Resource development and the Missouri River Basin
by Robert W Bowman

A THESIS Submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree of Master of Science in Agricultural Economics
Montana State University
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Abstract:
This thesis is an attempt to think through some of the basic problems of resource development,, particularly those pertaining to the Missouri River Basin. It develops what, it is hoped, are suggestive analyses of the complex social processes involved in resource development in order that the problem situations and strategic factors are related to a deductive theory in a way which mates further detailed research more purposeful and, therefore, more fruitful.

Chapters II, IV, and V are mainly descriptive of (II) the Missouri Basin, (IV) some aspects of the agencies responsible for developing the basin, and (V) measures to coordinate their activities.

Chapter I explains the almost inordinate contemporary national and international excitement over the words “resource development"; here apparently is the new panacea. But do we really understand what we are doing when in this modem age we can technically develop resources almost overnight? Chapter III makes a case for a new intellectual discipline, "generalism," to evaluate and integrate into social thought and action the implications of specialized research; this chapter also establishes a structural framework for the study and gives an analysis of the public planning process.

Chapter VI examines the social significance of reservoir siltation, with particular reference to the Missouri Basin, Chapter VII discusses some of the criteria by which federal investments should be evaluated.

Chapter VIII attempts to redefine “region" and “regionalism" and then examines the relationship between the Missouri Basin and regionalism.

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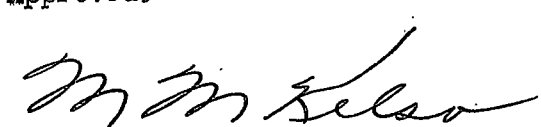
Approved:



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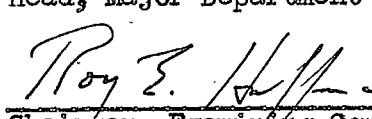

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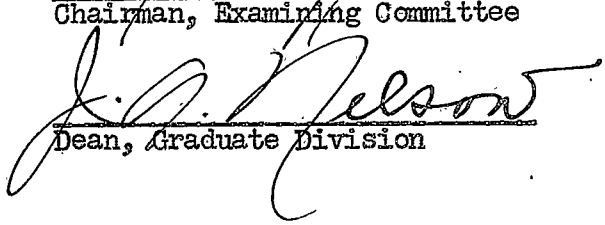

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PREFACE AND ACKNOWLEDGEMENTS

It took approximately fourteen months for a group of seven distinguished persons with a staff of over fifty persons to prepare a three volume, 2015 page report on policies for the development of the water resources of the United States.

It is, therefore, with appropriate humility that the writer presents this disquisition on some of the policies for, and some of the problems of, developing all the resources of the United States and particularly those of the Missouri Basin.

I have received a great deal of stimulation from various members of the faculty of Montana State College for which I am grateful. All the members of federal and state agencies with which I have had contact have been most kind and helpful.

The experience of the writer in government service suggests that public agencies are frequently aware of, and grappling with, problems which are not and often cannot be made public. For this reason the text does not imply that government agencies are unmindful of the problems which will be examined here. Rather, the purpose is to encourage wider public interest and thought on the exciting and crucial problems of resource development.

ABSTRACT

This thesis is an attempt to think through some of the basic problems of resource development, particularly those pertaining to the Missouri River Basin. It develops what, it is hoped, are suggestive analyses of the complex social processes involved in resource development in order that the problem situations and strategic factors are related to a deductive theory in a way which makes further detailed research more purposeful and, therefore, more fruitful.

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Chapter I

AN INTRODUCTION TO RESOURCE DEVELOPMENT

Resource development has become, according to one's point of view, one of the most popular or unpopular catch-phrases of the day. When an actor who has lived and played in obscurity for many years suddenly becomes famous, curiosity usually impels some individual to seek a way of explaining the transformation.

Resource development is not unlike our actor. It is not a new activity. In the year 3500 B.C. levees were being built around patches of the Tigris-Euphrates delta in order to dry up the rich alluvium and make its cultivation possible. In Egypt, soil fertility and productivity were being improved some 4000 years ago by an annual controlled inundation with the waters of the River Nile. At a much later date, the buried reserves of light, heat, and power were developed to establish the Industrial Revolution in Britain; this brought in its train the imperialist development of raw materials and markets in the so-called colonial areas. In the United States, mining, deforestation, the settlement of virgin soil, the building of roads and railways in the nineteenth century, were all spectacular examples of resource development.

Why, then, has this vast historical process suddenly "arrived"?

Before attempting an answer to this question, it would be pertinent to examine the nature of the process. In essence, it is extremely simple, being no more than a reorganization of factors of production to generate

output from previously unused natural resources, in response to human needs and ambitions, and in accord with the conditions imposed by the contemporary civilization. 1/

Human needs, human ambitions, and the conditions imposed by civilization are not to be regarded as discrete dynamic factors in resource development. They are interdependent forces. For instance, a new method of extraction from lean ores makes previously undeveloped deposits potentially valuable, and the object of men's ambitions. The ready availability of timber leads to the discovery of new ways of using wood--again providing an outlet for men's ambitions. The needs of men for food and clothing frequently make the settlement of virgin lands obligatory, which involves the development of new technics 2/ for exploiting a strange environment.

The development of resources is, then, no more than an attempt by man to satisfy his needs and ambitions by rearranging factors of production and his civilization in such a way as to maintain and improve the state of his material and "emotional" well being. To include "emotional" well being may give rise to some misgivings, but it is here contended that the deve-

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1/ "Civilization" is used in MacIver's sense, i.e., "the whole mechanism and organization which man has devised in his endeavour to control the conditions of his life. It would include not only our systems of social organization, but also our techniques and our material instruments." MacIver, R. M., Society, 1937, p. 272.

2/ "Technics" is used in Mumford's sense, i.e., "a translation into appropriate practical forms of the theoretic truths, implicit or formulated, anticipated or discovered, of science." Mumford, Lewis, Technics and Civilization, Harcourt, Brace and Co., New York, 1934.

lopment of resources is not wholly the result of impulses which can be explained in the rationale of economics. The history of land settlement in the United States is inextricably bound up with the desires of immigrants to put their European serfdom behind them and become owner-operators, i.e., "free-men." Even today it is not improbable that some of the massive concrete structures for harnessing water resources may have been conceived by their progenitors, partly with an eye to their memorial function. 3/

In a rapidly changing society, changes in the physical bases of life and in human needs and ambitions consistently outrun the institutional changes which are necessary to make these needs and ambitions effective in the total web of social action. This difficulty of the institutional lag may be ignored for the present, though its implications are extremely germane to the ensuing chapters.

So far, the concept of resource development has been restricted to the reorganization of inanimate material factors. This is in fact something of a popular misconception as to the nature of the process. It is misleading because men are not only instigators of resource development, but are themselves resources. This fact is explicitly recognized by the U. S. program of public education, which is based on the notion that educated citizens are indispensable to a higher material and "emotional" standard of living. In fact, one of the most pressing problems of the day is to

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3/ Verbal statement made to the writer in 1950 by a prominent U. S. government official.

devise a social and educational system which will help the individual to fully utilize the resources within himself. This should eliminate some of the frustration of the individual and should raise the well-being of society by fully utilizing the latent powers of the individuals who comprise the nation.

Thus far, the essential nature and antiquity of resource development have been indicated; therefore, why, and in what way, has an old "act," heretofore largely ignored by the critics, become "front page" news?

The following explanations are offered:

(1) There is a general realization that international power, whether military, economic, or political, rests on the degree of industrial development within a region, and the resource base which it has available to feed its men and machines. National strength involves developed resources, such as a high horsepower/man ratio, adequate efficient transportation, complex equipment and men capable of using it effectively, abundant reserves of raw materials ready for exploitation at short notice, and so on. Perhaps the most obvious measure of this power was the virtual subjugation of China's four hundred millions by Japan's seventy millions in the period from 1937 to 1940. It is unfortunate for mankind that this feature of resource development should need to be emphasized, but it is important for this study because controversies over programs are frequently "resolved," if that is the right word, by invoking the plea of being in the interests of national security. Such an argument is usually decisive. The feature is also realistic in the contemporary situation, where the ideological divergence and great power of both the U.S.A. and the U.S.S.R. constitute

a positive threat to world peace.

(2) Arising out of the schism between the political East and West, there is a need for a constructive policy, sponsored by countries with the western approach to democracy, to prevent the expansion of the potential enemy. President Truman's Inaugural Address of January 20, 1949, gave effect to such a policy under what is now familiarly known as the "Point-Four" program. Very briefly, the program recognizes that nations whose populations live in continuous economic and social misery are particularly receptive to the, not wholly specious, blandishments of communism. 4/ Therefore, so the argument runs, by improving living conditions, it may be possible to create a favourable environment for the growth of democracy à l'Ouest. The guiding principle for the program is to help those countries which are willing to help themselves; and while the difficulties to be faced will be tremendous, the general approach would appear to be very much worthwhile. It is to be hoped that the results will be equally so.

(3) For centuries, the economic and geographical worlds have been contracting at an ever-increasing rate. The significance of this process lies in the growing interdependence of events in all parts of the world and in all spheres of human activity. The manifestations of this phenomenon

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4/ For instance, the corruption, inefficiency, and great inequalities of wealth associated with the Chiang Kai-shek regime made a political change inevitable in China. The communists, with a radical program of reform and backed by a willing army, must have appeared more attractive to the peasant than the Kuomintang. Who are we to say that the Chinese people should have resisted communism when there was no better alternative offered and when they had no means of knowing or even caring about the long-term implications of communism?

can be illustrated in many ways. At the political level, interdependence is recognized and partly consummated in the United Nations Organization. At the economic level, prosperity in the United States can, and usually does, affect the economic health of many other nations. Wool prices in Australia affect the production of synthetic fibres in the U.S.A. The prohibition of exports from the U.S.S.R. to Yugoslavia means substantial trade reorientation for Yugoslavia and the western nations. At the sociological level, the transfer of technology and related cultural values from the West has caused profound upheavals in Indian and African patterns of society. Improved health services established by colonial powers, unaccompanied by the transfer or development of new social values, has already made the demographic problem, in many parts of the world, almost insuperable. This interdependence may be likened to a delicate plane surface resting on a highly rugose surface. The fewer the high points, the more uneven their distribution, and the greater the discrepancy between the high and low points, then the greater the likelihood that the plane will collapse or overbalance to a catastrophic degree. The rugose surface, of course, represents the co-existence of many nations at greatly varying levels of wealth, social organization, political organization, and technological development. It is the recognition that, in this interdependent world, the wealthy nation cannot isolate itself from its poverty stricken (or powerful) neighbours, which led President Truman to say "Only by helping the least fortunate of its members to help themselves can the human family achieve the decent, satisfying life that is the right of all

people." 5/ The implication of Point Four is that this laudable purpose can be greatly implemented by resource development, in the broadest sense.

(4) The growth of national independence in the old colonial areas, the growing voice of previously mute masses in the conduct of their national affairs, plus the desire of their leaders to maintain their own power and increase the power of their respective countries make resource development in these areas not only desirable, but inevitable.

So far, the explanations put forward have been in terms of the international scene. The following points are particularly applicable to the domestic scene in the United States.

(5) Most of the more obvious outlets for extensive private development in the United States have already been filled. In addition, those resources which remain to be developed are either beyond the means of private capital or they are too unattractive for it. 6/ Irrigation, flood control, and silviculture spring to mind as examples of future resource development which private enterprise either cannot, or will not, undertake.

(6) The history of resource development in the U.S.A. is one of economic plunder; to satisfy immediate ambitions without thought of the

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5/ From the Fourth Point in the Inaugural Address, January 20, 1949.

6/ As long ago as the eighteenth century, Adam Smith laid down the principle that it is the duty of the sovereign or commonwealth to erect and maintain "those public institutions and those public works, which, though they may be in the highest degree advantageous to a great society are, however, of such a nature that the profit could never repay the expense to any individual or small number of individuals, and which it therefore cannot be expected that any individual or small number of individuals should erect or maintain." Wealth of Nations, Book V, Chapter 1, Part III.

probable expense to posterity. The bare eroded slopes of parts of the Rockies due to predatory logging; the miles of inedible sagebrush now occupying once healthy grassland because of overgrazing; the "dust bowl" of the '30's because of excessive tillage in a semi-arid climate; and the falling floor of the Santa Clara Valley because of feverish uncontrolled water pumping for irrigation, 7/ all these examples demonstrate some of the long-run social costs of unregulated private development.

(7) The logical upshot of points (5) and (6) is an ever-increasing volume of domestic public investment. Again, this is not a new type of activity. Egyptian, Iraqi, and Mercantilist development involved a great deal of public investment. What is new, however, is the expansion of public investment, which is somewhat marginal in the strict economic sense, within a democracy cradled in the era of "laissez-faire." The very basis of the United States Constitution is freedom and independence for the individual. These conditions were probably achieved in the early frontier days, when there were few social or economic barriers and few traditional requirements for self-fulfilment. The economy was in too great a state of flux to enable such inhibitive forces to develop. Today, despite the existence of a society full of economic and social barriers to freedom, independence, and self-realization as originally conceived, these old conceptions are substantially identified with the modern pattern of society in the U.S.A. The spirit of the Physiocrats and the Classical Economists

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7/ Vogt, William, Road to Survival, New York, 1948, p. 128.

still permeates most sections of society. Governmental investment is regarded as a gratuitous tampering with the "Natural Order," "The Invisible Hand," "liberty," "property," and thus faces considerable opposition from some particularly vocal segments of society.

(8) Closely allied with point (7) is the rapid expansion of governmental activity and spending over the last fifty years, in particular, the last twenty years. This involves increasing taxation to provide spending power over which the individual has very little direct control. Government spending cannot, in the long run, be justified by the personal predilections of the politician but must be defended by reference to general scientific and ethical principles which are debated in open forum by a society which exhibits extreme variations in its attitudes to such principles.

