

WHERE IS THE LAND GOING?

J. W. SEVERY

Professor of Botany, Montana State University

Address of the retiring President, presented before the General Session,
December 28, 1946

People generally agree that the most pressing problem before the world is that of World Peace. The signing of Peace treaties and the establishment of the framework for peace will be one thing; the creation of conditions which will contribute to the maintenance of peace will be another. No matter how one may evaluate the relative importance of the various factors which may lay a base for lasting peace, certainly one of the more important will be the reasonable satisfaction of the primary needs of man for food, clothing, and shelter. Until such time as man can duplicate on a grand scale the primary synthesis carried on by the green plant in the presence of light, the satisfaction of these needs will depend upon the efficiency of the production of the biological products of the land.

The biological resources embrace not only all living things produced on land and in water, but the soil itself. The soil is placed in this category because what it is and what it will become, is the product of the organisms growing upon and within it. Controlled by climate, which determines the character of the natural vegetation developed on a soil, it is the chemical activity of the micro-flora and -fauna of the soil which give it the specific character associated with a given climatic type. Any practice which will modify the kind and amount of organic litter continuously returned to the soil will change the character of the chain reactions carried on by the microorganisms of the soil, and thus alter its chemical and physical properties. On most lands, practices which reduce the amount of organic and associated mineral matter continuously returned to the

soil through the process of decomposition, will tend to degrade that soil. And almost invariably, a reduction in the quantity and quality of vegetation produced on the soil will lead to a reduction in the amount of organic material returned to the soil. Furthermore, the natural processes are such that a reduction in plant cover usually exposes the soil to accelerated wind and water erosion. And thereby hangs the tale of an estimated 3,000,000,000 tons of soil washed into the ocean per year from the continental United States before the development of a control program and an annual loss of between 1,500,000,000 and 2,000,000,000 tons since the soil conservation program has been under way. How much of this reduction in loss has been due to conservation, and how much to climatic conditions, is difficult to say.

The processes of soil development are slow. Yet in the geological past, and without disturbance by man, they must have been sufficiently more rapid than the natural process of geological erosion to have left a balance on the constructive side of the ledger. For man found most of the land surface of the earth covered with a soil. But the balance between the constructive and destructive processes associated with the soil is a delicate one.

Both the prehistoric and historical record of man indicates that as human populations have expanded and colonized the land surface of the earth, man has persistently and progressively exploited the natural resources of the areas he has occupied.

The exploitation of the non-renewable

ANNOUNCEMENT OF ANNUAL MEETING

The annual meeting of the Northwest Scientific Association will be held at the Davenport Hotel on Monday and Tuesday, December 29-30.

Speakers of National importance have been invited to give papers at the General Sessions. A full program of Sectional meetings has been arranged. The response to the call for papers was exceptional and shows that the scientists of the Northwest are back at their research after the interruption due to the war.

Monday morning will be given over to Registration and General Session meetings. Mr. Julius E. Nordby, Director of the United States Sheep Experiment Station, will discuss the interesting results he has obtained by studying genetic problems in sheep. Mr. F. Ellis Johnson, Educational Director at the Hanford Project, will discuss "The Educational Program for the Hanford Project."

At noon on Monday a luncheon has been scheduled. Arrangements are in progress to obtain a well known speaker to address the group.

Tuesday morning the business meeting will be held and at the General Session Dean McGivern, the retiring President, will deliver the address.

Sectional Meetings are scheduled for Monday afternoon and evening and on Tuesday morning at 10:45-12:00 and all Tuesday afternoon.

Programs will be mailed to all members of the Association, and to the speakers. Copies will also be mailed to each college in the Northwest. Every section has a full program and a good attendance is expected. Help your Association by being at the Spokane meetings.

H. Walter Steffens,
Program Chairman

sources, as man learned to use them, as bad enough. But there is no indication that his use of these resources had survival value, although they had significance in shaping, in various areas, the pattern of civilization. But what he did to the renewable resources, particularly to the soil, often had a profound influence upon the quality of his living. Time and again man has had to "pull stakes" and start a new kitchen garden—his standard trademark of occupancy. And through all of the tragic injuries he has worked against rather than with all presently known ecological principles which govern the maintenance of relatively stabilized soils.

