of improved methods for communicating information about hazards and risk management, thereby enhancing constructive public participation in the decision process.

In addition to the above, we have a strong commitment to disseminating and encouraging utilization of our results. To aid us in this effort, we have brought together an outstanding advisory panel of potential users drawn from industry, labor, public interest groups, government agencies, the news media, and the scholarly community. We met with our committee for the first time in Washington on February 15, 1978 to review our progress after six months.

Our major achievement to date is the formulation of a structural model of technological hazards. Based upon the evolution of hazards, it links the origins of hazards to a number of other stages culminating in the hazard consequences (such as mortality, ecological damage, psychological disturbance). The model has also proved useful in identifying a finite number of modes of hazard evaluation and strategies for managerial control.

On the managerial side, we have completed a detailed study of the Consumer Product Safety Commission and launched intensive studies of two individual technological hazards cases (mercury and television) and one broad class (collisions). Each of these studies will treat the broad range of physical and social hazards and the managerial process as well.

Solar Energy Project

by STEPHEN SAWYER, ELIOT WESSLER AND ROBERT WIRTSHAFTER

Solar energy is perceived by many advocates and the general public as a panacea for America's energy problems. It is abundant and environmentally benign. Yet, similar to the development experience of other energy technologies, significant questions are developing as to the real potential of solar as a useable, economically viable energy source.

A problem is that the availability of sun's energy does not necessarily translate into usable energy source. The diffuse nature of this energy source requires the development of technology capable of collecting, storing and delivering the energy in the desired form. At present, many of these technologies are highly capital intensive. In addition, the availability of solar energy is not constant due to seasonal, daily, and weather conditions, and, therefore, there remains a dependence on traditional fuel sources for back-up service.

Despite these problems with solar heating and cooling technologies, the government perceives enough benefits in the potential of these solar technologies to undertake a program of rapid promotion. Unfortunately, this decision by government has not been based on a systematic analysis which accounts for all of these concerns, but more on an overriding desire to develop as rapidly as possible any technically feasible alternatives to oil and gas. To this end, the government has directed incentives to consumers to increase the cost-effectiveness of particular technologies. Of particular concern to present policy towards solar heating and cooling is the failure to assess these solar systems within a wider total resource management perspective. It is the present interdisciplinary aspects of resource theory which best illustrate the potential of a new technology and differentiate the benefits of that technology between individuals and society. The work by the group of solar people has been to solar energy promotion among government officials. The multidisciplinary approach that geographers employ has been particularly useful in dealing with this issue. This is especially the case when one considers the large numbers of engineers and economists involved in the government solar policy, who are somewhat unable to appreciate the complexities of each others arguments.

The solar work at Clark developed out of a grant two years ago (Monadnock 1976) examining the relationship between solar heated buildings and electric utilities that were serving as back-up energy sources. It was found by the group that many solar building designs impacted negatively on the servicing electric utility loads and

finances. Furthermore, all economic feasibility studies of solar heating technology had ignored the costs associated with these impacts, and, therefore, public policy towards the promotion of solar energy was creating inefficiencies in resource allocation.

Since the first grant, the work at Clark has been expanded to many other aspects of solar energy and general energy policy. Continued work on the solar building-electric utility interface has concluded that the electric rates play an important role in determining the extent of impact. Trends in electric utilities to develop Time of Use electric rates will charge the individual the cost optimization for solar equipment, perhaps to the point that temporarily at least solar collectors will become extraneous.

Other work by the solar group is examining the trade-offs between solar energy and energy conservation investment in buildings. These two areas represent separate entities in government energy policy. Our work has shown that these areas must be incorporated together to obtain optimal societal benefits. Government incentives directed only at certain high solar technologies appears to have lead to over-investment in these technologies at the expense of more cost-effective but less sophisticated technologies. The benefits of additional energy conservation investment was found to be greater to both individuals and society.

With respect to the solar building/electric utility interface, certain policy avenues are being explored which may produce benefits for both solar home owners and the electric utilities. Benefits to the homeowners would derive from lower (than otherwise) total energy costs; benefits to the utility would derive from forestalled peak load growth and lower fuel costs. In order to realize these benefits, solar building design must be viewed from a perspective of integration into electric utility load management. Several load management strategies are available to utilities which may integrate well with solar building loads. These include the use of time-of-use rates, interruptible rates, time dependent load shedding, and utility input into design and maintenance of solar energy systems.

All of these strategies have potential benefits - but their implementation is uncertain. A good deal depends on the initiative taken by individual utilities, and the interaction with the public utility commission which regulates them. In addition, a greater spirit of cooperation is needed between the solar energy community and the electric utility industry. The result of integrated solar/utility load management may be significant, but only if the institutional as well as the technical problems can be solved.

Another research effort has been directed at establishing, in a quantifiable and statistically valid manner, the experiences, attitudes, and assessments of present adopters of solar energy systems. To sharpen the focus and the utility of the research results, only present adopters who meet several specific criteria were included in the survey. For example, the individual had to be the

owner throughout the entire adoption process, the system had to be installed in a single family home in or since 1973, and it had to be totally owner financed - either directly or via a bank loan. (In addition, known solar pioneers, who have dominated feedback from the field, were consciously avoided). Some 177 appropriate individuals were identified and interviewed in New England and the Southwest. The identification and personal interview of these individuals was a tedious and laborious effort, but it yielded new information important to solar's rapid commercialization. This data includes present owners' a) assessments of the relative significance of the barriers and effectiveness of various incentives; b) socio-economic-attitudinal profiles; c) assessments of system costs, performances, and payback rates, and d) critique of the present Federal solar effort. The consumer's perspective on many auxiliary factors was also determined. This survey was accompanied by a parallel assessment by Federally funded solar administrators and researchers.

Based on the perceptions in resource management theme, the research has three primary objectives. The first and most important is to gain an improved understanding of the experiences and evaluations of individuals who have personally purchased the systems and thus participated in the entire process of decision making, installation, and operation. The second objective is to provide an update as to how the solar research-administrative community perceives these individuals and assesses their experiences. Finally, the comparative analysis of the two group's responses will provide a test of the assumptions and hypotheses that underlie Federal solar policy decisions.

Methods of Reducing Peak Water Demand II

by ROBERT OBEITER

The Clark University Water Study is continuing research on water demands and time-of-day pricing. The major objective of the project is to study the effect time-of-day pricing has on residential water demand as well as the water utilities load profile.