(9) The conflicts exemplified by points (7) and (8) can no longer be settled in the "salon" or by outright coercion. Universal suffrage, modern techniques of information propagation, relative freedom of speech and association, the wide dissemination of economic, political and institutional power in the United States, all ensure that there will be not only divergence of opinion, but also ample opportunities for its expression. In the field of resource development, a few examples will illustrate the possibilities of the situation. At the political level, the existence of two aggressive political parties equally uninhibited with regard to each other results in an ability to make political capital out of public spending or non-spending. The fact that congressmen draw their respective legislative authority from different parts of the nation frequently leads to what we might call regional favouritism in resource development, or at least

derisory cries of it. At the administrative level, the programs of the Bureau of Reclamation and the Army Engineers for the Missouri Basin appear to be designed for the purpose of maintaining intact or expanding their bureaucratic empires, as much as for benefiting the inhabitants of the Missouri Basin. Economic groups, such as the private utility companies and the railroads, have their lobbyists in Washington to influence congressional decisions. 8/ Private business as a whole conducts through the press 9/ and through the publications of the National Association of Manufacturers and the Foundation for Economic Education, 10/ its ceaseless campaign against government interference in private preserves and against taxation, or its corollary, public spending. On the other hand, organized labour, in the shape of the American Federation of Labour, the Congress of Industrial Organizations, and the National Farmers Union, have supported government participation in resource development. 11/

(10) Since the end of the nineteenth century, the idea of conservation,

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8/ See Terral, Rufus, The Missouri Valley, Yale University Press, 1947, page 218 for information on the National Association of Electric Companies, a power lobby. See also St. Louis Post Dispatch for May 12, 1945. Ibid, page 209 for information on the National Reclamation Association, a railroad lobby.

9/ It seems unnecessary to quote specific sources on this point; there are so few exceptions to the general hostility of the press to increased government activity of any kind.

10/See, for instance, von Mises, Ludwig, Planned Chaos, Foundation for Economic Education, New York, 1947.

11/See Terral, op. cit., page 222.

fathered by such people as Theodore Roosevelt and Gifford Pinchot, has been steadily finding a place in the thinking of the American people. Books by such writers as Vogt, 12/ Sears, 13/ Osborn, 14/ and Bennett, 15/ with their quasi-panic import have drawn attention to the excesses of past exploitation and the need for more conservationary development in the future. There is a growing awareness that at present rates of consumption, many critical resources such as oil and copper will soon be exhausted. This growth in conservation consciousness plays its part in the general interest in development designed to offset dwindling resources. Unfortunately, however, there is no great degree of correspondence between attitude and action. Too frequently conservation is something which the "other fellow" should be practicing; and, indeed, in a highly competitive society, it is almost futile to expect that conservation measures which are designed to protect posterity will be widely adopted without government stimulation and control.

(11) Particularly since the Keynesian "revolution" the part which public resource development might play in mitigating the effects of secular or cyclical unemployment has received much consideration. Hansen, 16/

12/ Vogt, Wm., Road to Survival, Wm. Sloane Associates Inc., New York, 1948.

13/ Sears, Paul B., Deserts on the March, University of Oklahoma Press, 1935.

14/ Osborn, Fairfield, Our Plundered Planet, Faber and Faber, London edn., 1948.

15/ Bennett, H. H., Soil Conservation, McGraw-Hill, 1939.

16/ Hansen, A. H., Economic Policy and Full Employment, McGraw-Hill, 1947, Chapter XVI.

Morgan, 17/ and Clark, 18/ have all emphasized this function of maintaining the health of the economy.

(12) There is a growing concern among thinking persons that the mechanics of resource development and its long-term implications are very imperfectly understood. In a world where the grounds for action must be justified openly and on reasonably scientific grounds, and where the scale of action is frequently so large as to vitally affect large populations and whole patterns of society, there is no place for fumbling, confused, and piecemeal developments in any program which requires the willing co-operation of ordinary people. Therefore, it would seem to be in order at this point to mention briefly some of the problems of large-scale development which seem to have been neglected in current plans. They will be considered as implications of resource development as it appears to be conceived of in the United States today.

The first implication results from the interdependence of man and his environment in the following way. Geological history can be roughly classified into relatively short periods of mountain building, interspersed between long periods of peneplanation. In these long periods, gravity, aided by the elements, and of late by human forces, has led to the complementary processes of degradation and aggradation, which produce the mature landscape. The consequences of these slow and exceedingly long-term changes

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17/ Morgan, T., Income and Employment, Prentice-Hall, 1947, Chapter XVI.

18/ Clark, J. M., Economics of Planning Public Works, Govt. Printing Office, 1935.

were not of great significance to man so long as average settlement densities were low, localization negligible, and private or social fixed capital at a minimum. The growth of population concentrations and permanent settlements assisted the increasing production of food, fibres, power, manufactures, and social services. With every step in the expansion of production, man's interdependence with his environment, and especially his modifications of it, became more complete.

Man's physical capital is a vital part of the framework on which modern society rests, and it may be objected that the works of man are no more permanent than the works of nature. It is doubtful whether this objection is really valid. For instance, the huge Tennessee Valley investments have created a complex economic and social fabric based on the production of cheap hydro-electric power and flood control. (There are, of course, many other features involved.) This economic and social superstructure will almost inevitably generate a will among the people whose lives and livelihoods depend on it to ensure the continued existence of the basic physical development scheme which makes the superstructure possible. What is more, the political, economic, and technological means of maintaining the basic development may be expected to lie within the control of the interested parties. However, it will be suggested later that in certain river basin developments, as at present conceived, and in the whole field of human technological invention, this may not be so.

This phenomenon of what the geographer calls "industrial inertia" can be well illustrated by reference to the United Kingdom, though the examples do not relate to river basin development.

At the village of Consett in the county of Durham, an iron works was established in 1840. The physical determinants of its location were local ironstone in the lower coal measures, a local outcrop of coking coal, and local silica rock. In a relatively short time, the local materials were almost worked out, but the capital equipment and the social superstructure remained. Therefore, coking coals were hauled from collieries twenty miles to the east, and haematite was imported through a port twenty miles distant and hauled up a steep gradient to the plant. The works grew, launched into steel production, and are now undergoing a major reorganization which will make them one of the largest steel plants in Britain. Its organic strength has greatly outweighed its present serious physical handicaps.

Another example of a rather different kind can also be taken from Durham county. When coal mining techniques were primitive, adits and shallow shafts were used to develop the upper coal measures of western Durham. As these deposits were worked out and mining methods improved, the industry moved eastward to the undeveloped, but deeper, seams of the lower coal measures. The social capital sunk into the original area was so great that, despite unemployment, poverty, and some migration eastward, the majority of the inhabitants refused to abandon the area, eking out what existence they could in marginal economic activities and on public relief. Finally the British government in 1946 deliberately fostered a policy of encouraging industrial migration into the area to fully employ the social capital already there. These examples, and there are many such in the United Kingdom, are not quoted to imply an inevitable causal relationship irrespective of the total environment, but to illustrate the tenacity

and power of survival of social and economic structures. It is this tendency of social organisms in a relatively stable environment to maintain what is in fact the status quo that makes for permanence in man's development schemes. This may be increasingly true in the United States where new frontiers, in the old sense, are disappearing and giving way to consolidation. Three significant inferences which may be drawn from this conclusion should be emphasized. First, the examples quoted relate to mining, which is perhaps the most unstable type of resource development, and yet which has not imparted its instability to social and economic institutions in the examples quoted, or at least only in a minor degree. Second, the Missouri Basin Development Plan is designed to stabilize agriculture and industry within that region, i.e., to strengthen the social and economic institutions of the area vis-a-vis the rest of the nation. Third, the operational emphases of a developed area will assuredly change, but the basic framework, e.g., dams, navigation channels, and irrigation projects is much less flexible over periods sufficiently long to be significant in the conduct of human affairs.

Therefore, if the increasing use of water resources by man is to continue, he must of necessity control forces which have hitherto been regarded as natural, because of the industrial and social inertia which may manifest itself in a given situation. Man can no longer be indifferent to natural changes due to erosion and siltation, for they interfere with his scheme of resource use. Moreover, development in the past has frequently speeded up these processes by the destruction of the biological cover. Although what we might call geological entropy is a very slow process, the more man

becomes involved in his environment, the more significant is the effect of even small physical changes upon complex and finely-adjusted economic and social systems. It could be argued that man's vastly improved technology enables him to modify his environment to suit his needs, but this rather misses the point. The essence of economy is the best use of resources; therefore, the more man discovers about his environment, the better able he is to use natural forces rather than upset them--a very costly process. This implies a reversal of the commonly-accepted idea that man is learning to control his physical environment. The more he acquires a proper understanding of the economic use of nature, the more it controls his actions. 19/

A second implication appears to be as follows. It is generally agreed that a given amount of capital, up to a point, when applied to favourable natural resources, produces a higher return than it would if it were applied to less favourable resources. Therefore, it is necessary to plan public capital investment so that the returns to the investment can be equated at both intensive and extensive margins. In the United States, this might mean increasing intensive development in the Middle West and South and decreasing extensive development in the Great Plains. 20/

A third implication of resource development in the U.S.A. concerns the assessment of repercussions on the rest of the economy resulting from a particular areal scheme. It can be argued that plans to rehabilitate the

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19/ See Chapter VI for a further treatment of the first implication.

20/ See Chapter VII for a further treatment of the second implication.

ranges of the Great Plains and provide winter feed on irrigation projects will cause economic dislocations in the Corn Belt. It can also be argued that the establishment of food processing plants in the Great Plains, based on cheap federally-produced hydro-electric power, will cause economic dislocations in Omaha, Minneapolis, and Chicago. 21/

A fourth implication of river basin development is an assumption that such a region constitutes a sounder basis for planning than one based on, say, the characteristic of semi-aridity. In other and more general terms, what homogeneous feature or features should be used to determine the most "natural" region for development? Is regional planning desirable, and, if so, on what grounds? 22/

A fifth implication is the possible effect of public resource planning and development on the social and political foundations of the U. S. and vice versa. Rational planning in a democracy requires the more or less willing acquiescence of the planned. A plan may be perfect on paper, but its realization depends on the day to day actions of many people. If the planners, administrators, and planned are inefficient, indifferent, hostile, corrupt, or just mischievous, there is no effective way, in a democratic society, to prevent individuals from wrecking a given program, if society itself is not interested and does not censure their behaviour. This is merely one special case of the legal dictum that laws cannot succeed permanently if they are opposed by strongly resistant and deep-seated

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21/ See Chapter VII for a further treatment of the third implication.

22/ See Chapter VIII for a further treatment of the fourth implication.

customary attitudes. 23/ In view of the antipathetic attitude of large numbers of Americans to planning, 24/ it is of paramount importance that this approach to human problems shall not be discredited as a result of the inefficiency, corruption, or apathy of the planners. If planning is discredited now because of these blemishes, it will take many years to restore public confidence in the process. The initiation of development schemes by governmental authorities is likely to have profound repercussions on concepts of freedom, liberty, and the rights of individuals and states. The historical, though somewhat artificial, delineation of states and their functions is likely to be continually modified. Legislation for large-scale development and supervision may make Congressional machinery inadequate. Administration may require a substantial reorganization of government departments and new systems of public accounting and democratic control. The experience of the United Kingdom with regard to the nationalized industries is of some interest. Even after four years of government operation of the coal mines, the right balances between central direction and local initiative, between organizational autonomy

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23/ A striking example has been the virtual nullification of one important provision of the 14th Amendment by the customary attitude of whites to coloured people.

24/ The antipathy seems to be directed at the word rather than the reality. The word "planning" as an emotive weapon, has been effectively used by vested interests; it is not unusual to find farmers on federal irrigation projects accepting their position with equanimity and condemning planning at one and the same time. It is, of course, likely that the past records of politicians and bureaucrats have not merited the respect of the American people.

and public control have yet to be struck. It is not unlikely that similar problems will arise from resource development plans in the United States. 25/

A sixth implication concerns the social adjustments of tenure, credit, taxation, settlement, compensation, and education, which any plan must include if it is to be successful.

A seventh implication arises from the conflict between present or future needs and between a simultaneous, integrated, over-all planning attack or a partial experimental approach. The pairs of alternatives are, of course, closely interrelated.

An eighth implication is how far existing programs can be given sufficient flexibility to allow for future critical technological changes. This is a particularly intractable problem because such changes occur so rapidly in the 20th century and cannot be readily foreseen. The following examples suggest some of the possibilities: aqua-culture, controlled precipitation in arid regions, the supercession of many conventional organic and inorganic materials by plastics, direct use or control of solar or cosmic energy, production of pure water from sea water, and atomic energy for peaceful uses. Further, and this applies particularly to the Great Plains, how far have technological changes in dry-land farming lowered the critical limit of annual rainfall necessary for successful cropping?

A ninth implication is possible changes in the supply of and demand for water. There is some evidence that climatic conditions are changing.

25/ The T.V.A. should provide a valuable case study for such problems.

The receding polar ice caps suggest that the earth is getting warmer. But if climate generally is getting warmer, then evaporation is increasing both on land and sea, and the problem is what will be the net effect of this change. The demand for water, for cooling, for synthetic fuels, for chemicals and other purposes, is growing rapidly with results that New Yorkers well know. Can this demand be allowed to continue its growth without being substantially curbed by public regulation?

A tenth implication concerns the optimum size of farm units from the point of view of both the farmer and the public. For instance, the policy of the Bureau of Reclamation for many years has been to impose a limit of ownership of 160 irrigable acres for each farmer on federal projects. In practice, this usually means 320 acres, but the important question is whether the family farm is to be encouraged at the expense of the factory farm or vice versa. The whole question of farm size and the family farm needs reexamination.

Because of the time element, it will not be possible to discuss all of these implications. Those which will be given a more detailed treatment have been indicated by footnotes.

Chapter II

GENERAL DESCRIPTION OF THE MISSOURI BASIN

There have been a number of adequate descriptions of the Missouri Basin, 1/ and particularly that part of it which lies within the Great Plains region. 2/ For this reason, only a very brief account will be given here. N.B., a brief statistical summary of the Basin will be found in Appendix A. 3/

The exposition of the planning basin is made difficult because it includes four distinct sub-regions, see figure 2. This also poses the problem of reconciling divergences of human use and interests of which basin development must take account. It must be emphasized that this division of the basin is a somewhat arbitrary process. The limits of the Great Plains used here, though definitive, do not necessarily correspond to alternative boundaries which are advanced for the region. In all cases, there is a zone of transition, and the mere drawing of a boundary line gives an impression of exactitude which is quite spurious in the world of

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1/ a. Senate Document No. 191--The Sloan Plan.
b. House Document No. 373--The Agricultural Program
c. The Missouri Valley, by Rufus Terral, Yale, 1947.
d. President's Water Resources Policy Commission, Vol. II, pp. 161-284.
e. et. al.