The end result of man's peregrinations as been to occupy most of the habitable land areas of the earth's surface with varying densities of population and to degrade the soil in varying degrees as he went his way. Shifting of population densities can still occur, but the days when man, having contributed to the despoliation of one area, can move into an area hitherto unoccupied, are gone.

Now that the Second World War is over, the ghost of Malthus haunts the minds of men, and stalks in the corridors of the United Nations. This is indicated by the establishment of the Food and Agriculture Organization of the United Nations. Almost one hundred fifty years ago Malthus postulated the idea that human populations ever tread upon the heels of subsistence. Despite the fact that the population of the world as at least doubled in that period of time, the Malthusian Doctrine has assumed much controversy, even down to the more efficient breeds of domesticated plants and animals, better agricultural practices, the use of more machinery, and the development of better transportation could stave off the fulfillment of that dire prophecy. To be sure, we have often made a little uncomfortable when we read of the periodic death through starvation of hundreds of thousands and sometimes millions of humans in China and India. But, after all, they were backward people. Besides, they were non-white, so why bother? Now

we are beginning to realize that how the other half of the world lives may be a material factor in the attainment of World Peace.

More closely at hand is the postwar instability of Europe, which is generally reported as more attributable to a continued substandard supply of food and inadequate supplies of clothing than to any other factor. Yet it has been estimated that in Europe the overall decrease in total agricultural productivity due to the war was only about 10%. Despite all of the food that has been shipped by this and other countries, the peoples of Europe are still short of food and clothing. It seems evident that a durable peace will necessitate the rising of subsistence levels in much of the world.

It is obvious that the United States will have to help stabilize the subsistence economy of other nations. If we want peace, we will have to do our part to maintain the economic stability which will underlie any enduring peace.

We are powerful and we have been fortunate. We are powerful because of our military strength and our capacity for industrial production. We are fortunate in that climatic conditions during the war were favorable to an all time high in our agricultural production.

What might have been the course of the recent war had its major portion been fought during the extreme drought years of the thirties? Could we then have shipped to our allies the minimum amount of food to stave off disaster, while we were getting ready? Yet, until we have brought our lands back to the point where another drought period, equal in intensity to the last one, can be weathered without materially injuring our soil, we can not claim to be ready for any crisis which arises internally or externally. Proper management of the land, which conditions the production of our biological resources, rests not just upon "know how," but also upon the understanding cooperation of the people. Although there is much to be learned in future research programs, we have enough "know how"

right now to do a pretty fair job of management. Any action program under peacetime conditions entails the support of the people, and the people just now are not actively supporting a conservation program.

We are between the Scylla of a strong authoritarian central government on the one hand, and the Charybdis of decisions too slowly reached by democratic processes, on the other. As a people, we want to keep a democratic form of government, but apparently we learn only slowly that this form of government demands from the individual the greatest amount of information and the keenest sense of responsibility of any governmental form in the world. Our success in using the democratic form of government in a capitalistic and highly industrialized society, will determine whether or not we are able to retain that pattern in a world which is rapidly adopting various modifications of the socialized state. Undoubtedly our success will in part depend upon the amount of resiliency in the system, and its consequent capacity for modification. Our governmental form has shown a greater capacity for modification than is generally realized. Strong individualism and what has lately been called "free enterprise" characterized to a high degree the period of expansion and exploitation, yet throughout our political history there has been a more or less continuous dogfight between the thinking of the people on the one hand and attitudes of the more or less vested interests, on the other. This culminated in the development of the progressive movement, faint beginnings of which can be seen in the latter years of the 19th century. The principles and the philosophy of the progressive movement were the expressions of the thinking of the people. This has given rise to a gradual political and social evolution, reflected in statutory law, from the beginning of the 20th century. Each advance has been the product of public opinion, stimulated by the liberal thinking of key leaders. An important offshoot of this evolutionary process gave rise to the popularity of the conservation movement.

It is important to note that neither the progressive nor the conservation movement was the product of either major political party, but the more liberal leaders in each party assisted in furthering the evolutionary processes already going on in response to the public opinion of a particular time. Conversely, reactionary elements in both parties have contested each forward step that has been taken, which leads to the observation that there ought to be a continuity to the various aspects and activities of the conservation program which would rise above the level of political campaigning, and which would be consistently maintained no matter which party might be in power. There is an element of danger in what seems to be the general apathy of the American people toward the conservation program at the present time. One thing contributing to this general apathy is the feeling of false security generated by the unusually high and relatively consistent agricultural production during the war. The memory of man is short, and too many have forgotten that during the drought of the thirties, disaster looked us right in the face. It is hard to convince people that climate is a cyclic phenomenon, and that this periodicity makes the proper management of lands, particularly of arid and semi-arid lands, one demanding the utmost skill and understanding, and a longtime point of view.

