

CHAPTER 10

PROBLEMS OF MEASUREMENT IN CONSERVATION PLANNING

THE NECESSITY FOR SOCIAL ECONOMICS

We have reached a transition period in our economic and social development. The era that is passing emphasized liberty of action by individuals and by nations; it has been an era of rapid growth of population and wealth, of rapid exploitation of vast new resources, and of exploitation of the weak, both individuals and nations. It has been an era in which we placed great reliance upon a natural harmony supposed to result from the automatic reconciliation of conflicts through competition. At the same time there has been a decline of competition as a regulating force both between individuals and nations, and protectionism has become a first principle of attaining and maintaining profits. The era has also seen the growth of an expanding concept of democracy in which equality has once more become an important principle of action. On the other hand, we have witnessed the rise of authoritarianism and use of coercion as one method of solving the basic social conflicts arising from insecurity and inequality. With the growing complexity and interdependence of our economic and social structure has come the realization that individual actions have a profound social significance; that actions which appear economic to the individual during the production period being considered may be very uneconomic from the point of society as a whole. Tariffs, monopolies, patents, franchises, and curtailing production when prices

are low, all appear to benefit individuals, but often they may involve serious social costs in terms of higher prices and unemployment. Similarly, maladjustments in land use may involve high relief loads, tax delinquency, and, in some cases, the costs of moving a stranded population. The old faith that automatic adjustments will take place in response to the workings of a flexible price system in a competitive economy has largely been destroyed.

One reaction to the problems thus raised has been to throw out all theory and deal pragmatically with each maladjustment as it occurred; in many cases this has led to oversimplification and a neglect of relationships that are of basic importance in any scheme of social planning. Ends have not been clearly stated, and means have not been closely related to the basic causes of the maladjustments. Temporary emergency measures and long-time adjustments have been confused, and palliatives have appeared better than more radical measures designed to attack the root of the problem because they eased the pain more rapidly.

A second reaction has been that of the so-called "theorists" who have been so aware of the complexities of the problems involved that no action appeared safer than any action. Usually they have been pessimistic and anticipated chaos, or futility, or dictatorship as a result of man's blind attempts to solve problems too complex for his mind to grasp fully.

Both these attitudes seem too narrow. Social control of economic matters is increasing and will probably continue to increase in the future, but the controls used will vary all the way from making a flexible price system function more efficiently, to the use of coercion and the limitation of property rights. The economics of today, therefore, must deal with individual economics, social economics, and the basic causes of divergence between individual and social net returns if it is to be useful in the formulation of social policies. Similarly,

social planning should make use of relationships revealed through theoretical analyses in order to develop the most reasonable policies. The causes of divergence between action and theory is largely a matter of insufficient data upon which a theoretical relationship can be satisfactorily proven. Action has usually been taken to alleviate an immediately urgent need often expressed and backed by a pressure group. Social action directed at preventing the development of a problem is in its infancy, and it is in this field of long-time planning that theory may make its greatest contribution. Where social action is undertaken to meet an immediate problem, and facts are not available to make a fully informed decision, it is essential that we develop techniques of estimation so that we can evaluate the results achieved in order to modify the program in the light of further information. In this sense planning becomes a continuous and changing process in which action should lead to information upon which more intelligent action may be developed. This implies flexibility of specific action programs and the willingness to change. In many cases quantitative measurement may be impossible, and we are forced to accept qualitative judgments of "more" or "less." Flexible action programs also imply that planning must be based upon judgment in evaluating alternatives, because the very complexity of the interrelationships prevents any single program of action from providing a complete solution. This, as we have seen, is particularly true of the problem of soil conservation.