With the aid of the Washington Suburban Sanitary Commission, 66 residential water users are paying for water on a time-of-day basis. These project participants pay a high price for water during the peak use hours of 12:00 noon to 8:00 p.m. daily. All other hours of the day water is billed at a low price. The peak period is defined for each individual utility, based on actual pumping records.

In addition to the project participants paying for water by time-of-day, there are two groups of participants being monitored for control purposes. One group pays the existing utility rates while the other group pays for water on a flat rate, zero commodity charge basis. The latter group pays the same price regardless of the quantity of water used.

To date our results indicate that time-of-day pricing is an effective means to achieve reduced water consumption during peak periods. In addition to lowering utility costs, a careful consumer can save between ten to twenty percent on his or her water bill.

In addition to monitoring residential water consumption by time-of-day, we are monitoring the consumption of Addison, Texas, also by time-of-day. Addison, a Dallas suburb, is primarily a warehousing and light manufacturing community.

Virtually nothing is known about the industrial sectors effect on peak water demand. Some general information on industrial demands for water will be made available by master metering Addison, Texas. An industrial water use survey questionnaire administered to individual firms in Addison will be used to ascertain each firm's effect on peak water demands.

Information collected by the Clark University Water Study is needed to help utility managers accurately forecast future water demands by time-of-time. Evidence shows that time-of-day water demands are responsible for the sizing of water supply factors. Also short run operating costs for water utilities vary by time-of-day. Data collected by the Clark research group will be distributed to policy makers; possibly leading to legislation affecting residential and industrial use of municipal water supply.

Political Landscape Research Project

by NURIT KLIOT

The political landscape study investigates rural communities in Israel from a developmental point of view. Political landscape is used here as a direct product or artifact of political process, viewed symbolically as well as functionally. The artifact may symbolize ideological values imposed by central authority upon the populace. Or, it may provoke value reactions independent and even contrary to the intentions of central authority. Once established, political landscape becomes both process output and input.

The relationship between process and landscape is not linear nor a closed cycle, but is one of change, feedback and development. Individual components of political landscape or aggregates of a single category can be studied for insights provided into the prevailing political values of a community in a particular community in a particular period (--e.g., values like military defense, individual freedom, justice, equality, economic security, social satisfactions).

Even more important than the single element or category is political landscape complex--the integration of associated features into a "whole". These features may reflect complementary values, or they may mirror values that are contradictory.

The focus of this research is the role of national and sectoral ideology in fashioning a political landscape. The study area chosen is the rural sector of Israel, kibbutz (collective), Moshav (cooperative), and moshava (private farm village), because the rural sector developed in more direct response to differing and changing political values than did the urban scene. The Zionist political parties and Zionist national institutions shaped the rural Jewish landscape of Palestine as a result of their pre-determined images or actual experiences in Eratz-Israel.

Altogether, 16 kibbutzim, 14 moshavim and 7 moshavot are being studied. The research is divided into three parts: settlements study, regional study and national interviews. In the settlements study, which will be completed by July 1978, leaders and non-leaders in each community have been interviewed and archival materials reviewed. In the regional study, regional patterns of cooperation and activities are being investigated, again through interview and archival procedures.

The principle investigator is Professor Saul B. Cohen from Clark University and the co-investigators are Professor A. Shmueli

from the University of Tel Aviv. Professor S. Krefetz from Clark University and Dr. Y. Shilhav of Bar-Ilan University are senior investigators. The Clark-based research team includes N. Kliot and E. Moscowitz (Clark '79). In Israel, several students from Tel Aviv University are carrying out the field research. The National Science Foundation awarded Clark University, last year, a $130,000 grant for the above study.

Abstracts of Dissertation Proposals

Family Livelihood Strategies and Their Adaptation to Change in Upper Volta, West Africa

Eileen Berry

Despite the vast amount of recent academic interest in the environmental and economic problems of the Sahelian countries of West Africa, there is still a lack of detailed knowledge on local systems of livelihood useful to planners and policy makers in the region. One writer complains that there are too many "cosmic statements" and "too much frustrating generality" but not enough information on the "day to day process of staying alive" (Randall Baker, 1977). Some reasons advanced for this situation are:

1. the concentration of the French colonial administration, and later the new independent administration, on the modern cash producing part of the economy; and
2. the failure of standard anthropological studies to deal effectively with "present day to day working of the economy" and with the effects of change.

The research proposed is based on the hypothesis that existing local livelihood systems are new entities, different from the traditional systems, and that they evolve as families are forced to combine the resources of a still essential local food production system with the wider cash yielding systems.

The Relationships of Time, Space and Place to an Understanding, and the Treatment of Psychological Stress

Michael A. Godkin

Transactional perspectives in psychology indicate the importance of considering interdependencies between individuals and their environments. This paper suggests that such relationships can best be examined within a framework of time-geography. A time-geographic perspective provides a holistic framework and facilitates an investigation of the nature and dynamics of behavior and experience in their concrete environmental setting and from a lifetime perspective. Results of an empirical study based on the lives of alcoholics indicates that particular time-space "stations" or places are especially important in the meaning ascribed to and experience of environment. Based on these findings therapeutic implications on the study are discussed. In particular, clinical evidence is presented which supports the notion that "place chronologies" can provide a focus for clinical interviews and the treatment of psychological stress.

The Effects of Stream Development of 250 Years of Human Activity: The French River Drainage Basin in Massachusetts

Edwin Hubbard

The French River drainage system in south central Massachusetts has a 250 year history of human activity. The French River and its tributaries played an important role in the early development of industry in this country, particularly textiles, and the original streams have been highly modified by the construction of numerous and closely-spaced mill dams and ponds. Several of these dams were breached during or shortly after the 1955 flood exposing the accumulated sediments behind the dams. The former Sigourney Pond in North Oxford is ideally suited for sedimentation studies because it is small, readily accessible, and the length of time represented by the sedimentary column is accurately known.

Studies in the Maryland Piedmont and elsewhere suggest that land-use changes within a watershed, including urbanization, result in changes in sediment yield and stream behavior. A historical sequence of land-use changes within the French River basin, including industrial modifications of the streams, will be determined. Hypotheses will be formulated predicting the effects of these changes on the natural stream channels. These hypotheses will be tested through an evaluation of physical studies made within the French River basin. An analysis of the former mill pond sediments will be an important part of the physical studies. The original characteristics and configuration of the French River will be described.