2/ a. "The Future of the Great Plains," report of the Great Plains Committee December, 1936, U. S. Government Printing Office.
b. Webb, W. P., The Great Plains, Ginn and Co., 1932.
c. et. al.

3/ For a complete summary of Missouri Basin Statistics, see "A Statistical Handbook for the Missouri River Basin," Montana Agricultural Experiment Station Circular No. 59, July, 1951.

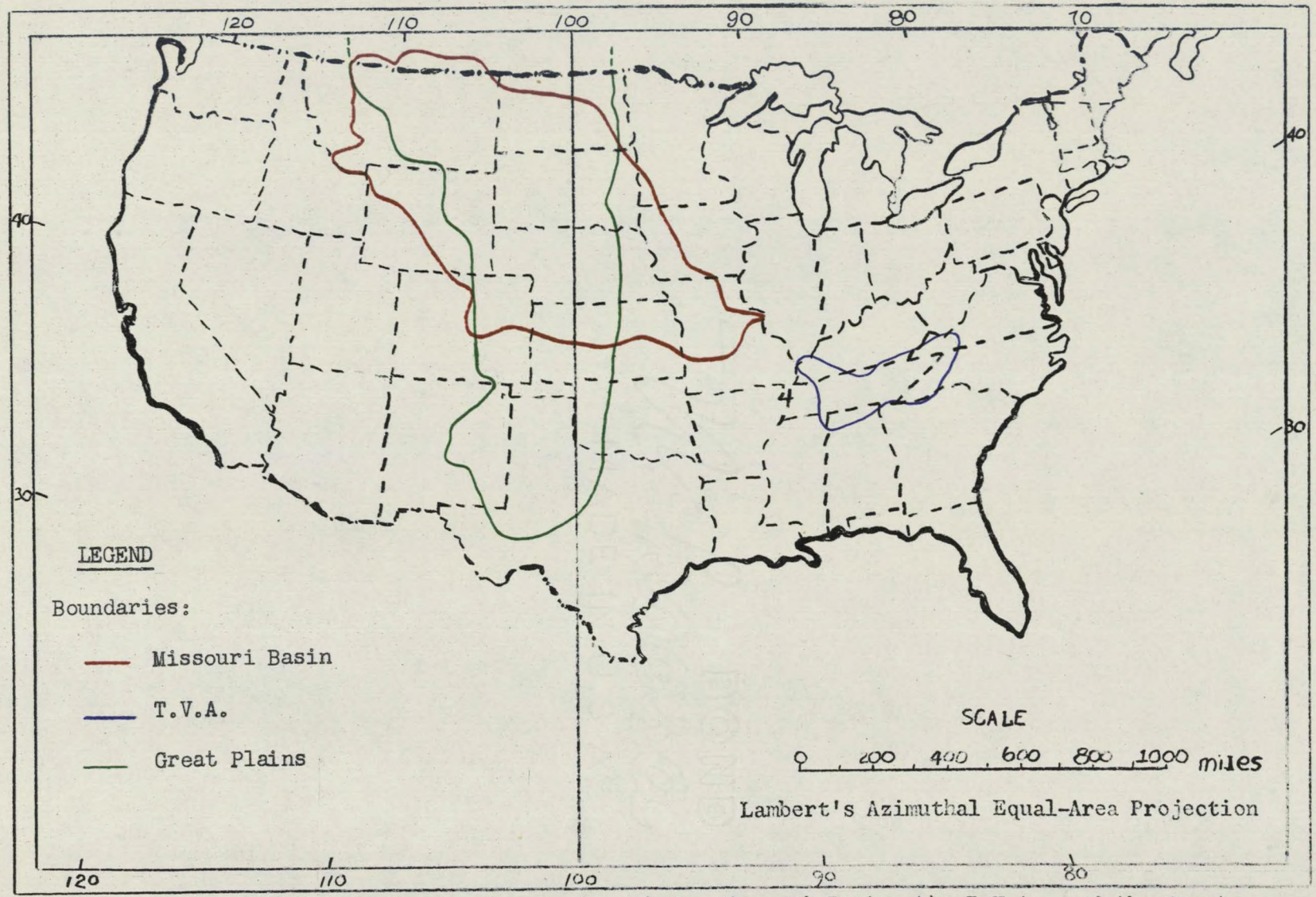

Figure 1. Map of U.S.A. Showing Boundaries of the Missouri Basin, the T.V.A., and the Great Plains.

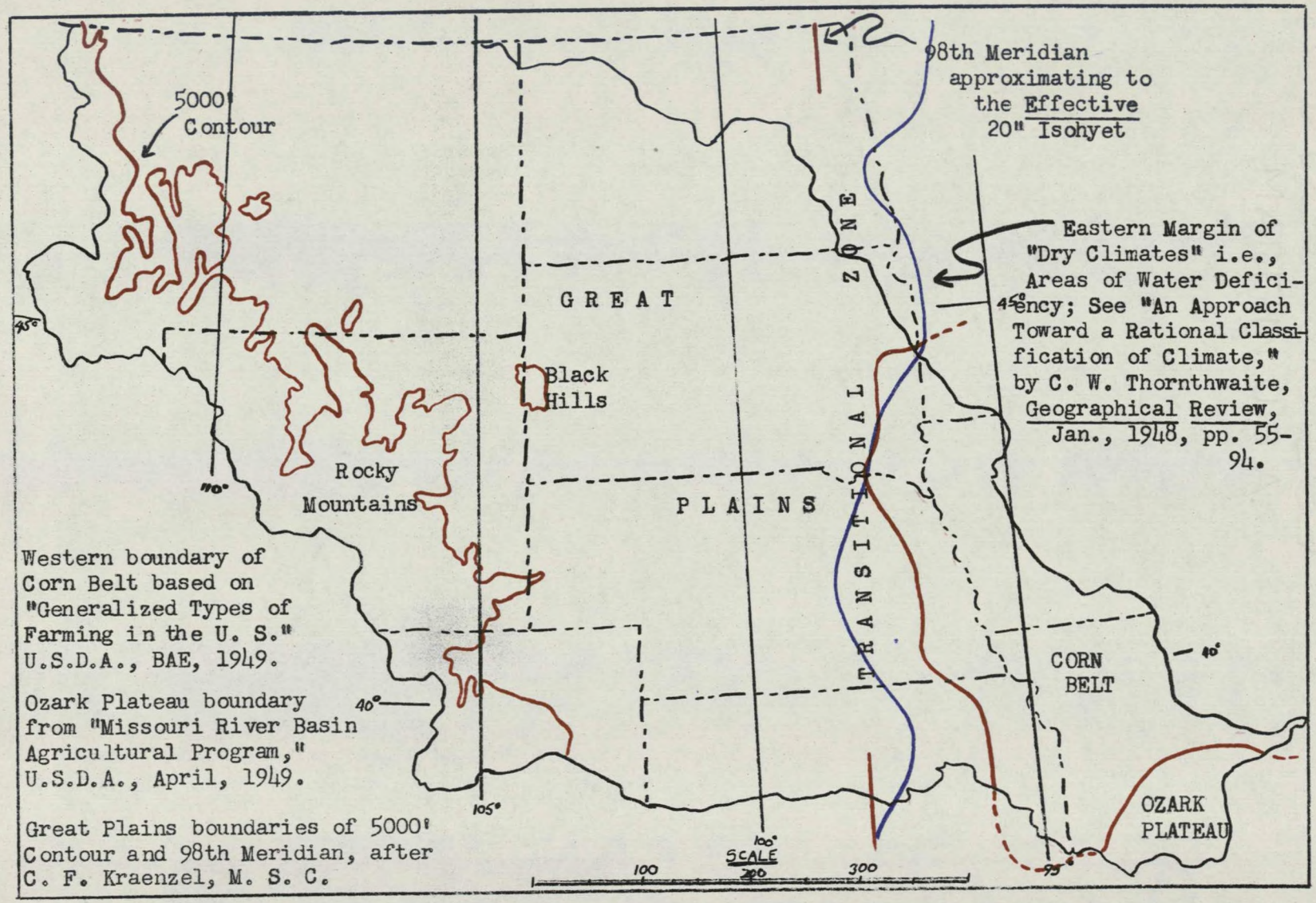

Figure 2. Missouri Basin Showing Major Land-Use Sub-Areas

reality. The areas of these sub-regions as percentages of the planning region are as follows:

1.	Rocky Mountains	14
2.	Great Plains	63
3.	Corn Belt	14
4.	Ozark Plateau	2
		93%

The 7 percent balance of the planning region is accounted for by a transitional zone between the Great Plains and the Corn Belt. It represents that area which is not included in either region, as defined by the authorities quoted in figure 2, and, having characteristics of both, it is not described separately.

Location and Size

The general location of the basin is shown in figure 1, where its size in relation to the Tennessee Valley Authority may be compared and its near coincidence with the Northern Great Plains may be noted. The basin, as such, does not include the Missouri-Souris diversion project, and the additional area which this project involves is shown separately. For ease of reference, the combined total is here designated "the planning basin." The measurements of the diagonals of this very approximate parallelogram are 1300 miles from southeast to northwest, and 700 miles from southwest to northeast. This represents an area which is roughly 17 percent of the continental United States. An area of this size has profound implications for planning. The problems of distance, sub-regions, decentralization, established political institutions, and so on, will play a critical part in any successful planning for the region.

Geology and Soils

(1) The Rocky Mountains. During the Cretaceous Period, most of the area of the Rocky Mountain Region, as well as that of the Great Plains, was covered by a shallow sea extending from the Gulf of Mexico to the Arctic Ocean. At the end of that period, the entire Rocky Mountain area was uplifted and the waters drained off. A long period of erosion followed this early uplift, during which time much material was removed from the summits and deposited in the basins. Sometime later (late Eocene Epoch) the Rocky Mountains were subjected to another period of growth accompanied by considerable volcanic activity and followed by still another period of levelling. The region's master streams flowing over sediments that had buried the mountain ranges established courses which they continued to hold after they had cut into older rocks forming the major gorges and canyons through the front ranges. Mountain glaciation followed, which further deepened the valleys and greatly eroded the peaks. Glaciation was most severe in the Northern Rockies and is still active there. 4/ Some of the consequences of this geological history which are significant for resource development are:

(a) The occurrence of volcanic minerals

(b) A paucity of stable soils except in the intermountain basins

(c) Many good hydro-electric sites

4/ White and Foscue, Regional Geography of Anglo-America, Prentice-Hall, New York, 1943, p. 617.

(d) Good recreational areas with paleotechnic 5/ logging and mining as the principal destructive alternative uses

(e) Difficulties of surface and aerial transportation

(f) Considerable water erosion.

(2) The Great Plains were formed by the retreat of the Cretaceous Sea following the close of the Mesozoic Era. Subsequent erosion and deposition modified the original landscape. The heavier rainfall and more severe erosion in the mountains to the west have deposited thick layers of sediment on the Great Plains in broad, overlapping fans. Near the mountain front some of these deposits have been removed by later erosion so that a broad trough appears between the mountains and the high plains to the east. This

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5/ "Paleotechnic" is here used in Mumford's sense, i.e., "Paleotechnic industry, on the other hand, arose out of the breakdown of European society and carried the process of disruption to a finish. There was a sharp shift in interest from life values to pecuniary values; the system of interests which had been latent and which had been restricted in great measure to the merchant and leisure classes now pervaded every walk of life. It was no longer sufficient for industry to provide a livelihood; it must create an independent fortune; work was no longer a necessary part of living; it became an all-important end..... The animus of mining affected the entire economic and social organism; this dominant mode of exploitation became the pattern for subordinate forms of industry. The reckless, get-rich-quick, devil-take-the-hindmost attitude of the mining rushes spread everywhere; the bonanza farms of the Middle West in the United States were exploited as if they were mines, and the forests were gutted out and mined in the same fashion as the minerals that lay in their hills. Mankind behaved like a drunken heir on a spree. And the damage to form and civilization through the prevalence of these new habits of disorderly exploitation and wasteful expenditure remained, whether or not the source of energy itself disappeared. The psychological results of carboniferous capitalism--the lowered morale, the expectation of getting something for nothing, the disregard for a balanced mode of production and consumption, the habituation to wreckage and debris as part of the normal human environment--all these results were plainly mischievous." Technics and Civilization, pp. 153-8

lengthens the course of the Missouri River. The Black Hills are a subdivision of this area, and they rise some 4,000 feet above the surrounding plains. They represent a domal type of mountain with a granitic core that has been pushed up through the plains and is surrounded by the upturned edges of the sedimentary rocks. The granitic rocks contain mineralized veins. 6/ The general features at maturity of the soils of the Great Plains are:

(a) The presence on some horizon of the soil profile of a zone of alkaline salt accumulation, usually lime carbonate.

(b) A relatively dark coloured surface soil; compare with the rest of U.S. soils where salt accumulation is present.

These two characteristics are not coincident--the dark colour extends east, and the salt extends west, outside the region; the overlap defines the Great Plains. The immature soils of the Great Plains do not have calcium carbonate anywhere in the profile, i.e., the phenomenon is the result of long-term climatic conditions of the Great Plains. 7/

Generally the soils of the Great Plains are good in texture and inherently fertile, though they exhibit extreme variations even within small geographical areas, particularly in their capacity for holding water and releasing it for plants. Soils are frequently underlain by gravel beds which reduce the water-holding capacity still further.

These characteristics give rise to the following development considerations:

6/ White and Foscue, op. cit., pp. 583, 585, 588.

7/ Marbut, C. F., Soils of the Great Plains, Association of American Geographers, Annals, vol. 13:41-66, 1923.

(a) A shortage of metallic ores because of the sedimentary nature of the sub-surface geology and the fluvial nature of the surface geology.

(b) The light and unconsolidated nature of the surface, making it susceptible to erosion under certain climatic and land use conditions.

(c) The increased evaporation resulting from irrigation tends to bring the alkalis to the surface, thus reducing or destroying soil fertility and entailing costly measures to correct the situation, e.g., the Belle Fourche Project, South Dakota. 8/

(d) The existence of heavy and poorly drained soils in valley bottoms which makes irrigation farming and drainage very costly.