THE OBJECTIVES OF CONSERVATION PLANNING AND THE ESTIMATES INVOLVED

In the discussion of society and conservation (Chap. 8), emphasis was placed upon the necessity of stating social objectives explicitly in order to evaluate the effectiveness of the means used in attaining them. It is obvious, however, that

stating ends more explicitly and breaking down broad generalizations will be of no assistance to action planning unless the end as stated is determinate. For example, the distinction between fertility depletion and soil deterioration which has been emphasized so strongly is useless for practical purposes unless it can be applied to areas as a basis for directing social action. This distinction has been made in the case of Iowa by the State Committee on Agriculture,¹ which has divided the state into two areas, A and B, on the basis of the reconnaissance erosion survey map. The area A consists of the relatively flat areas of the state where erosion has removed less than 25 per cent of the topsoil, and it is considered to be an area where fertility depletion rather than soil deterioration results from exploitive cropping. Area B consists of the rolling and rough areas where more than 25 per cent of the topsoil has been removed and where soil deterioration is serious. On the basis of these distinctions, the Committee recommended that subsidies, educational efforts, and action programs to achieve conservation be directed to area B. This does not mean that area A has no conservation problem but that, at the present time, the problem is much more urgent in area B and should be attacked there first in order to make the best use of available funds. This practical distinction is based upon estimates of the rate of erosion and the seriousness of its implications to the communities involved. It could be successfully applied to other states and regions so that we would obtain a clearer picture of areas where action is most urgently needed.

In order to obtain an over-all view of the problems involved in developing an effective program of soil conservation, we may review the four objectives previously outlined and list under each the essential information needed to make them useful guides for the formation of policy.

¹ Iowa State Committee on Agricultural Programs, *A Unified Agricultural Program for Iowa*, mimeo. C. P. 178, Ames, Ia., May, 1941, see pp. 43-58.

ESTIMATES NECESSARY TO DETERMINE WHETHER
CONSERVATION IS ECONOMIC
FOR THE INDIVIDUAL

The first named objective is to achieve conservation in those areas where it is economic for the individuals.² For this to be useful, we must be able to determine whether conservation is economic or not for the individuals concerned, and this in turn involves a budget analysis³ which will show:

- (1) The capital loss resulting from continued exploitation.
- (2) The changes in land use and practices needed to control erosion.
- (3) The capital expenditures involved.
- (4) The effect of the changes upon crop production.
- (5) The effect of changes in feed production upon the live-stock system.
- (6) The effect of the changes upon annual costs of production, including labor.
- (7) The net effect upon the farm income.

The greatest difficulty in making these estimates lies in the fact that the necessary physical data are not available when a program is first initiated. In spite of this limitation, most farmers have a rough idea of the effects upon income of a conservation program before deciding to adopt it. As the program develops, more information on the effect of various practices upon yields can be accumulated as a basis for more accurate forecasts. Budget analyses of this nature are also valuable in determining the most economic of alternative conservation plans.

Analyses designed to show whether conservation is economic or not for the individual and the evaluation of alterna-

² This assumes that if conservation is economic for the individual, it is for society, and this will hold true except for a war emergency when society might favor exploitation that would be uneconomic for the individual.

³ For a more complete discussion, see *A Method of Estimating the Economic Effects of Planned Conservation on an Individual Farm*, *op. cit.*

tive conservation plans is an essential part of planning, but the study of methodologies and factors to be considered is more logically classed as research. This is a typical example of the very close interrelationship between action and research that develops out of the growth of public action.⁴ However, as will be seen, it is only one of the phases of conservation research that is needed and is closely associated with the whole problem of farm management. Greater accuracy in making these budget estimates will depend upon the reliability of the records of physical factors kept by the Operations Division of the Soil Conservation Service, the use of sound budgeting techniques, and the proper evaluation of alternatives. In some cases, an alternative plan may be dependent upon the development of facilities not at present available, as for example, the opening up of market outlets for milk.

In making budget estimates it is essential that both primary and secondary production be considered. This is important for two reasons: A reduction in the intensity of primary production may lead to a change in the feed available on the farm, and unless some economic method of using the new feed supply is developed, the farmer may suffer an unnecessary loss of income. Of more importance, however, is the relationship between the intensity of secondary production and farm size, and the possibility of making a small farm provide a more adequate income by intensifying secondary production, thereby utilizing family labor more fully and possibly increasing managerial ability.