In general, the agencies managing federal lands have been successful in resisting demands for the unwise use of these lands during the war period. But the story is different with many privately owned lands. Range lands have been carrying to the very limit of their capacity. At present, there are undoubtedly more cattle on western ranges than there have been in any other period of our history. Agricultural lands have been more intensely cultivated than at any time. At the same time there has been a dangerous decrease in the amount of fertilizer added to the soil to replace the mineral elements removed from the soil under the intensive production of the war period. This means that the future productivity of these soils is already reduced, quantitatively and quali-

tatively unless the fertilizer deficit is restored. With the inertia of the landowner, the high cost of fertilizers, and the artificially restricted production by the fertilizer interests, there does not seem to be much hope that the deficit will be made up in the near future.

Right now the picture looks a little dark and discouraging. Yet, a backward look at the very general acceptance by the people of conservation principles and practices in the 30's indicates what can be done when the people are aroused. And in that there is hope. But the question arises: how can we get high level and sustained action during the periods when there is no emergency? Apparently the people always arise to an emergency. This is action stimulated by the emotional levels. Unfortunately, these levels do not ordinarily sustain interest after the emergency is over. A consistently maintained program must rest upon stimuli from the higher levels. At these levels, rational thinking and understanding are possible and essential. This means the establishment of relative values, and the acceptance by the individual of some moral responsibility for the welfare of the group. As far as the conservation of the biological resources is concerned, it means the dissemination of enough knowledge of biological relationships to give the individual a base for understanding the scientific principles underlying desirable conservation measures and practices.

This is a problem in education. Because time is short and the need great, it should be education at all ages. After all of the writing and talking about conservation, there must have been something wrong with the content and methods used, else there would be a more general recognition of the need for maintaining the conservation program at present. Probably the universities and colleges are partly at fault. Until recently there has been very little ecology taught, except to certain groups of pre-professional students. The general texts have generally left the topic of ecology alone, or else have written superficially about it. This writer knows of only one General Botany text which treats the

dynamical aspects of ecology. There are several which write superficially about vegetation types or concerning the geographical distribution of plants. As a result we have been sending the majority of students out of our universities and colleges without any real knowledge of ecological relationships. There has been no background laid upon which a future citizen could base an understanding of the fundamental need for conservation, nor has there been any understanding of the biological processes which are to some degree controlled by sound conservation practices.

During recent years the State University of Montana has placed an increasing amount of ecological materials in its introductory course in biology. It has had to reduce or excise certain other contents in order to do so. Subjectively, the change seems good. The interest of the student can be held with a properly taught ecological content. And the student does not go out of the university completely ignorant of the relationships between climate, vegetation and soil, particularly in a semi-arid climate.

At the request of the State Superintendent of Public Instruction, representatives of the six units of the University of Montana have agreed upon a syllabus for a course entitled "Conservation of the Natural and Human Resources of Montana." This course will be given to teachers and those training for teaching, in the various units. It will also be given as an extension course in those communities which want it. The hope is that the teachers who take the course will work conservation materials into the teaching program at all grade levels. If the extension teaching of conservation can interest adults with varying educational backgrounds, it may help to stimulate planning at the community level.

In conclusion:

1. Permanent World Peace will, in part, be conditioned by consistent production and distribution of the products of the soil.
2. From early times man has tended

to degrade the soils of the areas he has occupied.

3. Man has now colonized the habitable areas of the earth's surface and the days of exploitation of new land areas are over.

4. World populations are increasing to the point where the total production of the biological products of the soil will be needed to satisfy the primary needs of man for food, clothing, and shelter.

5. The surplus biological products of the United States will be needed in other countries to insure some degree of economic stability and insure the peace.

6. Our strength, internally and externally, will depend upon planned and sustained management of the soils of the country.

7. The general support of a sound land policy in a democratic country will depend upon educating the people to support the planning and the financing which is involved in any sustained conservation program.

8. While leadership should come from above, a better and broadly based educational program should emphasize the dynamic aspects of biological relationships, so that people at the grass-roots level can participate in the planning.