Managing Safety: A Comparative Study of Canadian and United States Risk Assessment of Environmental Hazard

David Pijawka

Risk Assessment is viewed as an appraisal of the kinds and degrees of threat posed by a man-made environmental hazard. The assessment process can be conceptualized as consisting of three activities: the identification of the hazard, the estimation of its threat, and the evaluation or meaning such measurements have to society. The study will undertake an investigation of comparative societal response to similar technological hazards by looking at the national experiences of risk assessment in Canada and the United States. Many hazards of technological origin are similar or shared between the two countries, and yet risk assessment differs for these. Three major overlapping factors will be examined to explain national variability. These are: the technical nature of the risk assessment; the economic implications of reducing risk; and, the legal and institutional structure of judging safety.

Citizen Participation in Resources Management: Highway and Wastewater Management as Case Studies

Amram Pruginin

Evaluation of the effectiveness of public participation programs, using two different resources, each with its own mandated participatory structure. Cases used were in Massachusetts highway development (I-290) and Wastewater Management (208 Planning).

Short-Term Sediment Movements and Related Channel Changes: The Piceance Basin, Colorado

William Renwick

Within drainage basins, sediment movements are discontinuous in both time and space. The irregularities of meteorological events are one major contributing factor in sediment movement patterns. Due to discontinuities in sediment transport, stream basin materials are often stored temporarily in alluvial and colluvial deposits. This is particularly true in semiarid areas where stream flow is not continuous. Net erosion and deposition in any stream basin are a product of the interaction between individual meteorological events and long term climatic patterns. A major hypothesis in this study is that individual storms will result in changes in the amount of stored alluvium in a basin. Some of these changes will be reflected in channel cross sectional areas. In portions of the basin where net deposition has occurred, channels will contract. Conversely, in areas where erosion predominates, cross sectional areas should increase.

To test this hypothesis, sediment budgets for individual stream basins within the Piceance Basin, Colorado, will be determined. Analysis of field-collected and existing data should provide major insights into the behavior of sediment flows and relations between slope and stream processes. The Piceance Basin is appropriate for this study due to the complimentarity of ongoing research being conducted in the area under the auspices of the U.S. Geological Survey.

Dietary Vulnerability as a Condition of Culture Change Among Puerto Rican Immigrants and Their Children in Worcester

Farron Vogel Roboff

Persons undergoing a period of major culture change are susceptible to a decline in dietary quality. This decline may be due to a lag between new cultural elements and the experience needed in dealing with them. When people are isolated by language barriers, low socio-economic status, and host community rejection the process of adaptation is prolonged, extending the period of dietary vulnerability. Many Puerto Rican immigrants to Worcester are undergoing a period of significant culture change. This study of comparative diet shift among different types of Puerto Rican communities in Worcester and Puerto Rico expects to highlight some of the areas of diet change and vulnerability.

The Concept of Reach and Its Relevance to Social Geography

Courtice Rose

The relationship between the phenomenological concept of "reach" and social geographic thought is the basis of this thesis. After an exposition of the origin of the concept in the Geisteswissenschaften tradition of Wilhelm Dilthey and its subsequent development by Alfred Shutz, the notion of reach is expanded to include "that sector of one's personal environment which can be apprehended and is deemed relevant to a person having taken himself as the spatial and temporal center of that environment." The concept of reach is seen as consisting of physical, social and cognitive components which serve to bound both action and thought in everyday life. This expanded notion of reach is applied to some of the major themes in social geography where it is found to simplify and clarify constructs such as "mental map", "territory", "social distance" and "social area."

A Comparative Assessment of the Barriers and Incentives to the Use of Solar Energy by Solar Consumers and Scientists

Stephen W. Sawyer

Solar energy systems for domestic water heating and space conditioning are considered to be one of the most viable of the renewable energy technologies. Such systems have been used both experimentally and practically for many years, however they have failed to achieve a level of use that would significantly reduce the nation's consumption of finite energy resources. The barriers and incentives to the use of solar energy systems have been the focus of an intensive research effort. The research outlined in this proposal is designed to validate and extend these efforts by providing a more accurate and sensitive evaluation of the barriers and incentives. This will be achieved by determining how they are assessed by present solar energy consumers and by comparing these assessments with those of the solar research community. The research results will be structured and tested according to four sets of hypotheses - one on the significance of the barriers, one on the effectiveness of the incentives, one dealing with internal variations among consumers, and one comparing the assessments of the consumers and the scientists.

Underdevelopment in Mature Capitalist Countries

Paul H. Susman

Existing regional development theory does not adequately explain the persistence of underdevelopment in depressed regions within mature capitalist countries. An alternative analysis is offered in this research proposal in which development and underdevelopment are seen as two components in a single process. Particular focus is placed on the roles of transnational corporations and the State in the regional development process. The alternative analysis will be tested in Northeast England.

Abstracts of Masters Theses in Environmental Affairs

Federal Water Quality Planning and Wastewater Reuse In New England

Branden B. Johnson

Municipal water utilities are faced with the tasks of reducing water pollution and expanding water supplies. Reuse of municipal wastewater for agricultural, industrial and other uses is a potential solution for some utilities. The evaluation of reuse as an alternative waste management technique in water quality planning is mandated by the Federal Water Pollution Control Act Amendments of 1972 and associated regulations. This project will seek to determine whether this option has been pursued in New England, and, if not, why this has not been done. The data will come from correspondence and interviews with utility managers, regional planners, engineering consultants, public health officials, and EPA personnel in New England; archival research in EPA's New England offices; and correspondence with national EPA personnel.

A Method of Generating Typical Weather and the Effects of Weather Sequence in Solar Energy Simulations

William Robert Petrie

Predicting the performance of a solar energy system by computer simulations requires weather data input for the locality involved. The method described in this paper analyzes an optional number of years of weather data for a particular month, resulting in a typical "week" which is characterized in terms of solar radiation, ambient dry bulb temperature, and wind speed.

Verification of the method was accomplished by comparative computer simulations using the proposed method and a more established method.

Due to the large amounts of data that require analysis, the method was computerized and is supplemented with a user's manual, allowing rapid analysis once the weather data has been put in punch card form.

The effects of daily weather sequence on solar energy system performance was investigated by altering the daily weather patterns in two different manners and graphically displaying several performance indicators of a relatively simple system.