Similarly, consideration must be given to the elasticity of production because a system of conservation farming with high elasticity is much less likely to be disrupted by price fluctuations than one that is highly inelastic. In practical estimates no quantitative measures can be given to this con-

⁴ See Neil W. Johnson, *Tailoring Conservation Research to Fit the Needs of Farm Planning*, Mimeo. F. M. 9, June, 1940, U.S.D.A., Washington, D. C.

cept, and we have to deal in terms of more or less when considering alternative plans and production changes that may take place in response to changes in prices.

The land use capability classes as developed by the Soil Conservation Service may be extremely valuable in indicating the limits of cultivation under conservation for various soil types, slopes, degrees of erosion, and practices. These classes set an upper limit of cultivation if disinvestment is to be avoided and give a physical basis which may be used in the development of conservation plans and budgets. Like other tentative standards that are established, the classes should be revised in the light of more accurate information that will be available as the conservation program is established more widely. It is essential that the limitations of these physical land classes be kept in mind; they represent the "permissive" factors of land use, and for each class there are numerous alternative uses which may range from permanent pasture to a three-year corn, oat, sweet-clover rotation, contour strip-cropped on terraces. Which of the alternative uses is best is an economic question. The budget analysis, therefore, can be made only when we have the physical information to determine what the *alternative* land use systems for conservation are, together with yield and price information that will enable an economic analysis to be made.

It is impossible to separate the effects of exploitation of virgin soil resources from the effects of prices and costs in determining the intensive and extensive margins. Maladjustments in land use patterns as indicated by low levels of living, high relief loads, high tax delinquency, and soil erosion may result from the fact that virgin fertility was available or from price relationships favoring erosive crops. Under such circumstances the introduction of conservation farming under the present institutional arrangement of farm size, taxes, population density, and rents may be a waste of public funds

where it does not remedy the basic maladjustments. If the conservation plan does not provide an acceptable level of living, exploitation will probably be re-introduced whenever it will yield even a small increase in net income, and a permanent conservation system can be firmly established only when it is coordinated with changes in institutional and farm size patterns.

The determination of whether conservation is economic to the individual or not is also of basic importance because of its relationship to the type of social action needed to eliminate exploitation. This problem of relating means to basic causes is discussed under the fourth suggested objective of conservation planning.

ESTIMATES NECESSARY TO DETERMINE WHETHER CONSERVATION IS ECONOMIC FOR SOCIETY

The second suggested objective of conservation planning is to establish conservation on those farms or areas where it is not economic for the individual but is for society. This assumes that budget analyses have shown that conservation is not economic to the individual and will therefore reduce his net returns, but because of factors that do not impinge upon the individual, conservation is economic for society. The causes of this divergence between social and private net returns can be determined only by concrete analysis of the problem in specific areas. However, they may be classified into three main groups as suggested in Chapter 7. These causes may be summarized as (1) Social costs of exploitation or benefits of conservation which do not impinge upon the individual; (2) Capital losses or gains not borne by the individual; and (3) differences in the prices available to society and the individual, including costs of conservation and interest rates.

The basic problems of measurement lie in determining which of these major causes are resulting in social losses, how

large the social loss from continued exploitation will probably be, the value of any social benefits from conservation above the elimination of actual losses, and the allocation of the estimates to areas. The most suitable means of attaining the end at the least cost must also be considered, but because these questions apply to all social action we shall consider them separately. It is in this field of social accounting that many of our unsolved problems are to be found, and any adequate treatment would involve a separate monograph for each particular problem discussed.⁶ For illustrative purposes, we will consider three hypothetical problems of social accounting in order to indicate the estimates involved under simplified conditions.

Damages Borne by Society

An example of the first group of causes making for a divergence between social and individual net returns would be the flood damage in a city resulting from the rapid flow-off of water from a given watershed and caused by the exploitive method of farming in the area. In order to make a sound social analysis of this problem we would have to estimate:

- (1) The average annual damage from floods.
- (2) What changes in land use and practices would be necessary to reduce the rapidity of water flow in the watershed in order to prevent floods under the prevailing rainfall conditions.
- (3) The effect of these changes upon the net income of the various farm classes (by size and type of farming). This would involve a sample study of the area by the budget method previously outlined, and the question of whether all farms could

⁶See A. N. Garin and G. W. Forster, *Effect of Soil Erosion on the Costs of Public Water Supply*, U.S.D.A., S. C. S., EC. 1, July, 1940. There is also a large amount of material available for analysis and study in flood control reports for specific areas.

continue to provide an adequate family income under the new system would have to be studied.