(e) Considerable variations in yield, even within one farming unit.

(f) Serious problems of water retention on the high plains.

(3) The Corn Belt is essentially a product of glaciation. The underlying rocks are flat and have been invaded several times by ice. Their soft and friable nature was very amenable to beneficial glacial action, and, unlike the boulder-strewn lands of New England, the result was a fertile and easy-to-work soil often 100 feet thick. Because of its fertility and proximity to the main centres of consumption, this area presents few of the problems of the other parts of the basin.

(4) The Ozark Plateau. The northwestern section of this dome-shaped formation juts into the southeastern corner of the basin. It is an area of carboniferous rocks, particularly limestone and dolomite, underlain by igneous rocks. The soils are mainly red-yellow podzols being too stony for farming and used mainly for forest and pasture.

8/ For a more detailed account of salts and alkali, see "Missouri Basin Agricultural Program," House Document No. 373, p. 39.

Climate

(1) The Rocky Mountains. The general continental climate of the basin is considerably modified by the altitude of this area. Temperatures are generally lower than in the eastern plains in the summer and higher in the winter, and the precipitation is higher. With air movements usually from the Pacific, this is first and foremost a catchment area, though the mountains in the basin are to some extent in a rain shadow. The relatively heavy precipitation, averaging from 20 to 25 inches a year, 9/ and the low temperatures are very beneficial because the snow run-off takes place mainly after the Plains' rainfall has passed its peak in June, thus evening up the annual flow of the river system. Large diurnal and seasonal temperature variation plus heavy precipitation stimulates erosion, thus retarding soil formation and creating serious silt problems downstream. The growing season is usually too short for farming, except in the intermountain basins; and forests are the principal type of vegetation.

(2) The Great Plains. This is an area enjoying a typical continental climate with hot summers and cold winters. The dominant climatic feature affecting human activity is the fluctuation of rainfall in an aperodic way, around a limit which is itself critical for grain production. 10/ Climatic conditions vary spatially as well as temporally. This is due to

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9/ Atlas of American Agriculture, part II; Climate, Washington, D. C., 1922.

10/ The Future of the Great Plains, pp. 27-33, op. cit.
Tree Ring Studies in North Dakota, North Dakota Agr. Exp. Sta. Bul. 338, April, 1946.

convectional rainfall which is quite geographically unpredictable, and frequently leads to flash flooding. Temperatures often remain at a very high level for long periods, evaporating water reserves and wilting crops; while the length of the growing season fluctuates and may be less than one hundred days. Wind velocities average the highest in the United States and this further increases aeolian erosion and the evaporation of moisture, which the area can ill-afford to lose. The periodic drying up of domestic and stock water supplies, the unpredictable nature of crop yields, and the incidence of flash floods constitute very serious social and economic problems. 11/ Because of their elevation, the Black Hills have a higher rainfall than the surrounding plains.

(3) The Corn Belt has a humid continental climate, hot summers and cold winters, with a long growing season of around 140 days. Precipitation is twenty inches in the west, increasing to the east, is reliable, and falls principally in the growing season. This is ideal for the production of corn.

(4) The part of the Ozark Plateau within the basin has roughly the same climate as the Corn Belt, with the normal modifications which result from altitude. 12/

Topography

(1) The Rocky Mountains--rugged hard rocks with softer rocks eroded

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11/ Developments in Range Management, U. S. Forest Service, Region 1, No. 7; Lommasson, T., The Influence of Rainfall on the Prosperity of Eastern Montana, 1878-1946.

12/ For a detailed account of the climates of the basin, see "Missouri Basin Agricultural Program," House Document No. 373, pp. 40-48.

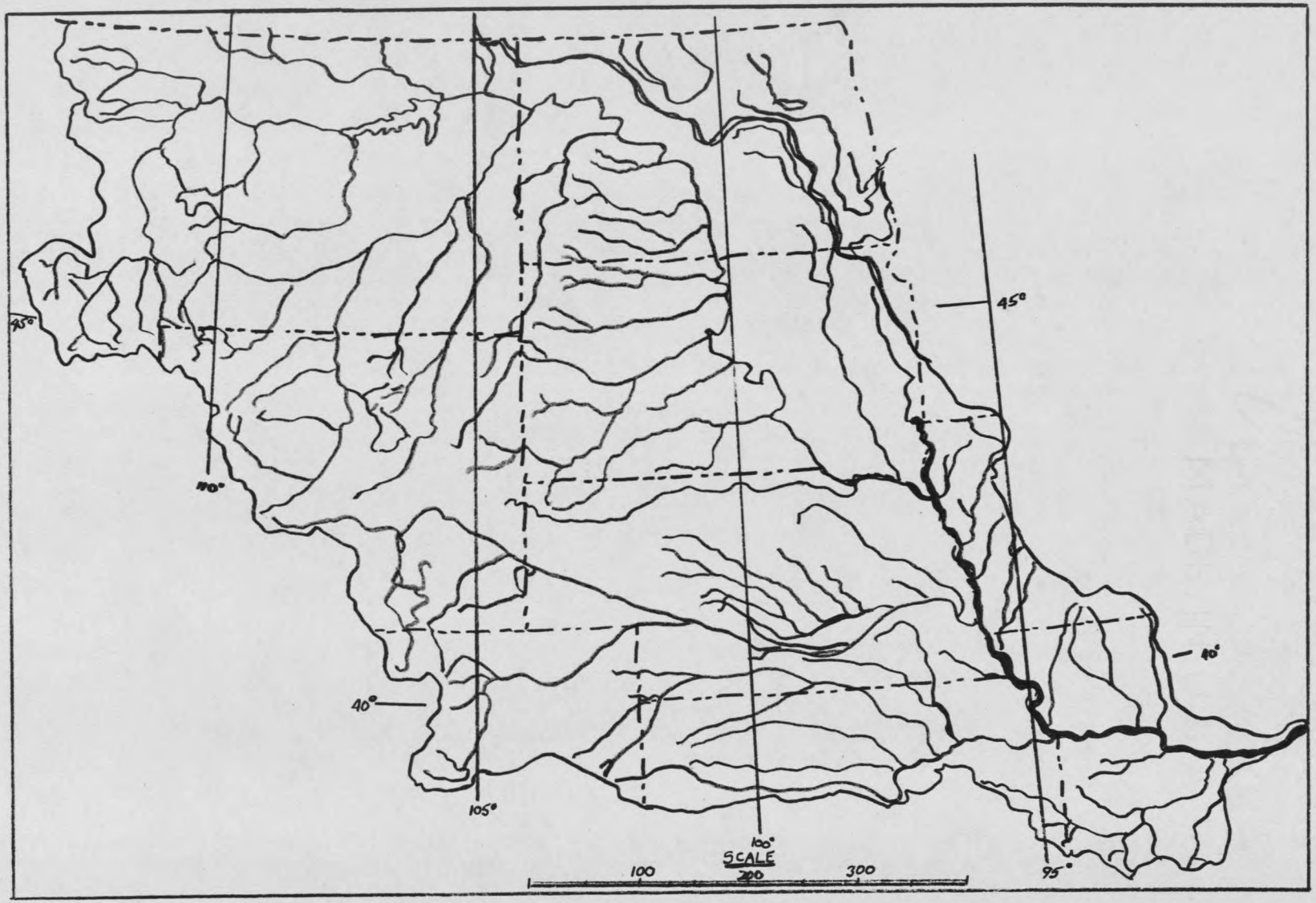

Figure 3. Map of Missouri Basin, Showing Surface Drainage

especially when deforested--glaciated valleys--steep slopes and gorges--a shortage of good passes--well wooded. Intermountain valleys--some trees--where badly cultivated--moderate erosion.

(2) The Great Plains. The badland areas of the West with scanty vegetation and eroded. To the east, moderately sloping lands with grass cover where not under plough. Few trees--some accelerated erosion contributing a great deal of silt to the streams.

(3) The Corn Belt--flat to hilly--intensively farmed--agricultural suitability precludes the retention of trees which compete for fertile land.

(4) The Ozark Plateau--hilly to mountainous--well wooded--erosion slow to moderate except when deforested.

Drainage (See figure 3)

The Rocky Mountain area is characterized by deep valleys with turbulent streams in the period of snow melt, and small flows for the rest of the year.

The Great Plains region specializes in meandering shallow rivers with moderately wide to very wide flood plains. The flow pattern is irregular and many silt banks develop. A certain amount of gullying is to be found, particularly in the badlands and where poor farming practices prevail.

The rivers retain these characteristics in the Corn Belt, but are swollen by the heavier rains of the eastern part of the basin. It is usually the coincidence of these spring frontal rains with the snow melt

run-off from the west which produces the disastrous floods of the lower Missouri.

Economic History

After the Louisiana Purchase of 1803, the first significant economic activity was fur trading. The cattle kingdom, expanding northward from Texas in one of the most rapid movements of U. S. history, occupied the entire Great Plains region by 1876. But from 1862 the Homestead Act started a series of migratory waves of agricultural settlers into the "free" land of the Great Plains. Barbed wire was introduced in the 1870's. The cattle industry, which was booming in the early '80's, suffered a financial collapse in 1885, when prices fell rapidly. During the boom, ranges were overstocked, so that without supplemental feed there were very heavy losses when a dry summer followed a hard winter. All these factors undermined the dominance of the cattleman and his free range. 13/ The rapid westward expansion of the railroads in the '60's and '70's brought more settlers to an area which had hitherto been regarded as a bridge over the desert between the East and the Pacific coast.

Farming, from this period up until the present day, has followed this historical pattern:

(a) The lure of cheap and wholly inadequate acreages of land in the Homesteading period and the good yields to be obtained in favourable years brought a flood of settlers who operated of necessity and misguidedly because of their humid area culture, without adequate reserves and flexibility.

13/ Webb, W. P., op. cit., chapter VI, pp. 205-269.

(b) The onset of a dry period led to—

(c) An expansion of acreages to meet the impact of low yields and to maintain farm income. Note that aggregate grain production plus carry-overs seldom fell at the same time, so that prices did not rise to offset reduced local supplies. Also, the price inelasticity of demand for wheat and its constant or increased supply in times of depression has the effect of completely depressing the market price.

(d) Acreage expansion leads to plowing land better suited to grazing, thus accelerating erosion and land deterioration.

(e) Falling farm incomes juxtaposed with a high fixed cost structure caused: 1. mortgage foreclosures and a retreat from the drier farmlands, 2. migration out of the Plains and urban migration within the area, and 3. extensive use of relief funds.

(f) A new series of favourable years with increased optimism and immigration and an eventual repetition of the previous cycle. For those who believe that farmers have learned their lesson, it should be pointed out that the acreages under crops for most of the Great Plains states in 1949 were the highest ever recorded. (See Table III of Appendix A). It is too early yet to say whether the improved techniques and increased size of modern dry-land farms will reduce the risk of complete failure, in the event of the prolonged drought.

Some farmers sought to insure against the vagaries of the weather by developing irrigation, either as a complete farming unit or as an addition to their dry-land operations. The Reclamation Act of 1902 signalled a rapid expansion of irrigation in the West by the participation of the Federal Government on a large scale.

Another movement which was of considerable significance for the region was the quest for gold and other minerals. The gold strikes of 1862 at Bannack, Montana, and at Virginia City, Montana in 1863 14/ started a flow

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14/ See Howard, Joseph Kinsey, Montana, High, Wide, and Handsome, Yale University Press, 1943.

of prospectors whose prime purpose was to make a fortune and spend it in the East or in California. They had no stake in the region and were not interested in its settlement or long-term development. With the development of mechanized mining syndicates, as in the case of Butte copper, the attitude was the same, except that the promoters avoided living in the area if they possibly could, preferring to draw their tribute and live in New York.

Another predatory group also invaded the mountainous area, completely stripping the more accessible hillsides of their protective timber, and leaving a legacy of very serious problems for the locality and the nation as a whole.

The section of the Corn Belt within the basin was mostly settled under the 1862 Homestead Act, though more easterly sections were settled much earlier. The historical problems of the area are mainly those of erosion, but, owing to the depth of the top soil, this has been but lightly regarded up to now. In addition, the region has known several land booms and agricultural slumps because of declining European markets after the First World War and cyclical depressions. Depressions are, however, general to most farming activities in an exchange economy.

The Ozark Plateau was occupied before the lowland prairies because it was superficially attractive to the pioneers. Its later development was retarded by its isolation from the forces of change which swept the prairies. Hunting and subsistence farming were the rule; today the rearing of sheep and low-grade cattle has replaced the hunting, but the area

has retained a backwardness and isolation which is in sharp contrast with the Corn Belt or the Great Plains.

Communications

Throughout the planning basin, railway communications are relatively good from east to west, but poor from north to south. This is because the area has been regarded as an unfortunate interlude in the journey from the culture of the East to the material treasure of the West, and because the railroad system is geared to a colonial exploitation of the area by the metropolitan powers of the East and West. In addition, the Rocky Mountains impose a strict limitation on the number of passes available to trans-continental routes. See figure 4.

Prior to the establishment of railroads, the Missouri River played a considerable, if hazardous, part in the communications of the region. 15/

The road system closely parallels the rail system, and good north to south highways are scarce.

The airways, too, have a mainly east-west orientation.

Handicapping all forms of transportation within the region are serious weather hazards and low population densities. The railway users also suffer from a freight rate structure which quite simply exerts a mono-

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15/ See Terral, R., op. cit., chap. XII.