Faculty and Staff 1978 - 1979

Full-Time Faculty 1978-79

Leonard Berry, Ph.D., Bristol, 1969, Professor of Geography, Acting Director Graduate School of Geography, Co-Director International Development Program - applied geomorphology

Martyn Bowden, Ph.D., U. of Calif., Berkeley, 1968, Professor - historical-cultural, urban environmental cognition

Anne Buttimer, Ph.D., Washington, 1965, Associate Professor - social, urban social space, philosophy of geography (on leave 1977-79)

Douglas L. Johnson, Ph.D., Chicago, 1972, Associate Professor - cultural, landscape, economic development (on leave 1978-79)

Gerald J. Karaska, Ph.D., Pennsylvania State, 1962, Professor and Editor of Economic Geography - urban economic, quantitative methods

Roger E. Kasperson, Ph.D., Chicago, 1966, Professor of Geography and Government - urban-political, decision making, nuclear risk assessment (on leave Sem. I)

Robert W. Kates, Ph.D., Chicago, 1962, Professor of Geography and University Professor - environmental perception and management, resource development, risk assessment, early childhood education

Duane F. Knos, Ph.D., Iowa, 1956, Professor - geography and its teaching, urban, simulation as a learning process

William A. Koelsch, Ph.D., Chicago, 1966, Associate Professor of History and Geography, University Archivist - historical, history of geographic education

Laurence A. Lewis, Ph.D., Northwestern, 1965, Associate Professor - geomorphology, slope processes, fluvial processes

J. Richard Peet, Ph.D., U.C., Berkeley, 1968, Associate Professor - social, economic, community planning, Marxist geography (on leave 1978-80)

Harry J. Steward, Ph.D., Wales (Swansea), 1972, Associate Professor - Cartography, remote sensing imagery

Visiting Faculty

Harry E. Schwarz, B.C.E., George Washington, 1964, Visiting Profes-

sor of Environmental Affairs - water resource planning and water reuse

John E. Seley, Ph.D., U. of Pennsylvania, 1973, Visiting Associate Professor of Geography - social and urban geography, city and regional planning

Peter R. Taylor, Ph.D., U. of Liverpool, 1970, Visiting Associate Professor of Geography - political geography, regional and local planning, statistical geography

Phillip O'Keefe, Ph.D., University of London, 1973, Visiting Lecturer in Geography - resource economics, natural hazards, underdeveloped countries, Marxist resource theory

Richard A. Warrick, Ph.D., Colorado, 1975, Visiting Assistant Professor of Geography - natural resources management, environmental perception, natural hazards

Adjunct Faculty

Saul B. Cohen, Ph.D., Harvard, 1955; President of Queens College, CUNY, Research Professor of Geography - political geography, educational networks

Dennis W. Ducsik, Ph.D., M.I.T., 1976, Assistant Professor of Science, Technology and Society - management of energy technology and coastal zone management

Stephen L. Feldman, Ph.D., The Hebrew University, 1975; Russell Sage Foundation - resource economics, solar energy and public utility economics

Staff

Herbert C. Heidt, Manager, Cartographic Laboratory
William J. McCall, Map Librarian
Mary O'Malley, Administrator

Alumni News

ADKINSON, BURTON W. (PhD 42) is retired. His recent publications include an article in the Encyclopaedia of Library & Information Science (Vol. 19, 1976). A book is in press: Two Hundred Years of Government Information. He continues work on a chapter for the Annual Reviews of Information Science & Technology.

ALEXANDER, LEWIS (MA 48, PhD 49) is Chairman of the Department of Geography and Marine Affairs at the University of Rhode Island. He has recently completed a two year project on "Regional Arrangements in Ocean Affairs." Recent publications include "Regional Arrangements in the Oceans" in the January 1977 issue of The American Journal of International Law. He continues research on multi-national regional systems.

ALLEN, AGNES M. (MA 34, PhD 37) Professor Emeritus. Since retiring, Professor Allen has become involved with city, county & regional Aging Councils in Arizona. She is also the Chairman of the County Retired Teachers Group.

ANDERSON, JEREMY (Faculty, 1966-1971) is Chairman, Department of Geography, & Coordinator of Social Science Education, Eastern Washington University. One of his recent publications is an article on "Turf Maps" which appeared in the Pacific Northwest Forum, summer 1976. He writes that "we enjoy small town life." With his family, he spends his spare time hiking and climbing in the Northern Rockies & Selkirk Mountain ranges. (Yes, Jeremy, we are behind in our publishing schedule and quickly losing ground.)

ARENDES, MARY (54-55) is a 7th grade geography teacher. 1977-78 will be her 16th year of teaching geography at Agassiz Jr. High, Fargo, N. Dakota!

ARNOLD, ROBERT H. (MA 64, PhD 70) is an associate professor of Geography and Cartography at Briarcliff College. He is currently working in the area of the application of remote sensing techniques to planning at the county and metropolitan level. He writes that "we are now completing our second successful Institute of Cartographic Methods & Remote Sensing Applications, and have doubled the enrollment of last year's first institute." He has informed us that Briarcliff College has become bankrupt and is being taken over by Pace University; "the only faculty members to continue...with Pace University...will be Bruce La Rose and myself - both Clark Alumni!"

BEISHLAG, GEORGE (MA 37) is Professor Emeritus of Geography at Towson State University and a consultant and editor for A/V Educational Products. Co. Inc. of Baltimore. He writes that although he is officially retired, he is being recalled to teach his course in "The Geography of Alcoholic Beverages!"

BIRCH, WILLIAM (Professor, 60-63) is currently the Director of Bristol Polytechnic, England. He also held the position as President of the Institute of British Geographers, and his presidential address is published in Transactions of the Institute of British Geographers.

BLACK, ROBERT (MA, ABD) is Assistant Professor at Massachusetts Maritime Academy.

BOTTS, ADELBERT K. (MA 32, PhD 34) is retired. His hobbies consume most of his time: lapidary, silver, & water color painting. He says that he and Donna are well and active, wintering in Texas.

BOUCHER, BERTRAND P. (51-52) is Chairman of the Department of Geography and Urban Studies at Montclair State College, New Jersey. He has recently presented two papers before the AAG, Middle States Division, and among his many publications are the following: "Plow Back: the Use of Arab Oil Money" (Aramco World, Sept.-Oct., 1975) and an article, "Development Projects in the Middle East: Domestic Investments Utilizing Oil Revenues," in a book OPEC and the Middle East.