(4) What the cost of the program would be in terms of subsidies or land purchases, and other alternative action programs that might be used.

(5) What other social values might be expected from an increase in game or recreational areas created by the conservation plan, and what future social costs resulting from erosion might be avoided.

For a small watershed such estimates might be made relatively easily. But as the area of drainage becomes larger and its boundaries further removed from the focus of the damage occurring, the problem becomes increasingly difficult because physical measures and estimates are less reliable. In spite of the difficulties, such estimates have been made and action programs initiated.⁶ Past and current experiences are accumulating masses of data which will provide information for more accurate estimates in the future. The compilation, tabulation, and analysis of these types of data, together with improving techniques of estimation, is an important function of government which must be shared by both research and operations personnel; theory through its analysis of conditions and relationships can play an important part in suggesting the necessary information needed for the complete solution of specific problems and in evaluating the significance of empirical data that might be obtained or is already available.

The Transfer of Capital Losses

When we consider capital losses which do not impinge on the individual as a general cause of divergencies between individual and social net returns, we find that this is most

⁶See the report of the Muskingum River flood control project in Ohio. "Working Together in the Muskingum Valley," a Coordinated Conservation Program by Federal, State, and Local Agencies, mimeo., 1939. Also *History and Development of the Muskingum Watershed Conservancy District Project Ohio*, mimeo., March, 1938, Zanesville, Ohio.

serious in the case of such biological resources as fisheries, game, and forests.

Many examples of capital losses not borne by the individual occur where there is no way of allocating a capital value to the resource. This is true of fisheries, game (including fur-bearing animals not in captivity), and the recreational uses of forests and streams. In these cases exploitation may destroy the possibilities of future incomes in terms of goods or services. In order to determine social policy we must know, in the case of fisheries:

- (1) the value of the flow,
- (2) the kind and quantity that may be taken without reducing the yield, and
- (3) the costs of control, including propagation and law enforcement. Much of this problem is biologic in nature, and fairly rapid progress has been made in developing social controls to restrain competitive exploitation, even when Nations rather than individuals are concerned.

In the case of soil there is the outstanding example of the tenant farmer who is exploiting the resource at the expense of the landlord. This may result from the landlord's ignorance, custom, or the purchase of land for speculative purposes with an early sale anticipated. The social loss is borne largely by individuals, and in order to analyze the importance of this to society we would have to estimate:

- (1) The annual capital loss resulting from the exploitive system.
- (2) The decrease in net income that would result if conservation were adopted.
- (3) Whether exploitation was economic after the capital loss was deducted from the net income.

This requires a budget analysis of tenant farms by the method previously outlined. Where it could be shown that conservation would be economic when capital losses are con-

sidered, tenure reform and education of landlords might be sufficient to eliminate exploitation so that the costs of introducing the conservation system would be low. Where conservation appeared to be uneconomic even when capital losses were considered, coercion or subsidies might have to be used if the exploitation was creating other damages or appeared undesirable from a social point of view.

Differential Prices

Differential prices available to the government and the individual were listed as the third cause of deviation between individual and social net returns, and differential interest and wage rates were discussed in some detail in Chapter 8.

Differences between prices available to the Government and the individual reflect rigidities and lack of equilibrium with full-employment conditions. If society has control over unemployed resources of capital or labor, the cost to society for any given project is essentially an opportunity cost. In the case of unemployed labor a minimum amount is allowed for relief; and if the labor is employed by the government, the cost of the labor is the wages paid less the relief costs. A private individual employing labor must pay the going wages, and the costs of a conservation program involving hired labor would be much higher.

The problem society must solve is that of allocating the unemployed labor to projects that will give the largest social returns and of using the labor for projects that would not be privately economic when the total labor costs were charged against them. In formulating conservation policies, therefore, unemployed resources should be directed first of all to those areas where conservation would be uneconomic to the individual at current market prices. If this policy is not followed, the resources might be used in areas where conservation would be economic at current rates. This would tend to

reduce the private employment of such resources, and those areas needing subsidies would be left to continue exploitive uses. This general guide to policy must be modified in such a way that expenditures are allocated only to areas where conservation is economic at the lower rates (in terms of social opportunity costs), and where it will continue once it is introduced. Similarly, the policy assumes a continuous educational process and anticipates the adoption of conservation in those areas where it is economic at current prices.