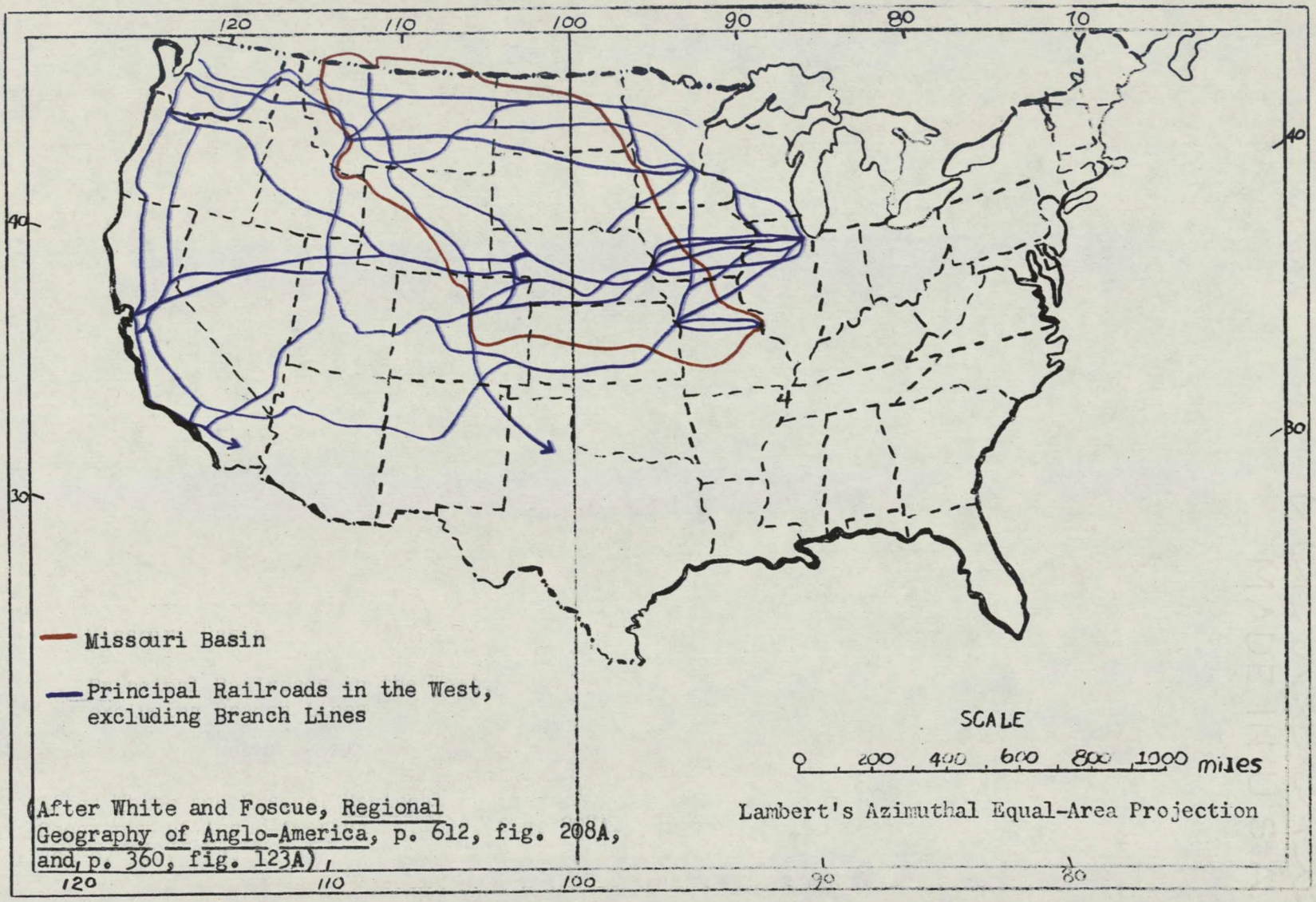

Figure 4. Railroads of the Western United States

polistic power and exacts what the market will bear. 16/ In practice, this means four things for the basin:

(1) Relatively low rates for the movement of primary products from the Great Plains to the East.

(2) Relatively low rates for the movement of finished products from the East to the Great Plains.

(3) Relatively high rates for the movement of finished and semi-finished products from the Great Plains to the East.

(4) Relatively high rates for the movement of primary products from the Great Plains to the West coast.

Population

With the exception of the Corn Belt, the most significant feature of the basin is the low population density. This means that either adequate social services are not available or they are very costly per capita to institute and maintain. For instance, Carter County in Montana had in 1940 a population of 3,280, with no doctor or high school. The population density was approximately one person per square mile, and, with an average family size for Montana of between three and four persons, this would make the family density one family to three to four square miles. The spaciousness, so beloved by many residents of the Great Plains, particularly those who live in the towns, has often a very high social and economic price attached to it.

16/ a. Ibid., chap. XVI
b. House Document No. 363, 78th Congress, 1st session, letter from Board of Investigation and Research, transmitting report on rate-making and rate-publishing procedures of railroad, motor, and water carriers, 1944.
c. House Document No. 264, 75th Congress, "The Inter-territorial Freight Rate Problem of the U. S." a report of T.V.A., 1937.

The fact that much of the population of the region is physically and psychologically migrant adds to the difficulty of low density. So long as this attitude remains, and it will remain unless it is removed by improved prospects of a satisfying future in the area, there will be little incentive, or capital, to invest in fixed social assets. Young men seeking their fortunes and older men seeking outlets for fortunes won will move out of the area as they have done in general for the last thirty years. The emigration from particular areas has seldom has compensating immigration (see Tables IV V VI of Appendix A), and the gross population figures for 1950 are rather misleading because they conceal such things as the increased life expectancy and the upsurge of births in the 1940's. The children born in this latter period are not yet old enough to affect migration figures.

Population densities are not low in the Corn Belt, and this has been one of the important reservoirs of population for the urban migration which has offset the failure of urban areas to maintain their net reproduction rates during the period from 1910 to 1940.

The population in the Ozarks is not dense and has remained relatively stable for some time.

Agriculture

Despite the hazards of Great Plains agriculture, the importance of this area to the nation's larder is not to be underestimated. (See Tables VII, VIII of Appendix A). The more successful dry farming techniques become and the more irrigation projects are established, the more significant--qualitatively and quantitatively--will the contribution of the

area become. The importance of the Corn Belt needs no emphasis. The basin as a whole is unquestionably vital in the production of grains, cattle, sheep, and hogs for the United States economy.

Industry

In the Rocky Mountains, industry is based on the extraction and refinement of minerals, the extraction and processing of timber, and tourism.

The negligible industry of the Great Plains is based on food processing and the extraction, refinement, and fabrication of minerals. Denver is something of an exception. Strictly speaking, its altitude, 5280 feet, makes it a part of the Rocky Mountains, though its influence undoubtedly spreads onto the Great Plains. It is a major commercial and financial centre between the Missouri River and the Pacific coast, and is one of the leading livestock and packing centres of the West. It is the headquarters for many mining operations in the mountains to the west, and has one of the three U. S. mints. Denver has a variety of light industries, and is a major tourist centre.

In the Corn Belt, the industry is closely geared to farming. Kansas City is a major slaughtering and meat packing centre, and America's largest market for winter wheat, and important for flour milling. Aircraft manufacture also ranks nationally high. Omaha is another important market and packing centre, with other food processing and aircraft manufacture also significant. The other towns of the region specialize in stock and grain marketing and processing.

The Ozark Plateau has no industry worthy of the name.

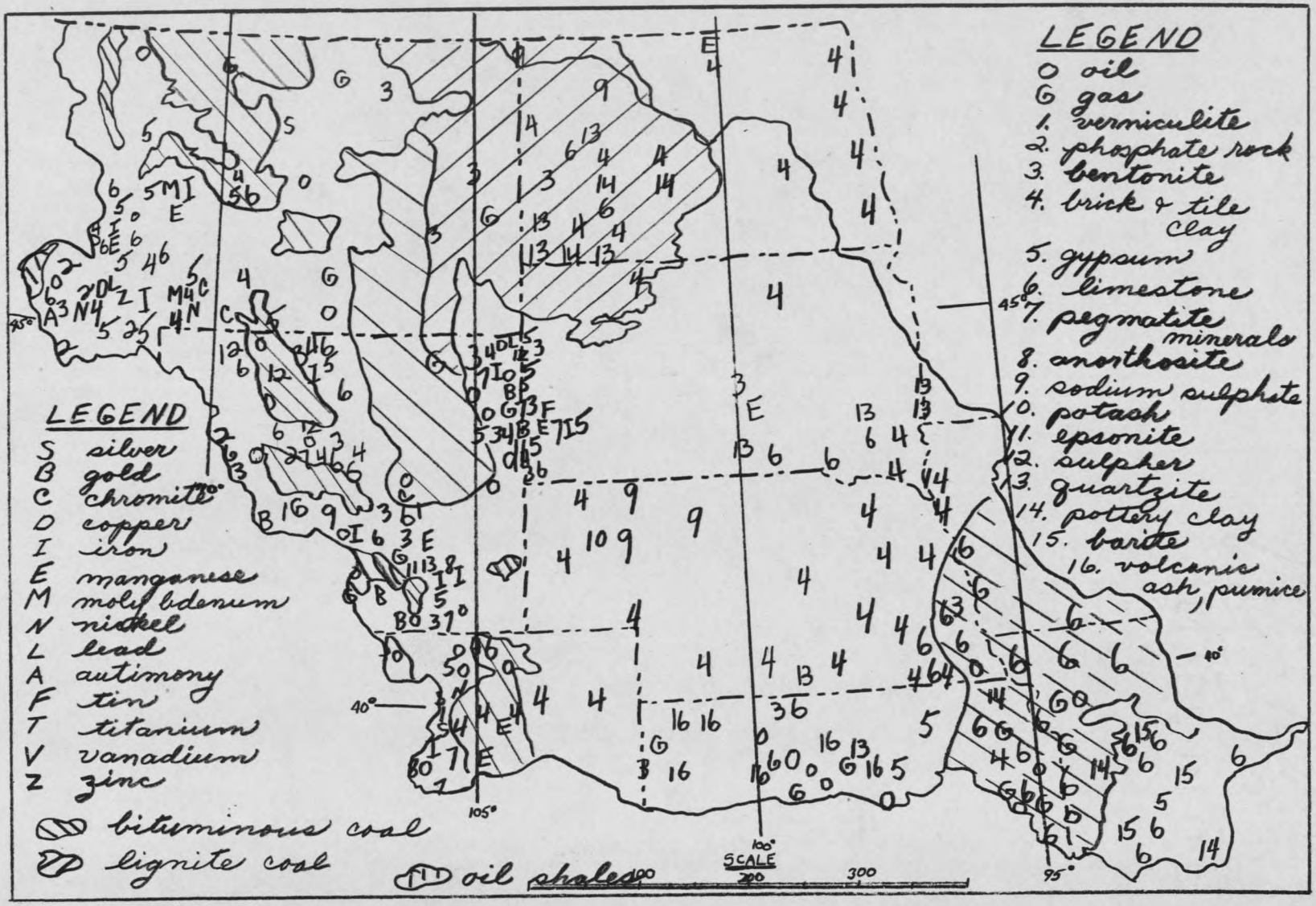

Figure 5. Selected Mineral Resources (After Map VI, "Power Market Survey")

Mineral Resources

Some extent of the variety of mineral resources which exists in the basin may be gained from figure 5, though it should be pointed out that, generally, the qualities are low and few are economically exploitable at present. It should further be pointed out that a precise inventory of the mineral wealth of the region probably does not yet exist.

Chapter III

METHODOLOGY, THE PROBLEMS OF THE MISSOURI BASIN, AND THE ROLE OF THE "GENERALIST"

It seems appropriate, at this point, to discuss briefly the methodological justification and limitations of this study.

In the first place, empirical reality is very complex. This means that to reduce any social problem to manageable proportions, any "postulated solution" 1/ must be concentrated on the important and relevant factors. In the words of Stigler, "No one is interested in complete reality.....and in any case the necessary factual knowledge is beyond one man's powers of assimilation." 2/ Moreover, it is possible to break down a general problem without serious injury to the validity of a general conclusion. For instance, it may be true that consumer taste for bread is changing from loaves to biscuits, though this fact need not be taken seriously when considering the problem of fair wheat acreage allotments in Montana.

In this study, the root problem lies in the impression that the full

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1/ The term "postulated solution" is employed here because modern scientific method requires that a policy or program shall not be called a "solution" until it has been proved pragmatically that it achieved the ends which it was postulated to achieve. Presumably, this also requires that all dynamic factors entering into the situation during the period between the inception of the program and the realization of the end shall be credited or debited to the account of the program, according to whether they were foreseen or unforeseen and whether they were harmful or beneficial.

2/ Stigler, George J., Theory of Price, Macmillan, New York, 1949, pp. 9 and 12.

implications of resource development have not been properly understood, 3/ and that, from this point of view, existing programs are unsatisfactory. This means, in effect, that due consideration does not appear to have been given either to the value premises or to the factual premises, upon which policies and programs must be based. Nor has adequate attention been paid to the cumulative causations which may result from a given policy and program.

The distinction between means and ends is not by any means clear cut; the following quotation nicely expresses the interdependence: "The cult of increasing knowledge, of continually reconstructing the world, took the place both of the ancient conception of adequately organizing the world as presented in thought, and the medieval conception of a systematic formulation on the basis of the statement in church dogma of social values. This modern conception (that the valuation processes are part and parcel of the embracing social organization) proceeds from the standpoint, not of formulating values, but giving society at the moment the largest possible number of alternatives of conduct.....We postulate freedom of action as the condition of formulating the ends toward which our conduct shall be directed. Ancient thought assured itself of its ends of conduct and allowed these to determine the world which tested its hypothesis. We insist such ends may not be formulated until we know the field of possible action. The formulation of the ends is essentially a social undertaking

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3/ Vide supra, Chapter 1, pp. 19-26.

and seems to follow the statement of the field of possible conduct, while in fact the statement of the possible field of conduct is actually dependent on the push toward action. A moving end which is continually reconstructing itself follows upon the continually enlarging field of opportunities of conduct.....Knowledge for its own sake is the slogan of freedom, for it alone makes possible the continual reconstruction and enlargement of the field of conduct."4/

Arising out of this quotation and the earlier discussion, we may formulate a frame of reference for this study which is:

(1) What are the existing and foreseeable possibilities in the field of resource development in the Missouri Basin? i.e., what are the technical, economic, social, and political alternatives which can be postulated?

(2) What value premises must we take as given in contemporary society, and what limitations or qualifications to these premises are imposed by the answers to (1)?

(3) How far do the means which are currently employed compare with the possibilities, and how far will they lead to the achievement of the answers to (2)?

(4) What are the additional steps which it is anticipated will be required to most nearly realize the answers to (2)?

The specific problem-areas already discussed in a preliminary way in Chapter 1, pages 20-25 are judged to be strategic factors.

A consideration of the ramifications of the above frame of reference suggests that there may be a very real danger that the wholeness of living will be overlooked in a world where the growth of knowledge and wealth has

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4/ Mead, G. H., from an essay in Creative Intelligence, Henry Holt and Co., New York, 1917, pp. 223-5.

taken place through highly specialized investigations and operations.