BOWDEN, LEONARD W. (PhD 65) is Professor in Earth Sciences, University of California, Riverside. Recent publications include "Remote Sensing of Water Demand Information, Geographical Review, July 1977.

BROWN, ROGER (PhD 61) is the Senior Research Officer for the National Research Council of Canada. His research interests concern 'permafrost investigations in northern Canada,' and, as a member of the Canadian Permafrost Delegation, he visited the People's Republic of China for 3 weeks in 1977.

BURRILL, MEREDITH F. (MA 26, PhD 30) is an export consultant for the U.S. Department of State. His research continues in toponymy and terminology. In 1977, he headed the U.S. Delegation to the Third United Nations Conference on the Standardization of Geographical Names, held in Athens.

BUZZARD, ROBERT GUY (PhD 25) is retired. He is the founder of the Alpha Chapter of Gamma Theta Upsilon at Illinois State University, which now awards at least two annual scholarships in his name.

BUZZARD, H.L. (MA 48).

CALDWELL, HARRY H. (PhD 51) is Professor in the Department of Geography, University of Idaho. In 1977 he was awarded the U.S. Air Force American Society for Eng. Education Summer Faculty Research Award for his work on "Livability as Applied to Air Force Bases."

CERNY, JAMES W. (PhD 76) is the Liberal Arts Computer Consultant and Adjunct Assistant Professor of Geography at the University of New Hampshire. He indicates that his research interests are in Cartography.

DIETTRICH, SIGISMOND DE R. (PhD 31) is retired from his position as Assistant Vice President for Academic Affairs, Inter. American University of Puerto Rico, San Juan P.R. He now resides in Florida.

DONNELL, ROBERT, P. (MA 71) holds a position as Assistant Professor of Geography at Framingham State College. Recent research interests focus on man-induced hazards and the quality of living environments, with future research planned on fire hazards. He is completing his doctoral dissertation for Syracuse University on "Fire in the City and the Quality of Living Environments: Patterns of Structure Fire Incidence and Related Hazards in Syracuse, N.Y."

DEAN, V.K. (MA 40, PhD 49) is retired. Her research on a special area of the Middle East continues.

DORNBACH, JOHN E. (PhD 67) is Assistant Chief, Earth Observations Division, Johnson Space Center, NASA, in Houston.

EKBLAW, SIDNEY E. (PhD 34) is Professor Emeritus at the University of Missouri, Kansas City; he retired in 1970 after 36 years of service at Kansas City. He spends his time "sort of keeping in touch with activities in Geography...visiting the Geography Department of Arizona State University once or twice a week...I occasionally eat lunch with some faculty members and/or graduate students."

ELLIOTT, FRANCIS E. (PhD 52) is retired from the Department of Commerce, NOAA. He has travelled with his wife (Esther B. '50) extensively; in 1976 to Australia and New Zealand and the next jaunt will probably be to South America.

FAIRCHILD, WILMA BELDEN (MA 37) does free-lance scholarly editing and is part-time librarian at the Munger Africana Library, California Institute of Technology. Recently she conducted an all-day seminar in the Department of Geography, UCLA, on geographical writing and editing.

FISK, BRADLEY (MA 52) is a professor in the Department of Social Sciences at Cape Cod Community College. He writes, "My current employment stresses general teaching - at one time I taught in 5 disciplines, now in 3. Merely 'keeping up' precludes research. I take pleasure in "simply messing about with boats in my spare time" (He is President of Arey's Pond Boatyard, South Orleans).

FLETCHER, ROY (PhD 68) is a Professor at the University of Lethbridge (Canada). He has 3 publications on Arctic Canada and is researching the physical aspects of site of settlements in Arctic Canada.

GARRETY (KENNEDY), KATHLEEN M. (MA 34).

GASSAWAY, ALEXANDER (PhD 71) is Professor of Geography at Portland State University. He is involved in work on a research grant on recreation in Portland, Oregon.

GEORGE, JOHN L. (MA 56) is Professor and Chairman at Salem State College. Recently completed a sabbatical for a semester working on urban land use planning.

GLEDHILL, THOMAS E. (MA 66) is an Earth Science Teacher at Burrillville (R.I.) High School.

GOULD, LOREN (MA 59) is Director of Institutional Research at Worcester State College. Recently published a book co-authored with his wife, Arts and Crafts for Physically and Mentally Disabled: The How, What and Why of it.

CREVELING, HAROLD F. (PhD 51) is now a retired Professor of Geography in Norman Oklahoma active in teaching geography to senior citizens. He was recently awarded a certificate of appreciation from Senior Citizens Center. Married to Milfred L. Day who attended Clark in 1948.

GRIFFIN, DONALD W. (PhD 63) is a Professor of Geography and Director at the Institute for Regional, Rural and Community Studies, Western Illinois University. Recently published A Technical Guide for Determining Land Use Suitability as part of a grant under Title V, Rural Development Act of 1972.

HANKINS, TOM (PhD 73) is Associate Professor of Environmental Studies at West Virginia College of Graduate Studies. Just completed a series of six reports for Corp of Engineers on projected land use in West Virginia river basins being considered for water resource development.

HARRIS, ALAN (51-52) is Reader in Geography at the University, Hull, England.

HAUK, SISTER MARY URSULA (PhD 58) is the Archivist at Mt. Aloysius Junior College, Cresson, Pennsylvania.

HECHT, ALFRED (PhD 72) is Associate Professor and Chairman of the Department of Geography at Waterloo Lutheran University. Articles recently published in Journal of Geography, the Monograph and Ekistics.

HECOCK, RICHARD D. (PhD 66) is Professor at Oklahoma State University. Paper published in Proceedings: River Recreation Management and Research Symposium.

HONES, GERRY (MA 53) is Senior Lecturer in Geographic Education at the University of Bath, England. Daughter is studying for MA at Clark in the English Department.

HOYT, JOSEPH B. (PhD 54) is retired from South Connecticut State College. He writes "my wife June died May 3, 1977."

HUNTER, ESTHER KINCH (MA 40) recently made first solo flight in a sailplane (Schweizer 1-33), now preparing to take FAA exams for a private license.

HUNTER, GILBERT (MA 59).