In choosing between alternative expenditures we would have to determine:

(1) The additional cost to the government of using the unemployed resources.

(2) Whether conservation, once it is established, would be economic and provide an acceptable level of living.

(3) The willingness of the individuals in an area to bear additional costs (above the use of the unemployed resources) that may be necessary to establish the conservation system; or their willingness to contribute part of the costs involved in using the unemployed resources.

(4) Whether conservation would be economic without any subsidy, and whether education and the modification of institutional resistances alone can be expected to lead to the adoption of conservation.

The importance of making budget analyses of individual farms must be emphasized, and these analyses need to be made before decisions regarding the allocation of resources are made. Such estimates can be only tentative, but they can indicate whether or not the conservation system is likely to be accepted. Just as we have made reconnaissance erosion survey maps for each state, so should we make a reconnaissance survey of the economic feasibility of conservation. Such a survey, which might well make use of a vast amount of information already collected, would be extremely valuable as an

aid in selecting the areas to which unemployed resources should be directed. Only as this is done can there be any reasonable assurance that the conservation program will result in an economically appropriate land use pattern. If the analysis shows that under the conservation program and the present farm size pattern an acceptable level of living cannot be maintained, then the expenditure of conservation funds or the use of compulsion would not be justified unless a co-ordinated program of land use to correct other maladjustments is initiated at the same time.

Apart from the economic effect upon the individual farm operator, the question of social costs not borne by the individual must also be investigated because of their bearing upon the type of control that is justified.

If the survey shows that conservation is not economic because exploitation yields higher individual and social net returns *when all costs are considered*, conservation funds should be spent only after all exploitation that is uneconomic to society has been eliminated. If the survey indicates that conservation is economic for society but will not provide sufficient income to the farm family, the costs of alternative programs must be considered. This may involve moving the population, or part of it, from the area. The size of the farms may be increased, or the whole area might be allowed to revert to wilderness, or be reforested. All federal and state agencies concerned with land use and population would need to co-operate in making the decision. Only if the costs of alternative solutions were higher would the expenditure of funds for conservation on the individual farms under their present pattern be justified, and some form of a permanent subsidy to a stranded population might have to be developed.

If we apply these general principles to any one specific problem, the complexity of social accounting is revealed because, in analyzing a single problem, several causes may

be related to it. In the flood control problem previously mentioned, a survey might reveal that insecurity of tenure and landlord ignorance were responsible for a great deal of socially uneconomic exploitation, and that because there was unemployed labor available the social costs of establishing conservation would be lower than individual costs. This would have the effect of reducing any subsidies that might have been necessary to offset individual losses, and also it would reduce the costs of the control program. In spite of the complexity of the problem, society does allocate funds to one flood control project in preference to another, and decisions that one project is "more" economic than another have to be made. If we neglect the importance of political considerations, it does not seem impossible to evaluate the economic importance of various social expenditures providing that there is time to make the necessary surveys and estimates. In many cases more accuracy can be attained only by spending larger sums to obtain the relevant information, and we are immediately faced with the question of deciding how much should be spent upon this phase of social planning. If extremely careful and detailed studies of all the factors were made, the cost might be more than the social expenditure involved. The cost of making estimates, therefore, must be related to the size of the expenditure contemplated and also to the detail necessary to establish a priority between competing demands. Further research into these problems of social economics is needed, and should include techniques and theory as well as the accumulation of empirical data.

EVALUATING CONSERVATION AS AN INTANGIBLE END

The third objective of social policy is to achieve conservation on those farms or areas where it is not economic for the individual, but is desired by society to achieve intangible ends. This is one of the most widely publicized ends of con-

servation. It is couched in terms such as "national defense," "love of the soil," "harmony with nature," "future generations," and "America the beautiful." It ignores all the problems of measurement by making conservation an ethical concept; all conservation is good, and if it happens to be economic, so much the better; but economic or not, it is good.