In the main, specialization is encouraged insofar as its results are capable of economic, social, or political incorporation into the web of human activity. 5/

It is obvious that our civilization is dependent upon a division of labour which every day grows more complete, but this increasing division, of necessity, involves an increasing need for integration and coordination. The diversity and depth of specializations is now so great that their integrated comprehension--even in the broadest of terms--becomes almost impossible for any individual or group. It would, however, be doing less than justice to human societies to suggest that they do not make adjustments--the United States in the 19th and 20th centuries suggests otherwise. The difficulty was that, because of a lack of a wider understanding of the existing and new dynamic elements in a given situation and a failure to disseminate widely this understanding where it existed, the needed adjustments were not as enlightened and constructive as they might have been. 6/

In the fields of natural science research, this fragmentation of effort is especially serious, because there is usually no apparent need for the wider view. The social scientist, on the other hand, must fit his conclusions into a very intricate web and thus tends to be less insular.

5/ This statement is not intended to neglect basic research undertaken with no thought of its practical application, but it is well known that such research, if it is sound, almost invariably finds its application when the appropriate combination of circumstances arises.

6/ This raises very urgent questions of how far predictions about social phenomena can be made with any degree of accuracy.

It is true that several natural scientists have advanced theories suggesting that the different and apparently discrete lines of physical, chemical, biological, biochemical, biophysical, and other thought are in fact converging, and that sooner or later a synthesis will emerge which will enable any problem in any field to be solved in terms of a fundamental theory. To a small degree, small, that is, in relation to the corpus of knowledge, this is precisely what Einstein's recent formulation has attempted to do for physics. He claims that by means of four basic equations which he has derived any problem in the hitherto distinct fields of gravity, electricity, and magnetism may be solved.

At the present time, however, this general synthesis is not in sight, and investigators hurry off down their particular paths, so absorbed in their private objectives that they have neither the time nor the inclination for the study of work by other researchers unless it is directly applicable to their own project. 7/ This increasing insularity of the natural scientists seems inevitable, so long as present trends in social organization and human endeavour continue. This being so, there must be some attempts at various levels to pull the specialized data together and to see their interrelationships.

This leads to the idea of a "specialist in generality," perhaps describable as a sort of "intellectual busybody."

In a sense, there is nothing fundamentally new in such a concept.

7/ Another difficulty is that the dissemination of technical literature and information is a very difficult thing to organize, and is in fact poorly done.

From historical times there have been men, usually statesmen and administrators, whose function it was to coordinate, correlate, and weigh the various aspects of a given situation to produce that policy which would be most likely to realize those ends given by the culture of the society. What is new is the divorce between individual experience and skill, and what Needham refers to as the envelopes of thought and experience which scientific methods have distinguished. 8/ The new envelopes of thought and knowledge cannot be known intuitively as a result of the day to day experiences of living. The interrelations between the various envelopes which may be brought about by a change in any one are not appreciated without a sound grasp of the principles of natural and social sciences at each level.

In the earlier stages of social organization, the breadth of experience and understanding required to achieve this grasp of principles may not have demanded less intellectual effort than it does today, but the means of and need for it have changed with the growth of specialization. Today a wide and rigorous education, in the best sense of the word, is indispensable.

It is necessary to point out that "generalist" functions are not homogeneous. For instance, the extension agent, by establishing communication between the research institution and the actual operator, performs a "generalist" function determined by his responsibility. The general agricultural economist, by participating in, directing, and coordinating specialized research within his field, tries to give perspective to the detailed studies. The research adviser to a political committee correlates

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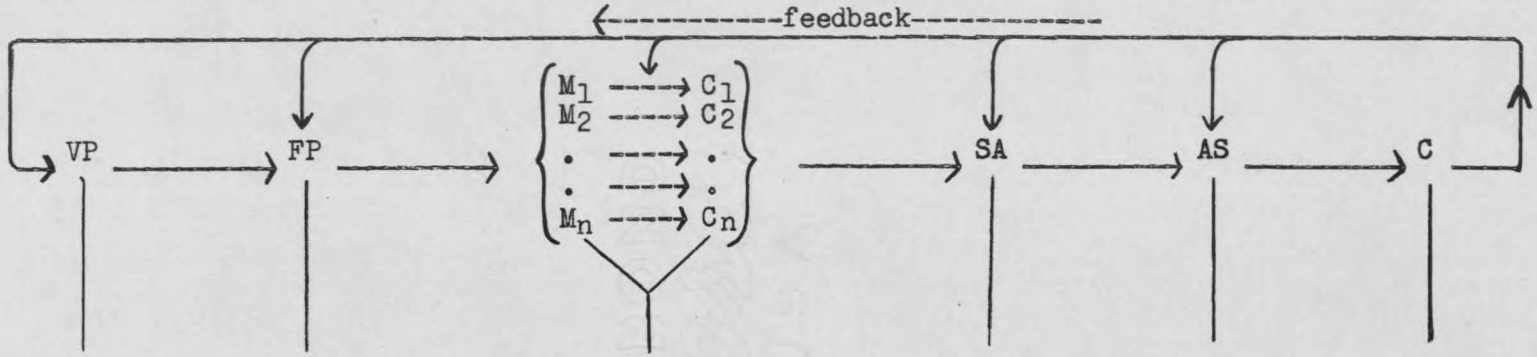
8/ Time, The Refreshing River, MacMillan, 1943.

the specialized programs into a statement of the possible alternatives and consequences which are available to the politicians. The administrator takes the results of many-sided researches and decides upon that alternative which is most likely to produce results which correspond to the policy which he is employed to administer. It follows, then, that the generalist operates within various envelopes which are defined by his responsibilities. They may be "entrepreneurial" in which case his responsibilities are to make his company profitable within the limitations which society imposes upon him. They may be research, in which case his responsibilities are limited to the preparation of means-consequence relationships. They may be public-administrative, in which case his responsibilities are limited to the taking of decisions on alternative means-consequence relationships, in accordance with the government policies which he is employed to administer. (See figure 6, page 56.)

"Generalization" must not be misinterpreted, for it means a great deal more in this context than emotional appeals for "controlled free enterprise," for "rational agricultural policies," for "the integration of Western Europe," and for "an integrated regional development program." The kind of generalization envisaged is not a pious aspiration about ends, but a technique, a carefully considered synthesis of the various measures by which certain ends may be attained. These plans and their integration, by defining limits, give meaning and reality to the statement of ends. It is of considerable importance that the "generalist" should know a good deal about the relative importance of various ends in a given society if he is responsible for planning. The failure to do just this has been



Hypothesis: i.e., value premise given expression by elected representatives, i.e., "political generalists"

factual premises selected as a consequence of value premises by researchers in specialist disciplines

means-consequences alternatives prepared by researchers and planners in specialist disciplines, and coordinated by the "research and planning generalists"

selection of one alternative as a policy and/or program, by politicians (or by administrators with delegated authority) i.e., "political generalists"

action-stage--the implementation by administrators responsible for the government programs i.e., "administrative generalists"

consequences which feed back into the system (in Cybernetics this process is defined as "learning") and which require the immediate attention of the "generalists" at each stage to integrate them dynamically

This diagram suffers from the showing of a three dimensional process in two dimensions. The time dimension in the direction VP through C prevents the process from becoming a static closed system. The dynamic process is: planning-action-feedback-planning-action-etc., through time; its apparent circularity is a function of the diagram and not the actual process.

Figure 6 Schematic Representation of the Public Planning Process, Showing the Types and Functions of "Generalists" Within the System

the graveyard of many otherwise excellent plans for areas with different cultures from that of the planner. It is only by establishing intelligent weights for both ends and means that sound policies and programs can be built up. It is true that this last statement begs many questions, but it is in the essence of social problems that they are incapable of precise solution. The following words of K. H. Parsons indicate the best that can be hoped for: "The person responsible for action, if he is wise, simply tries to anticipate the major or strategic consequences and acts with the certain prospect that some of the consequences will be undesirable and unexpected. But it is a matter of practical judgment." 9/

The "generalist," besides being capable of wide and acute perception must deliberately erect a personal barrier against narrow specialism, refusing to be drawn into studies of, and controversies over, minutiae. 10/ By this means he may be able to retain his ability to see the possibilities for society in general. In this respect, he should be the friend of the layman, discounting the extravagant claims of some scientists and tempering the intellectual snobbery of others; showing how new information fits into the existing civilizational and cultural patterns; how the citizen will be affected; and how he can raise his sights to a fuller life--should

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9/ "The Problem-Solution Basis of Forward Pricing," Land Economics, Nov., 1949, Vol. XXV, No. 4, p. 427.

10/ This may lead to what might turn out to be serious oversights if the minutiae develop a significance which was not suspected. This would be true uncertainty in Frank Knight's sense, i.e., those contingencies which cannot be insured against. See Knight, F. H., Risk Uncertainty and Profit, Houghton Mifflin Co., 1921, pp. 19-20.

he want to do so. This function is the propagation of information and the stimulation of true education, so that the individual can have a sound basis for action; but it is closely bound to the planning and administrative functions which are under discussion. 11/

It is necessary that the generalist be sufficiently strong minded to reject specialist advice, from however high an authority, if it is not wholly consistent with the main objectives of his responsibility. This means that he must not be blinded by individual brilliance or persuasiveness, and that he must reject advice with the soundest of reasons and the greatest of tact in order to avoid losing the services or respect of the specialist.

It may well be asked whether any man exists who is part historian, philosopher, mathematician, physicist, chemist, biologist, agronomist, engineer, economist, sociologist, statesman, and diplomat; and the answer may well be no. However, there are some people with wide interests and sound judgment who, with the right kind of training, might make a reasonable approximation to this ideal.

A. G. Black puts forward a similar case, "There is need of men who correlate and coordinate the specialized knowledge in the separate cells--men who can bring to bear on the larger problems the findings of the

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11/ See Renne, R. R., Land Economics, Harper Bros., New York, 1947, p. 151, for an example of easing the inauguration of a rural zoning plan by good public relations. Not only is this good sense, but it provides an outlet for practical democracy--at least to the extent that democracy is practical.

different specialists, and who have sufficient perspective and sense of proportion to apply just the correct shade of emphasis to the contribution of each particular specialist.....Too often solutions of complex problems by specialists carry with them a certain element of unreality, a certain fantastic quality that makes people hesitate to accept them." 12/ His appeal is primarily for generalists in the relatively narrow field of agricultural economics, but an advocacy for generalists in much wider fields seems to be implied.

R. R. Renne in discussing problems of the future control of land use says: "It is necessary to make coordination a full-time job for specially qualified men, and to set up structural organizations or arrangements through which the work of such individuals can be effected." 13/

In practice, the generalizing function has often found its typical expression in the committee. This device can be excellent, but experience would indicate that the effectiveness of the committee and the general ability of the chairman bear a strong positive correlation. This is particularly likely in resource development where committees tend to be quite heterogeneous in composition. What better candidate for chairman could be offered than the "generalist"?

12/ Black, A. G., "The Need for Generalists," Journal of Farm Economics, Vol. XVIII, No. 4, p. 658, Nov., 1936.

13/ Renne, R. R., op. cit., p. 715, pp. 712-724 contain an account of the function of coordination and its advantages, which it is suggested lie in three fields: (1) promotion of better institutional and individual spirit, (2) more effective advancement of knowledge, (3) important savings of time, money, and materials.

It must be emphasized that training in the field of generalization, if it is conceded to be a legitimate field, cannot produce a good generalist, any more than twenty years of mathematical courses can produce a mathematician. Training can only heighten those basic aptitudes and interests which are the prerequisite of a sound coordinator.

The experience of the T.V.A is of some interest in this connection. The underlying assumption for all its plans and activities is unified development. This is to be achieved by three broad principles of action:

(1) A unified responsibility for planning and action. In the President's message to Congress in 1933 this fact was stressed. The T.V.A. he said "should be charged with the broadest duty of planning for the proper use, conservation, and development of the natural resources of the Tennessee River drainage basin and its adjoining territory for the general social and economic welfare of the Nation. This Authority should also be clothed with the necessary power to carry these plans into effect." 14/

(2) An insistence that all planners and administrators shall live in the basin and in close proximity with the people affected by their plans.

(3) The close cooperation of experts in different fields in all stages of planning and action. In the words of Lilienthal, the mode of operation was as follows: "The final question was always this: looking at the situation as a whole, and not merely at the professional or technical standards of any one or several of the specialized interests, what

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14/ Quoted by D. E. Lilienthal in Democracy On the March, pocket book edition, Feb., 1945, p. 214.

course of action would yield the best results as judged by the common purpose, the goal of the whole undertaking--the well-being of the people of the region? The T.V.A. experts and the Boards of Directors on these occasions came together to learn from one another and merge the various special judgments into decisions of broad public purpose..... The problem was studied as a single problem." 15/

It is not proposed to analyze the organization of the T.V.A. at this stage, but one or two comments may be in order.

First, on the page following the above quotation, there is a short, but revealing sentence: "Nowadays, there are fewer conflicts between experts to be settled by the Board of Directors." 16/ Presumably the Directors would be described as experts in generalization, and to evaluate the technique we need to know what proportional change "fewer" represents.

Second, it is implied that because the general ends are given (in this case, "planning....the natural resources of the Tennessee River....for the general social and economic welfare of the nation....") there is no room for dispute as to how they can be brought into practical focus. It can be maintained that means can always be subjected to a pragmatic test of whether they are producing the given ends. But, unfortunately, the difficulty in society is that once a program is instituted, its effects may be virtually irreversible, at least for a long time, even though the program

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15/ Ibid., p. 77.

16/ Ibid., p. 78.

be discontinued. In which case, a new set of factual premises and value premises will exist, and the pragmatic test becomes a kind of infinite regress.

Third, there is no apparent realization that means may condition ends.

It has been argued that the "generalist" function is to correlate and integrate all the known and relevant factors pertaining to a given situation, so that the final over-all result of action is likely to be that which will exhibit the fewest complications and anomalies, and the closest fit to human needs and desires.

The Missouri Basin Development Program does not appear to have been formulated in such a way, and, consequently, the following hypotheses will be discussed by implication in subsequent chapters:

(1) The program is not one of "comprehensive development" 17/

(2) The existing organizational framework is not capable of carrying out "comprehensive development"

(3) There is a need for trained "generalists" of the various kinds described, if the program is to fulfil its paper aspirations.