JAMES, PRESTON E. (PhD 23) is the Maxwell Professor Emeritus at Syracuse University now living in Florida. Recently awarded Honorary Membership Geographical Society of the Soviet Union. Publications include, "The Process of Competitive Discussion," Professional Geographer, 18:1-7, and Grove Karl Gilbert, A Biobibliography, published by Commission on History of Geographical Thought I.G.U., 1977.

JENSEN, J. GRANVILLE (PhD 46) is the Professor Emeritus in the Department of Geography at Oregon State University.

JESSEMAN, JESSIE M. (THORNTON)(MA 41) is retired and busy!

JEYASINGHAM, W.L. (MA 51, PhD 58) is Dean of Faculty of Humanities at Jeffna Campus, University of Sri Lanka.

KISTLER, ESTHER L. (MA 38) is now retired from her teaching position.

KOELSCH, WILLIAM A. (MA 59) is Associate Professor of History and Geography and University Archivist at Clark. He writes, "Attended an advanced workshop on College and University Archives at Case Western Reserve University, June, 1977; served as a consultant on a National Endowment for the Humanities teaching film, "Remnants of Things Past," and served as co-chair of local arrangements for the New England Archivists annual meeting at Clark, April, 1977; active in community affairs in Boston, including most re-

cently the Union Park Neighborhood Association and the Project Working Committee for the Orange Line Replacement/ Transit Improvement Study of the M.B.T.A.

KIRCHER, HARRY B. (PhD 61) is Professor and Coordinator, Environmental Studies, Southern Illinois University.

KOEPPE, CLARENCE E. (MA 27, PhD 29) is retired. He writes, "corrected vision now 20-20 in right eye after cataract removal. At 86, I do little other than try to keep abreast of events, Clark did so much for me during that three year period 1927-29 -- I can never repay it."

KOPEC, RICHARD J. (PhD 65) is Professor and Chairman of the Department of Geography at the University of North Carolina. Recent publications include, "The Response of the Wet-Bulb-Globe-Thermometer Heat Stress Index to Selected Land Use Types," The Southeastern Geographer, Nov., 1977.

LEMAIRE, MINNIE (MA 32, PhD 35) is Professor Emeritus of Geography at Mount Holyoke College - travelling a lot.

LEMAIRE, SALLY (MA 74) is Executive Director, YWCA, in Saginaw, Michigan.

LEWIS, TOM (NDEA Fellow 66-67) is Associate Professor of Geography at Manchester Community College, Connecticut. He received the 1977 Merit Award for Local History from Connecticut League of Historical Societies.

LITTLE, DANA (MA 51) is Senior Planner, Maine State Planning Office.

LOCKHART, MIRIAM (MA 57) is a part-time teacher active in community affairs in Cambridge, Massachusetts.

LOCKHART, RICHARD (MA 57) is Urban Planner, City of Cambridge, directing the City's Open Space and Neighborhood facilities program.

LOGAN, RICHARD F. (MA 37) is Professor of Geography at U.C.L.A. Recently awarded Distinguished Teaching Award from California Council for Geographic Education and ARCO Award for Distinguished Leadership in Geographic Education. Recently co-author of Introduction to Geography and Introduction to Physical Geography.

LOOKER, ALETA (MA 60) is the Secretary to the Deans of Liberal Arts and to the Director of the Legal Studies program Quinnipiac College. (See comment Jeremy Anderson re publication schedule).

LOOKER, ROBERT (MA 66) is the Deputy Director, City Planning Department, Hartford, Connecticut. Robert and Aleta write, "While not exciting, we have employment. Our four children continue to grow up and three are in their teen years. The oldest, Susan, is 16 and enrolled in college courses while attending Cheshire High School. The second, Daniel, begins high school in September 1977. Probably our chief interests are flying (Bob has a two-seater Cessna 150) and photography (Aleta has had a few photos published in the Cheshire Herald, our local Weekly). Mundane, yes, but 'geography is what geographers do'."

LOWE, JOHN C. (PhD 69) is an Associate Professor at George Washington University, Washington, D.C. Recently published a book, Geography of Movement.

McCUNE, SHANNON (PhD 39), LLD 61) is Professor of Geography and Director of Asian Studies at the University of Florida and has several publications including, "Korea is Transformed," The Geographical Magazine, XLIX, 10:643-47, July, 1977. Recently received Distinguished Alumnus Award, College of Wooster, Ohio, his undergraduate college. President of Society of Florida Geographers. He writes, "Any geographers coming to Florida for visits or retirement are cordially invited to get in touch with the Society to make their trips more interesting geographically."

McINTYRE, WALLACE E. (MA 47, PhD 51) is a federal employee. Recently travelled to Greece and Southern Spain.

MAIER, EMMANUEL (PhD 61) is the Chairman of the Department of Earth Sciences and Geography, Bridgewater State College. He writes, "I am getting tired of being chairman but not of geography."

MELEEN, NATHAN H. (MA 64, PhD 77) Assistant Professor of Earth Science, Oral Roberts University.

MERRIAM, FREDERICK (MA 46) Sales Representative, Waddell & Reed Inc., Financial Services.

MILLER, DAVID D. (MA 72) is a teacher at Taunton School. He writes, "This major minor public school has just gone completely co-ed. I have bought a very expensive new flat which is open to visitors (are you reading this Roger Hart?)"

MINOGUE, JAMES A. (MA 36, ABD 41) is a retired federal employee living in Bentonville, VA. Elected President of the American Rock Garden Society, July, 1976. He writes, "Lecture extensively on indoor light gardening and on rock gardening. Currently involved with landscaping and otherwise improving new home in the Blue Ridge Mountains, i.e., involved with the practical aspects of micro-geography.

Dr. Ekblaw used to refer to it as 'the attributes of place.'"

MORRILL, ROBERT W. (PhD 73) is Assistant Professor and Acting Chairman of Geography, Virginia Polytechnic Institute and State University.

MUNCASTER, RUSSELL W. (MA 68, PhD 72) is Associate Professor, Wilfred Laurier University, Waterloo, Canada. Recently on sabbatical.

MURPHY, RICHARD E. (PhD 57) is Professor and Chairman of the Department of Geography, University of New Mexico.

NATOLI, SALVATORE, J. (AM 57, PhD 67) has recently completed his eighth year as Educational Affairs Director of the AAG. He is editor of the AAG Newsletter and of the new Resource Papers for College Geography series. Since 1970, he has annually contributed the "Geography" entry in the Encyclopedia Britannica Yearbook. He has recently co-authored an article on change in geography in Change Magazine (Vol. 9, No. 7, July, 1977) as well as co-ordinated with the staff of Change on the preparation of a report on geography teaching.