This attitude to conservation is not only an expression of social groups but is found in individual farmers who take pride in maintaining their farms at a high level of productivity. These are the good husbandmen who view their lands with a critical eye; to them a gully, a weedy pasture, a broken fence, or a broken door in the barn is a personal offense; farming is more than a means of making money, it is an art. This is the antithesis to the farmer who boasts that he has ruined three farms and made enough money to retire to California. Where this "pride of workmanship" exists there is no conservation problem except when sheet erosion insidiously removes the topsoil, and when this is recognized, conservation methods are eagerly accepted. In the case of the individual, there is no economic problem because the personal satisfaction from being a good husbandman outweighs any lowering of income through increasing the costs of production.

If this is true for the individual, is it necessarily true for society as a whole? If all farmers had this attitude, it would, of course, be true for society also; but we know that this attitude is not widespread, and many farmers think more in terms of income than in terms of maintaining their soil. This is partly due to the fact that customary methods of farming brought over from areas of gentle rains did not prevent erosion in areas of great rain intensity; it is partly due also to the fact that conservation farming with long rotations could not compete with exploitive grain farming with cheap land and stores of virgin fertility. If the individual does obtain more satisfaction from a higher income rather than from a pride in his

husbandry, then social action to induce conservation when this would lower his income would only be justified when there was some external factor to be considered.

The use of conservation as an intangible end often *ignores* the problems of measurement, but it cannot *eliminate* them. We must continually keep in mind the basic question of whether conservation is economic for the individual. Where conservation is economic, for the individual or for society, the concept of conservation as a desirable intangible end simply strengthens the justification of social action; it also justifies a bias favoring conservation when the estimates are indeterminate. The basic problem of social policy is to determine how far society should go in inducing (or compelling) conservation when it appears uneconomic but is still desired for intangible ends. To make any rational allocation of funds for this purpose, it is necessary to know (1) what the social cost in terms of a decline in income would be, and (2) what are the specific intangible ends desired, how they rank with reference to other intangible ends desired by society, and how much money society can reasonably spend in relationship to the benefits of the conservation program.

It is the second problem that presents the greatest difficulties in social accounting. With reference to the conservation of wildlife, and forest, lake, and river areas, the intangible end of recreational facilities is fairly explicit, and we can obtain indications of the importance of this end through the number of people using the facilities. One broad general guide to social expenditures for these purposes might be that they should be related to the use made of the facilities by the public; such "consumption" expenditures should provide, as far as possible, those facilities which can be used by all classes in society. This is particularly important in serving the recreational needs of people in large centers of population. For low income groups with two weeks vacation, camping areas

in virgin forests over a thousand miles away may have little value unless cheap transportation facilities are available. The same amount of money spent in an area one hundred miles away might be very much more desirable in terms of increasing the use of recreational facilities. In determining the expenditures of federal, state, and local governmental agencies for such activities, we have to rely upon the reflection of public opinion through the democratic process with its accompanying appendages of pressure groups representing special interests. Whether we can refine this process through the use of public opinion polls on specific questions is an interesting possibility, and there seems no sound reason why such polls should not be used more extensively in the future.

When we turn to the problem of conserving our farm lands to attain an intangible end, it is much more difficult to state explicitly what this end is. Many of the appeals for public support use the concept of preserving our land for future generations, and this may be an intangible end to which many will give support; however, when we support conservation that is economic for the individual or for society, we are at the same time preserving the land for future generations, and the general use of this intangible end may simply mean that all conservation, whether it is economic or not, is equally desirable for society. This is certainly not true, because conservation that is economic increases the social net returns while the elimination of economic exploitation will decrease social net returns, and this decrease must be included as a cost when evaluating the desirability of alternative ends. It would seem logical that general conservation policy should be directed toward achieving conservation in those areas where the increase in social net returns will be greatest and that it should progress to the less economic areas. Finally, when all economic conservation has been achieved, conservation of farm lands that is uneconomic for the individual and for society