Some of the more relevant factors which the "generalist" must correlate in relation to the development of the Missouri Basin are as follows:

(1) Size. How can the distance cost factor be reduced to make development economically justifiable? Can an area of these dimensions be efficiently administered as a region?

(2) Location. Can the economic stranglehold of the bordering metropolitan areas be broken?

17/ See "Missouri River Basin, report of a committee.....to review features .....for the comprehensive development of the Missouri River Basin," Senate Document No. 247, 78th Congress, 2nd Session.

(3) The stabilization of agriculture in the semi-arid regions. 18/ How can adaptation, flexibility, and reserves be stimulated?

(a) At the physical level, e.g., stock and seed quality, irrigation, land practices, farm size, pest control, crop distribution, (all these factors have their social and economic aspects).

(b) At the social level, e.g., crop insurance, taxation, credit, public land purchase and operation, tenure, research, irrigation repayment, acreage limitation, administrative reorganization, zoning laws, education, new markets and transport organization for increased production.

18/ The numerical and interdependent growth in the number of variables in economic and social organization has created many new problems, not the least of which is that of fluctuations. It is not inferred that fluctuations are a strictly modern phenomenon, or that they are worse in relation to human activities than they were when Joseph secured his emancipation from slavery by interpreting the Pharoah's dream correctly; however this may be, they are certainly different. The problems are more complex, but so are the means of dealing with them. As the means of production become more and more mechanized and capable of control, the orderly and gradual regulation of economic conditions has become a major organizational objective. As Mumford points out in Technics and Civilization, regularity with respect to time and magnitude is the very foundation of the modern productive process. His emphasis, of course, is on the industrial process, which is very often much more organizationally flexible for the individual plant than is the agricultural process. The production period, uncertainties of weather, price inelasticities of demand, the hazards of an organic process as compared with an essentially inorganic process all make the elimination of agricultural fluctuations very difficult. There is no doubt that stability and regularity of production, and hence of reward (generally assumed to follow, and implying in practice that rewards may go up, but not down) have been pursued very powerfully as ends in themselves; for instance, industrial monopolies, the American Medical Association, trades unions, irrigation. Whether this tendency is desirable or not in itself, or whether it will produce desirable or undesirable consequences for society, either by reducing economic want and uncertainty or by establishing strong pressure groups, or by inducing economic stagnation and restrictionism, is not material to this discussion. It is contended only that the trend is well rooted in productive psychology, as illustrated by history; and so long as it continues, agriculture must find ways of bringing its organization more into line with industrial and professional practice.

(4) Geographical diversity of the sub-regions. Is the cohesive power of a drainage system enough to weld such divergent cultures into an effective unit of human activity and planning?

(5) Water use. What is the most productive use of a fluctuating water supply of varying qualities? This involves a proper understanding of water resources in relation to:

Supply	Demand
(a) climate	(a) domestic use
(b) catchment	(b) irrigation
(c) erosion	(c) flood control
(d) man-made works, physical and institutional	(d) hydro-electricity
	(e) industrial use
	(f) fish and wildlife
	(g) recreation
	(h) navigation
(e) technical change	(i) technical change

(6) Mineral use. What is the most productive use of mineral resources in relation to supply, demand, and technical change?

(7) The creation of a better social life for many communities. What is needed, how can it best be stimulated, and what is the real cost likely to be? e.g., rural electrification, occupational diversification through industrialization, broadening of tax base by increased population and elimination of current anomalies (the Apex laws, for instance,) increasing the unity and stability of the population, better communications, better health services and educational facilities.

(8) Reduction of transport costs. How much and by what means?

In conclusion, it should be made clear that, in the words of Robbie Burns, "the best laid schemes o' mice and men gang aft a'gley"; that planning and the millenium are not synonymous, as many people know, but consistently overlook; and that the never-ending search for better ways of doing things is still strongly nourished by the philosophical belief in "progress" engendered in the eighteenth and nineteenth centuries.

Chapter IV

FEDERAL AGENCIES WITH RESPONSIBILITIES FOR RESOURCE DEVELOPMENT IN THE MISSOURI BASIN

Throughout this study we shall frequently have to refer to the inconsistencies of practice and the overlapping of authority which exist between federal planning agencies. For this reason it is proposed to outline in this chapter the specific legislation for the Missouri River Plan and the functions and practices of the agencies involved, which are inconsistent, and/or overlap.

The legislative basis of the present development program in the Missouri Basin is the Flood Control Act of 1944. Here is a brief summary of it:

Flood Control Act, approved December 22, 1944, Public Law 534, Vol. 58, Pt. 1, pp. 887-907.

Section 1. Enacted for navigation or flood control under a Congressional policy of recognizing (1) the interests and rights of the states in determining the development of the watersheds within their borders, and (2) their interests and rights in water utilization and control; in order to protect to the fullest established and potential uses of the nation's rivers; to facilitate the consideration of projects on the basis of coordinated and comprehensive development; and to limit navigation works to those where substantial benefits accrue and which can be operated consistently with other uses.

In conformity with this policy:

(a) plans of the Army Engineers shall only be submitted to Congress after the investigations which form the basis of the plans have been

conducted so that affected states can be given:

(1) information during and arising out of the investigations

(2) opportunity for consultation regarding plans and proposals

(3) to the extent deemed practical by the Chief of Engineers, opportunity to cooperate in the investigations

Where investigations are concerned with water rising west of the 97th meridian, the Chief of Engineers shall give the Secretary of the Interior during the investigations, information developed by the investigations and an opportunity for consultation regarding plans and proposals, and, to the extent deemed practical by the Chief of Engineers, an opportunity to cooperate in the investigations.

Federal-state liaison to be between the Chief of Engineers and the affected state governor or his appointed representative. The "affected states" shall include:

(1) those in which the works or any part thereof are proposed to be located

(2) those which in whole or part are both within the drainage basin involved, and situated in a state lying wholly or in part west of the 98th meridian

(3) such of those which are east of the 98th meridian, as, in the judgment of the Chief of Engineers, will be substantially affected

The Chief of Engineers is to submit his plans to the affected states and the Secretary of the Interior in cases west of the 97th meridian, and must give them ninety days to reply. The replies, at the discretion of the Chief of Engineers, are to be attached to the plan and letter of transmittal to Congress.

(b) (the O'Mahoney Amendment) "The use for navigation, in connection

with the operation and maintenance of such works herein authorized for construction, of water arising in states lying wholly or partly west of the 98th meridian shall be only such use as does not conflict with any beneficial consumptive use, present or future, in states lying wholly or partly west of the 98th meridian, of such waters for domestic, municipal, stockwater, irrigation, mining, or industrial purposes."[88]

(c) the Secretary of the Interior to be subject to the same rules as the Chief of Engineers under (a), (though he appears to be subordinate to the Chief of Engineers, for if the latter objects to the Interior plan, the proposed works shall not be deemed to be authorized except upon approval by an act of Congress).

Section 2. The Army Engineers to be responsible for improvements of rivers and other waters for flood control. The Department of Agriculture to be responsible for improvements of watersheds and measures for run-off, water flow retardation, and soil erosion prevention.

Section 4. The Chief of Engineers is authorized to construct, maintain, and operate public park and recreational facilities in reservoir areas under the control of the War Department; to grant leases for such purposes with preference to federal, state, and local government agencies without a monetary consideration. All waters are to be open to public use without charge, unless the Secretary of War deems it not in the public interest. Any revenues from leases or privileges are to be deposited in the United States Treasury.

Section 5. The Department of the Interior is authorized to dispose of power from Army dams, to encourage widespread use at the lowest rates

(to be approved by the Federal Power Commission) consistent with sound business principles, and with supply preference to be given to public bodies and cooperatives.

Section 6. The Secretary of War is authorized to sell any surplus waters on his own terms, provided the sale does not interfere with existing lawful uses of water.

Section 7. The Secretary of War shall prescribe regulations on all federal structures for their use in flood control (except the T.V.A.).

Section 8. The Secretary of the Interior shall, after agreement with the Secretary of War, use and control any waters available for irrigation after specific authorization from Congress.

Section 9. Approval of the comprehensive plans for the Missouri Basin in House Document 475 and Senate Document 191, as revised by Senate Document 247, 78th Congress, 2nd Session.

This Act must be viewed against a background of water legislation starting with the Constitution and evolving continuously up to the present day at both federal and state levels. This body of law is described in detail elsewhere 1/ and will be referred to only in relation to the context of this chapter.

The program authorized by the Flood Control Act of 1944 is being put into effect principally by the Bureau of Reclamation and the Army Engineers, with many other agencies having responsibilities and interests

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1/ President's Water Resources Policy Commission Report, op.cit, Vol. III.

in certain aspects of the plan. The welter of differing policies, overlapping functions and complexities, which are a part of the development of resources under existing programs, have been discussed at some length in public debate and elsewhere. For this reason, only a brief reference will be made to them in this chapter. 2/

The overlappings and inconsistencies are numbered consecutively through the various agencies listed; each having the appropriate cross references in parenthesis.

A summary of the federal agencies which have responsibilities and interests in resource development in the Missouri Basin will be found in figure 7, page 81.

The Corps of Engineers (hereafter designated C/E)

(1) primarily responsible for the development of authorized navigation programs and flood control, limited to investigations and improvements of rivers and other waterways throughout the U. S. (18), (19)

(2) dams and reservoirs programmed by the C/E may also serve other purposes.

(3) flood control projects are assessed as feasible if costs are exceeded by benefits or "if the lives and social security of the people

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2/ Principal references include:
(a) Ibid., pp. 493-643.
(b) The Commission on Organization of the Executive Branch of the Government, Task Force Reports Appendix L and Appendix K; U. S. Government Printing Office, Washington, D. C., January, 1949.
(c) U. S. Government Organization Manual 1950-51, General Services Division, Washington, D. C.
(d) Report of the Policy Committee of the American Water Works Association, 1948.

are otherwise adversely affected" by floods. And since 1938, are provided almost wholly at government expense, with local contributions at C/E's discretion. (22), (37)

(4) flood control and navigation are not generally reimbursable. (23), (57), (48)

(5) are given individual grants of authority by Congress to make examinations and surveys in connection with their water resource responsibilities. (21)

(6) authorized to collect data relating to stream flow. (26), (53), (62), (63), (65), (66), (70), (71), (72)

(7) authorized to collect data relating to the commercial benefits of their navigation responsibilities. (70)

(8) reports for navigation projects must include data on development and utilization of water power. (61)

(9) river and harbour appropriations usually allow funds appropriated to be applied to examinations and surveys at need. (30)

(10) interest rate employed for conversion of non-uniform benefits to an equivalent average annual benefit is local average rate of interest for long-term private investment, i.e., around 4-5 percent. (31), (55)

(11) price level used in calculating benefits is that at time of the analysis. (32), (56)

(12) has a general authorization for the recreational use of reservoir projects under C/E's control. (33)

(13) despite lack of express statutory requirement, reservoir projects under C/E always include interest charge on project cost when power

rates are set. (34), (38)

(14) repayment of C/E projects not statutory, but power from dams is to be sold at prices which will return power costs including interest within a reasonable period of years. (35), (48)

(15) drainage works non-reimbursable except where a local contribution may be required. (36), (24), (58)

(16) in the marketing of power, preference is given to "public bodies and cooperatives."

(17) in flood control projects, 75 percent of the money received from the leasing of lands acquired for flood control must be paid to the state involved. No such provision applies to navigation. (41), (59)

The Bureau of Reclamation (hereafter designated B/R)

(18) primary responsibility for the development of irrigation programs. (1)

(19) authorized to provide for power, navigation and flood control, and to furnish water for municipal water supply or miscellaneous purposes. (1), (2), (49)

(20) with the Department of Agriculture, it has responsibility for developing programs under the Water Conservation and Utilization Act.

(21) has general authority to make examinations and surveys in connection with their water resource responsibilities. (5)

(22) feasibility of irrigation projects is determined on the basis of ability to pay reimbursable costs, defined by statute, during the statutory period. (3)

(23) on B/R projects, irrigation costs are reimbursable without interest; municipal and industrial water supply costs are reimbursable with interest not exceeding 3 1/2 percent, if the Secretary of the Interior determines interest charges to be proper; while power costs are generally reimbursable with interest at 3 percent. (4), (14), (48), (57)

(24) may not supply water to irrigable project land in single ownership over 160 acres, unless a recordable contract is executed providing for the sale of excess land. (15), (36)

(25) Reclamation Project Act, 1939, provided for variable repayment of construction charges, according to varying levels of agricultural income; recognized the allocation of construction charges to power, navigation, etc., in multi-purpose projects.

(26) authorized to collect data relating to stream flow. (6), (62), (63), (53), (65), (66), (70), (71), (72)

(27) obligated to provide data on the cost of irrigation projects which can be allocated to power.

(28) authorized to dispose of power at both B/R and C/E dams, but has no statutory responsibility for the design of a C/E dam.

(29) examinations and surveys limited to the seventeen Western States. (54), (1)

(30) annual appropriations for the B/R have contained specific amounts for general investigations. (9)

(31) interest rate employed for conversion of non-uniform benefits to an equivalent average annual benefit, usually 2 1/2 percent. (10), (55)

(32) price level used in calculating benefits is estimate of average

prices for the project's life, as of May 1950, prices corresponding with the 1939-1944 period. (11), (56)

(33) no general authorization for the recreational use of reservoir projects under B/R control. However, a law was passed in 1946 authorizing the B/R to invest in recreational values. (12)

(34) repayment of project costs with interest is not required, and when interest is collected in form of power rates, the statute permits interest component of revenues to be applied to repayment of construction investment. (13)

(35) provision for allocation of that part of estimated cost which can be properly allocated to power and probably be returned to the U. S. in net power revenues. (14)

(36) drainage work is performed as part of irrigation project development and is therefore subject to repayment. (15), (24), (36), (58)

(37) in B/R projects, non-reimbursable allocations to flood control are authorized under the 1939 Reclamation Project Act, as in the case of navigation. But Reclamation law makes no provision for local contributions such as exists in the case of the flood control works of the C/E, and the Department of Agriculture. (3)

(38) 1944 Flood Control Act requires B/R to distribute power from C/E dams at prices which will, among other things, produce an interest element of 2 1/2 percent of the unamortized portion of the construction investment. The rates are subject to review by the Federal Power Commission. (13), (39)

(39) 1939 Reclamation Project Act requires B/R to distribute power

from its dams at prices which will, among other things, produce, as administratively construed, a perpetual 3 percent interest element of the appropriate share of the construction investment, regardless of the portion of the investment previously returned. The rates are not subject to review by the Federal Power Commission. (38)

(40) in the marketing of power under the 1939 Act, preference must be given to municipalities and other public corporations and agencies, and to cooperatives and other non-profit organizations financed in whole or in part by loans under the Rural Electrification Act of 1936.