OLSON, RALPH E. (PhD 46) retired in June, 1977 as Professor Emeritus in the Department of Geography, University of Oklahoma at Norman after 30 years of service. He and his wife, Margaret, are spending 1977-78 in Luxembourg where he will continue the research and writing for a book on the Grand Duchy which was begun during his 1974-75 sabbatical, as well as doing some part-time teaching at the Miami University of Ohio European Center. He has recently authored a chapter on "Agriculture in Oklahoma" in John W. Morris (ed.) Geography of Oklahoma, (Oklahoma Historical Society, 1977).

NICHOLS, NORTON, JR. (AM 50) is Superintendent of the Antelope Valley Union High School District in Lancaster, California, and is author of the Educational Master Plan 1976-81 for that district.

PARSON, RUBEN L. (MA 34, PhD 43) has completed a book on his grandfather's homesteading experience in 1869, entitled Ever The Land - A Homestead Chronicle. He adds news of health problems, however: "My teflon aorta blew up in the left groin in May and I underwent emergency surgery at the Rochester Methodist Hospital. Function of my left leg remains somewhat impaired. I hope to cheat the grim reaper until my book is in print."

PERRY, ROBERT F. (PhD 57) is chairman of the Department of Geography at Worcester State College, Massachusetts. He was a visiting professor at Holy Cross, fall semester of 1976, and has travelled and studied in Brazil, the Nile Valley, South Africa, Rhodesia and the Rift Valley. He plans to undertake research on coastal morphology of the Florida east coast between Ft. Pierce and Indialantic.

PICO, RAFAEL (MA 34, PhD 38) is Vice Chairman of the Board of the Banco Popular de Puerto Rico. He recently presided over a team of Puerto Rican experts to advise on the reform of the Banco National de Fomento of Honduras. Returning via Colombia, he attended the international meeting of the Conference of Latin American Geographers in Paipa and "served as moderator in one of the sessions in which Preston ("Jimmy") James and Warren Nystrom participated." Dr. Pico was made an Honorary member of the Urban and Planning Institute of Peru in July, 1976, and of the Puerto Rico Planning Society in November, 1976.

PRINCE, HUGH (visiting professor at Clark, 1971) is a Reader in Geography at University College London, where he plans to do research on the historical geography of England in the eighteenth and nineteenth centuries.

RISTOW, WALTER (PhD 37) retired from his position as Chief of the Geography and Map Division, Library of Congress, April 30, 1977. In the last few years he has written numerous articles on the history of cartography and on map librarianship, and has edited a book, World Directory of Map Collections.

ROBINSON, J. LEWIS (PhD 46) has had the honor of being named "Master Teacher" for 1977 at the University of British Columbia, where he is Professor of Geography. He sends us a summary of his publications over the last 34 years: Books: 9; Chapters in other books: 11; articles in geographical periodicals: 38; articles: 50; edited wall maps of Canada: 8 - a total of 2,200 pages of Published work. WOW!

SHAW, EARL B. (PhD 33) is retired and may be moving to Florida soon.

SHIN, SUK-HAN (MA 68) is an Assistant Professor of Geography at Eastern Washington University. He is planning a visit to Seoul, Korea, to collect data on the changing urban environment in the course of industrialization there. He writes that he spends his spare time listening to classical music in winter and playing golf ("I compete with myself -- a frustrating game") spring, summer and fall.

SIEVERS, ANGELIKA (MA 36, PhD Berlin 39) is Professor Emeritus at University of Osnabruck, Vechta Branch, - W. Germany. She has done research on the geography of tourism and on structural problems in South Africa. In winter, 1977-78, she "realized the geographer's dream" - a three-month world cruise.

SMILNAK, ROBERTA A. (PhD 73) is Assistant Professor of Earth Science at Metropolitan State College in Denver. She has done research on education in geomorphology and on environments of the Arid West. She worked with the Earth Science Club to organize a highly successful field research trip to Utah, Nevada, and Wyoming.

SPECHT, RAYMOND E. (MA 47) is University Planner and Associate Professor of Geography at University of Wisconsin, Stevens Point. He has been doing research on Wisconsin railroads.

SMITH, DAVID A. (MA 68) partner - Lane, Noland, Smith and Co., Inc.

SMITH, HELEN BOYES (MA 38).

SOLOMON, LES (PhD 74) Assistant Professor of Geography, University of South Carolina. Recent publications include "The Use of Needle Sorting Data Banks in Geographic Inquiry," Journal of Geography, Nov., 1976. He writes, "Would someone please contact the El Morocco to see if they would consider opening a restaurant in South Carolina. While our family enjoys grits and gravy, we miss the ethnic foods. Hi Y'all!

STERNBERG, ROLF (MA 56) is Associate Professor of Geography at Montclair State University. His research interests focus on the historical geography of Argentina.

STONE, ROBERT G. (31-32) is retired from the USAF, Air Weather Service. Much of his research concerns hiking trails and the Appalachian Ridge Valley area.

TOSI, JOSEPH A. (PhD 59) is a self-employed private consultant and General Manager of the Tropical Science Center.

VARNEY, CHARLES B. (MA 53, PhD 63) is Professor of Geography at the University of Wisconsin, Whitewater. His research interests include population controls and dynamics.

WEST, SEYMOUR (MA 41) is a retired federal employee. He is self-employed as an out-of-print book searcher.

WHITTEMORE, KATHERYN THOMAS (MA 25, PhD 36) is the retired Professor Emeritus, SUNY, Buffalo. In May, 1977, she received the President's Distinguished Service Award.

WOOD, DENIS (MA 69, PhD 73) is Assistant Professor of Design, North Carolina State University, Raleigh. He writes that his recent publications are "too numerous to detail even if they weren't all too silly to recapitulate." He adds the following thoughts:

It's July.
The crepe myrtle is in blossom
and the ground is thick in its purple flowers.
Here and there among them the bodies lie
of fledgling birds who never learned to fly.
It is six of one, half dozen of the other
in this business:
My best ideas never make it off the ground,
and those that flower, fall
trampled on the sidewalk.