might be justified on the basis that we wished to reduce our social net returns now in order that future generations might benefit from our sacrifices. When we have actually achieved all the conservation that is economic, there may not be a great deal of exploitation left, and if population continues to increase, not only conservation but improvement and reclamation by drainage, irrigation, and increased use of fertilizers will become economic. It is because there is considerable substitutability of capital for land that we need have little fear of future generations of Americans paying very high prices for food because we have ruined our patrimony. Long before the level of living is seriously lowered, conservation and land improvement will be so much more profitable that economic motivations will tend to overcome the forces of inertia and custom. This does not mean that we will achieve more if we take no action to induce soil conservation now. On the contrary, such steps are highly desirable but at present all our efforts should be directed to those areas where they will be most economic.

RELATING METHODS OF CONTROL TO CAUSAL FACTORS

The final objective of conservation policy is to use the means best suited to attaining the three ends discussed above when complimentary or conflicting relationships to other ends are considered. This objective may be divided into two parts; the selection of the means and the analysis of conflicts; these can best be discussed separately.

The selection of the most appropriate means of attaining conservation in various areas depends upon our insight into the basic causes of exploitation. The question of whether conservation is economic or not for the individual is of basic importance because where it is economic the conservation system will tend to be permanent once it is established; where it is not economic for the individual but is for society, the

conservation system will not be maintained by the individual after it is established unless society maintains some form of permanent control. This may be achieved by means of an annual subsidy, by buying the land in the area and renting it under specific agreements regarding land use, or by limiting the property rights of the individual by law so that exploitive use is prohibited. In the latter case, compensation for any loss in-land value might be desirable, and the government then becomes a part owner of the property rights; a clause limiting the land use could be inserted in all transfers of title and the control becomes permanent. A similar result could be obtained through zoning ordinances or tax rebates for the recommended land use.

The question of whether compensation should be paid to the individual when conservation is not economic depends upon the cause of the difference between individual and social net returns. If the difference is due to damages to society through floods or reservoir siltation, the elimination of such losses will reduce the tax burden on one section of the community (usually the urban areas), and where conservation reduces farm income, this burden should be shared by the section of the community receiving benefits.

Where exploitation is economic because the operator does not bear the capital losses, there appears to be no justification for the payment of compensation. In the case of landlord ignorance and insecurity of tenure, the education of the landlord to maintain the productivity and value of his land so that net returns are maximized, will benefit both the tenant and the owner. In order to increase intensity, which tends to offset any decline in rents due to restrictions on the land use, greater security of occupancy and compensation for unexhausted improvements should be introduced at the same time. Where the capital loss is borne by society as a whole, as in the case of fishing and hunting, restrictions on the actions

of competing individuals using these resources will permit a permanent flow over time and benefit them as well as consumers, and compensation under these circumstances is not necessary.

Where conservation is economic to society but not to the individual because of differences in prices, social action that reduces interest rates or subsidizes individual conservation costs through the use of unemployed resources may maintain or increase individual returns and compensation is not justified. In some cases the individual might reasonably be expected to bear part of the costs when the action results in an increase in his net returns.

When conservation is economic for the individual and he continues to exploit his resources, the basic problem of policy consists in selecting the methods of control which will overcome the resistances at the least cost to society. Education, subsidies to overcome inertia, and coercion through law may all be used separately or, as is more general, in combination with each other. If a law limiting the rights of individuals to use their land as they pleased met with widespread opposition, it might be completely ineffective because of the difficulty of enforcing it. This can largely be overcome by local land use regulations to which the majority of the persons involved agree.⁷

When we attempt to bring all these problems of measurement together, for the purpose of making decisions, the essential need of dealing with relatively small areas is revealed. National, regional, and state programs directed towards achieving conservation must be so flexible that the program can vary not only with regard to details but also with regard to the means employed. At present we know far too little

⁷See E. A. Foster and H. A. Vogel, "Cooperative Land Use Planning—A New Development in Democracy," *U.S.D.A. Yearbook of Agriculture*, 1940, pp. 1138–56.

about the causes of uneconomic exploitation, and the experimental use of various means would add greatly to our knowledge. County agricultural planning committees located in similar areas might adopt different programs for a period of five years and the results evaluated at the end of the period; one area might emphasize education and individual farm planning, another might develop land use and practice regulations, a third might use five-year contracts and complete planning by technicians, while a fourth allocated A.A.A. payments purely for the introduction of conservational land use and conservation practices. Until more information is available, however, action programs will have to be based upon a rather crude analysis of the various factors involved and judgment as to the best methods to be used. Experience will provide further data for improvements in both analysis and judgment, provided that adequate records of results are maintained by the action agency.