WRIGHT, MARION L. (MA 46) Professor of Geography, Rhode Island College. Visited India during Spring 1977 sabbatical as part of continued interests in development, and was to continue study of Eastern European countries during the fall, including Finland, USSR Baltic Republics, Poland and Czechloslovakia. She writes "I've been waiting to see Finland since I did a paper on it in Dr. Atwood's Physical Geography Seminar!"

ZUBE, ERVIN H. (PhD 73) Director and Professor, Institute for Man and Environment, University of Mass., Amherst. Recently co-authored two books, Perceiving Environmental Quality and Changing Rural Landscapes, and has another forthcoming on the relationship of environmental perception, evaluation and public policy. Received the NATO Senior Science Award and, in April-May, 1977, was visiting Professor of Geography and Town Planning, Oxford Polytechnic, England.

ZUBER, LEO J. (Clark 48-49) is the Director, Community Planning and Management Division, HUD, Atlanta. He recently received a Resolution of Commendation from, and A Certificate of Appreciation for Outstanding Service to, the Governments of the Mid-Cumberland Region, as well as a Certificate of Special Achievement from the Regional Administrator, HUD, Region IV, Atlanta for exceptional performance. He has published an article on "Code Administration: An Emerging Profession" and is also busy with the Peachtree Federal Credit Union, serving on the Board of Directors and as Organizer and Editor of the award-winning quarterly Newsletter. Dr. Zuber has also travelled to Spain, Mexico, and the Dominican Republic and anticipates doing research on the period of Spanish occupance of the Georgia coast.

IN MEMORIUM

Ina Cullom Robertson, November 11, 1975
Janet L. Glen, February 13, 1976
Phelps N. Swett, July 7, 1977

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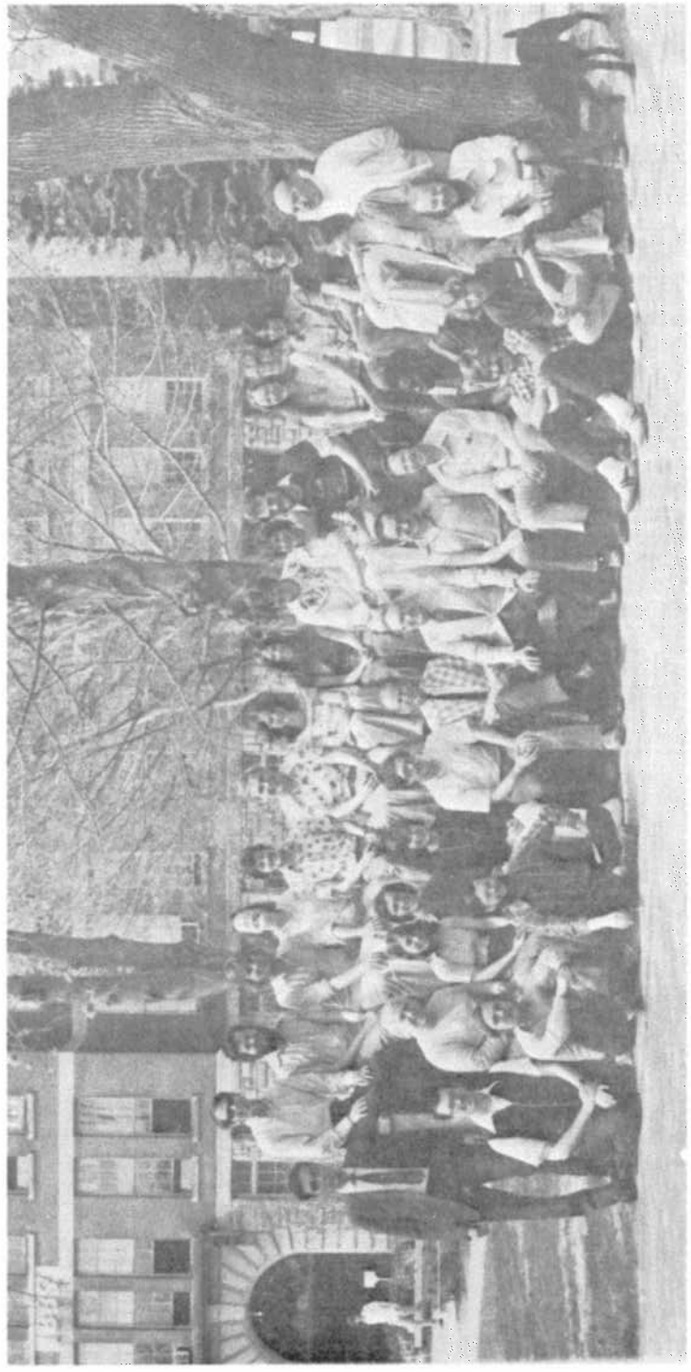
Copies of Henry J. Warman, Geography: Backgrounds, Techniques and Prospects (For Teachers), 1954; 5th printing, 1966, are still available from the Clark University Press. They will be sold at a special price of $ 1.00 each until the stock is exhausted.

Geographers interested in environmental perception may find two volumes in the Heinz Werner Lecture Series quite useful. Rene Dubos' Of Human Diversity, examines the nature of individualism in nations and men, as it is affected by their natural and cognized environments. Errol E. Harris' Perceptual Assurance and the Reality of the World, is both a critique of the phenomenological theories of Husserl, Heidigger and Merleau-Ponty and an attempt to define in philosophical terms the relation of the physical world to human sensibility.

The Werner Lectures, cloth-bound, are available for $ 3.00 apiece from the Clark University Press, 950 Main Street, Worcester, Massachusetts, 01610. A new catalogue listing all the Werner Lectures and other publications is also available from the press.



Group Photograph - Graduate School of Geography 1976-77

Front row (left to right): John Bik, Herb Heidt, Jim Lyons, Bret Halverson, Paul Oberg, Mike Steinitz, ? .

Middle row (seated, left to right): Harry Schwarz, Ruth Fincher, Courtice Rose, Anne Buttimer, Alan Sharaf, William Koelsch, Saul Cohen, Mike Enders, Douglas Johnson, Forrest Cason.

Back row (left to right): Ang Koh Ping, Bruce Meier, David Seamon, Michael Godkin, Hilary Renwick, Vernon Domingo, David Prior, Kitty Sibold, Lindy Warrick, Dick Warrick, Joni Seager, Bill McCall, Ann Dennis, Nancy Villanueva, Farron Vogel Roboff, Janice Jones, Duane Knos.