ANALYZING CONFLICTS BETWEEN MEANS AND ENDS

Soil conservation is only one of many problems of agriculture. As has been pointed out, action programs affecting prices and changes in tenure conditions have important implications for conservation. The development of greater security of tenure and other tenure reforms represent aims which are complementary to the end of conservation. On the other hand, price changes which increase the comparative advantage of erosive crops may directly conflict with the development of conservation. The importance of these complementary and conflicting ends to conservation vary between areas and are related to the particular crops and soils involved. Improved tenure conditions in the corn belt may lead to a less exploitive land use pattern and increased livestock production, while in some areas of the South cotton production has such a high comparative advantage over the nearest alternative crop

that a change in tenure might have little or no effect upon land use.

In an analysis of the effects of price changes or nationwide programs affecting acreages of specific crops, in their relationship to conservation, statistics must be broken down by counties or smaller units and related to the conservation problems of the area. Changes in national or state acreages of corn or grass crops are of little value in determining the effects of these changes on conservation, because they are not related to the seriousness of erosion which varies greatly within large areas; even county figures may be misleading if the area contains large differences in topography and soil type. For the purposes of conservation analysis we need a small sample of farms representing erosion problems in various areas so that the effect of other programs and price changes on land use can be studied. The results should improve the overall conservation planning and indicate land use changes that may result. Sample census farms might be classified on the basis of erosion and topography and used for this purpose.

When we turn to the relationship of less tangible ends such as personal liberty and the sanctity of private property which may conflict with social controls, particularly those involving limitations of property and contract rights, measurements become largely a matter of polling public opinion. In this field also, variations between areas will occur, and what would appear to be a reasonable control in one place might seem to be unwarranted interference in another. Attitudes change over time in response to publicity efforts, so that basic and permanent relationships are difficult to discover. In this realm, county agricultural committees might well function as agencies which would obtain the reactions of farmers to specific proposals in order that conflicts may be avoided. These committees also may perform a valuable function in evaluating the effect of price changes and action programs on

conservation so that they may play a part of growing importance in determining national conservation policies and minimizing conflicts between various means and ends.

MEASURING THE EFFECTIVENESS OF VARIOUS MEANS OF CONTROL

As we look to the future, progress in achieving soil conservation over the wide areas where it is economic will be related to our ability to appraise the effectiveness of the various means that are used. In many states, soil conservation demonstration areas are already on a maintenance basis after five years of intensive work and the development of "complete" conservation plans. The question immediately arises as to what the effect of this work will be in another ten or twenty years. Will the land use patterns and practices introduced spread to other farms or will there be a gradual retrogression to the old exploitive system? No immediate answer is possible, but periodic surveys will be valuable in determining what practices and rotations are not being maintained and why. At present, soil conservation districts are the major instruments of soil conservation activities and give every indication of becoming permanent parts of our agricultural organization; they are, however, too new to indicate how far the farmers will go in adopting complete programs or how many of the farmers will actually put the plans into practice. As experience with districts develops, analyses of resistances will become important and the allocation of technicians may need to be supported by conservation payments to assist the farmer in making the necessary adjustments and possibly also by tenure legislation giving greater security of occupancy. At present little is known about the effectiveness of various means of control in relation to their costs, and progress can be made only as we develop

more accurate records of both the costs and final results of the programs in physical and economic terms.⁸

From these general relationships we may now turn to a more detailed application of the principles to the specific problem of relating conservation to a period of expanding production necessitated by war demands. In this analysis the close relationship between physical and economic problems is made clear.

⁸ For an example of this type of information, see R. E. Uhland, *Better Harvests Through Conservation Farming*, Soil Conservation Service, U.S.D.A., March, 1941.