(41) no statutory provision for a contribution to the revenue of the State whose lands are acquired and leased for irrigation. (17), (59)

Bureau of Indian Affairs

(42) has primary responsibility for the administration of Indian lands, including the programming of authorized water resource projects for irrigation water supply and power, and arrangements for compensation and resettlement of Indians disrupted from river bottom lands by the creation of reservoirs. (18), (19)

(43) responsible to the Indians for the management of trust property, including its protection and development.

(44) responsible for the provision of services which are not otherwise available to Indians in their status as wards.

Fish and Wildlife Service

(45) responsibility for the protection of fish and wildlife and minor water resource facilities for wildlife.

(46) recommends measures which should be taken for the protection of

fish and wildlife, on either federal or non-federal land under federal permit.

(47) authorized to study effect of water resource development on fish and wildlife resources.

(48) authorized to spend project funds for replacing losses of, or mitigating damage to, wildlife. These funds are considered to be non-reimbursable. (4), (14), (23), (57)

Department of Agriculture

(49) a primary responsibility for programming watershed measures in aid of flood control. (1), (19)

(50) also has primary responsibility for the small water facilities supplying domestic, stock, and irrigation water. (2), (19)

(51) authority to collect agricultural data useful in connection with federal water resource activities.

(52) authorized to make snow surveys and conduct research concerning long-range weather forecastings and the relationships between weather and soil erosion. (62), (6)

(53) several agencies within the Department have authority to collect data on soil erosion and its effect upon navigation and flood control. (6), (26), (63), (62), (65), (70), (71), (66), (72)

(54) authorization to formulate and keep current a program of facilities for water storage or utilization is limited to the arid and semi-arid areas of the United States. (29), (1)

(55) interest rate employed for the conversion of non-uniform benefits to an equivalent average annual benefit usually 2 1/2 percent. (10), (31)

(56) price level used for calculating benefits is that prevailing at the time of the analysis. (11), (32)

(57) costs of flood control work are not required to be returned unless the Secretary, at his discretion, requires local contributions. (3), (4), (23), (48)

(58) drainage works and operations are non-reimbursable unless a local contribution is required. (24), (36), (15)

(59) in case of retired sub-marginal lands, the Secretary is directed to pay 25 percent of the net revenues to the county involved. (17), (41)

Federal Power Commission

(60) facilitates private development of water power resources under terms and conditions designed to safeguard the public interest and protect other water uses. In so doing, it must assure that the project adopted will be best adapted to a comprehensive plan for development of the waterway for the use or benefit of commerce, the improvement and utilization of water power development, and other beneficial public uses, including recreation. (1), (2), (18), (19)

(61) authority to make investigations and collect data concerning the utilization of water resources, the water power industry and its relation to other industries, and to interstate or foreign commerce; the location, capacity, development costs, and relation to markets of power sites, whether the power from government dams can be advantageously used by the United States for its public purposes, and the fair value of power from government dams. (73), (74), (6), (26), (53), (62), (63), (65), (70), (71), (72).

Weather Bureau

(62) authority to collect data useful to federal water resource development. (6), (26), (53), (63), (65), (70), (71), (66), (72)

(63) since 1890 has been responsible for the gauging and reporting of rivers. It measures the water equivalent of snow on the ground and forecasts water supply and stream flow. (6), (26), (53), (62), (65), (66), (70), (71), (72)

(64) authorized to provide current information service on precipitation and flood forecasts for the C/E.

Geological Survey

(65) authority to collect data useful to federal water resource development. (6), (26), (53), (61), (62), (63), (66), (69), (70), (71), (72)

(66) maintains 6,200 gauging stations and the conduct of nationwide investigations concerning the occurrence, the quality, and the quantity of water in the United States. (6), (26), (53), (61), (62), (63), (65), (69), (70), (71), (72)

(67) major responsibility for the federal program in mineral resources which is shared with the Bureau of Mines "without objectionable duplication," but the incursion of some twenty-five other agencies into the field of mineral resource studies does lead to "extensive duplication." 3/ (68)

Bureau of Mines

(68) major responsibility for the federal program in mineral resources,

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3/ "The Commission on Organization of the Executive Branch of the Government" Task Force Report, Appendix L, Jan. 1949, p. 50.

which is shared with the Geological Survey "without objectional duplication" but the incursion of some twenty-five other agencies into the field of mineral resource studies does lead to "extensive duplication." 4/ (67)

Coast and Geodetic Survey

(69) authority to collect data useful to federal water resource development. (6), (26), (53), (61), (62), (63), (65), (66), (70), (71), (72)

Department of Commerce

(70) authority to collect data on inland water traffic by both the Bureau of Foreign and Domestic Commerce, and the Inland Waterways Corporation. (7)

(71) authority to collect data useful in federal water resource activities. (6), (26), (53), (61), (62), (63), (65), (66), (70), (72). Apparently the Department of Commerce though technically responsible for examining problems of water in relation to new industry, e.g., the liquefaction of coal in the Missouri Basin, it is not carrying out the necessary study, and the problems are devolving upon the Bureau of Reclamation. 5/

Public Health Service

(72) the acquisition and use of stream flow data would appear to be an essential step in the discharge, by the Surgeon-General, of his responsibility for preparing comprehensive programs for eliminating pollution

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4/ Ibid., p. 50

5/ Statement by federal official, made to writer in June, 1951.

on inter-state waters. (6), (26), (53), (61), (62), (63), (65), (66), (70), (72)

National Security Resources Board

(73) has conducted power surveys as a part of its mobilization planning. (61), (74)

Rural Electrification Administration

(74) authorized to make studies, investigations, and reports concerning the condition and progress of the electrification of rural areas. (61), (73)

Soil Conservation Service

(75) responsible for programs for the improvement and conservation of certain federal lands. (76), (77)

Bureau of Land Management

(76) responsible for programs for the improvement and conservation of certain federal lands. (75), (77)

National Park Services

(77) responsible for programs for the improvement and conservation of certain federal lands. (75), (76).

It must not be inferred that the interest of two agencies in different aspects of the same problem necessarily results in inefficiency and duplication--the separate studies may be complementary--but it is necessary to have close cooperation and good will between the agencies concerned, or some kind of compulsory cooperation.

Nor must it be inferred that the differences of procedure between

agencies outlined above necessarily imply Procrustean measures to eliminate them. For instance, it has been maintained, and is supported by the President's Water Resources Policy Commission Report, 6/ that power costs to be repaid should include interest, whereas irrigation costs should not. This is partly due to the different marketing situations which face the productions of power by the federal government and the production of crops by the irrigation farmer. However, there can be no denying the fact that the unity of resource development problems seriously controverts the divergent policies but convergent responsibilities of the federal agencies.

This inadequacy in federal activity may be explained on the basis of two hypotheses:

(1) The rapid growth in the participation of federal agencies in resource development, which has outrun departmental and political practice

(2) A tendency of government departments to maintain their bureaucratic "empires" by building up large stores of private information. Some members of government departments believe, probably correctly, that a pooling of this information would threaten the existence of many agencies at their present levels of staffing. The failure to share information is indeed a bad example of resource development and use, and overlooks the fact that the welfare of the nation rather than its own welfare is the raison d'être of a federal agency.

6/ President's Water Resources Policy Commission Report, op. cit., Vol. I, pp. 84-85.

Department of Agriculture:
- Agricultural Research Administration
- Bureau of Agricultural Economics
- Bureau of Plant Industry, Soils, and Agricultural Engineering
- Extension Service
- Farm Credit Administration
- Farmers Home Administration
- Forest Service
- Production and Marketing Administration
- Rural Electrification Administration
- Soil Conservation Service

Department of the Army:
- Corps of Engineers

Department of Commerce:
- Bureau of the Census
- Bureau of Foreign and Domestic Commerce
- Bureau of Public Roads
- Civil Aeronautics Administration
- Coast and Geodetic Survey
- Inland Waterways Corporation
- Weather Bureau

Department of the Interior:
- Bureau of Indian Affairs
- Bureau of Land Management
- Bureau of Mines
- Bureau of Reclamation
- Fish and Wildlife Service
- Geological Survey
- National Park Service

Department of Justice

Atomic Energy Commission

Council of Economic Advisers

Federal Power Commission

Federal Security Agency:
- Public Health Service

Housing and Home Finance Agency:
- Community Facilities Service

International Joint Commission

Interstate Commerce Commission

National Forest Reservation Commission

National Security Resources Board

Reconstruction Finance Corporation

Securities and Exchange Commission

Figure 7 Summary of Agencies Which Have Responsibilities And Interests in The Basin

Chapter V

THE COORDINATION OF STATE AND FEDERAL INSTITUTIONS IN THE MISSOURI BASIN DEVELOPMENT PROGRAM

The picture presented in the previous chapter, though incomplete, indicates one need for coordination, i.e., the division of responsibility, and the divergence of practice among the various agencies.

The second need for coordination arises from the multiple-purpose character of river basin development juxtaposed with the unity of the flow system, no part of which can be modified without its affecting the whole complex of the basin.

These are coordination needs for making resource development more efficient both in human effort and in natural forces. We have already suggested in Chapter I that this is an indispensable feature of the spending of public funds in a democratic society. But there is another important need for coordination, and that is to make federal resource development more democratic in its operation.

It is somewhat unrealistic to try to analyze separately the ends of democracy and efficiency--they are interdependent. In time of war, most of the members of a democracy have a homogeneity of purpose which is unusual; moreover, this purpose is meant to be achieved as quickly as possible. Under these circumstances, as we know, efficiency in the prosecution of the war is attained at the cost of individual freedom. In the long run (between wars) the members of the democratic society believe that as far as possible they should satisfy their heterogeneous individual purposes because therein lies the ultimate strength of the

democratic way of life. They may suspect that the free society is not always highly efficient, but they should also know that the efficient society is not necessarily free.

In this democratic society of heterogeneous individual purposes, the common denominator for social action can only be secured through the majority vote, generally speaking. This naturally implies that even in a society of diverse individual purposes there exists enough homogeneity to secure effective social action. And if we believe in this democratic system, we must believe that this is the most efficient way of <u>getting</u> social action, though it may not lead to the most efficient social result in the short run.

A consideration of the practice of democracy in the United States is outside the scope of this work, but mention of one aspect should be made. Because of the constitutional division of power between the state and federal governments, the individual must learn to divide his allegiance between the two. It is not unnatural that he should seldom know how to distribute his allegiance when the constitutional spheres of influence of state and federal government do not correspond with the physical and social problems to be faced in resource development. What may be good for his state, with which he may identify his interest, may not be good for other states or for the nation as a whole. Conversely, what may be good for the nation may not be in the best interests of his state--at least in his estimation. This is a split in the determination of patterns of social action which admits of no easy solution.

The responsibilities of state and federal government are not always clearly defined, and they become more and more intertwined as the nation becomes more of a nation and less of a group of states.

Finally, when the individual has had an opportunity of registering his opinion on a problem of resource development in an oblique fashion through his elected representatives, he is entitled to expect that the social action, whose inception he has supported, shall be carried out as efficiently (i.e., at the lowest unit cost) as is possible within the framework of democracy.

In this chapter, some attempt will be made to indicate and assess the existing institutional techniques for reconciling state and federal interests and for securing the efficient implementation by federal agencies of resource development plans. 1/

Congress

In theory, Congress is the ultimate coordinator of development programs, particularly in the relationship between the needs and possibilities of the area immediately affected by the plan, and the needs and possibilities of the nation. In practice, this is not entirely the case, for the following reasons:

(1) The planning of a river basin, such as the Missouri, is a large and highly complex undertaking. The time which members of Congress would have to spend studying such plans in order to insist upon effective changes

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1/ In the case of federal coordination, the chief sources of information are: Hoover Task Force Reports, op. cit., Appendixes K and L
President's Water Resources Policy Commission Report, op. cit., Vol. III.

and coordination would be wholly inconsistent with their other Congressional responsibilities. Therefore, Congress relies, to a large extent, upon the recommendations of the agencies, either in good faith or by default. 2/ This leaves most legislators very much at the mercy of the skilled lobbyists supporting agency plans as originally submitted. 3/

(2) The organization of the legislative committees does not allow for a multiple-purpose consideration of multiple-purpose programs. The 1946 Reorganization Act made the relationship between the Committees and resource development programs a little more realistic. Figure 8, page 87 shows the present divisions of Congressional responsibility in relation to highly interdependent variables. Congressional Hearings are a common technique for sounding the opinions of interested parties and thus provide some basis for program coordination. The Hearings of the Rivers and Harbours Omnibus Bill H. R. 3961, before a subcommittee of the Senate Committee on Commerce, 4/ are remarkable for their length, for their absence of information beyond uninhibited statements of special group interests, unsupported by evidence in most cases, and for their constitutional rectitude in the face of a problem more appropriate to physical

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2/ It is perhaps unfortunate that this was not the case in respect of the "Missouri River Basin Agricultural Program," House Document 373, 81st Congress, 1st Session.

3/ See de Roos, Robert and Maass, A, "The Lobby That Can't be Licked," Harpers, August, 1949, for an examination of the lobbies supporting the Army Engineers.

4/ U. S. Senate, 78th Congress, 2nd Session, Feb. 18, 22, 1944. These hearings include the "Pick-Sloan" Plan.

than to constitutional laws. 5/ The technique is an indispensable part of the democratic process, but it does not greatly assist Congressmen in evaluating and coordinating resource development programs, except on the basis of agency plans already made public and the volume of participants' opinions. The ultimate responsibility of Congress for public development is not called in to question; it is the rightful seat for such power. However, the appropriate machinery has not yet been devised for making the responsibility effective. Perhaps an increase in grass roots participation in the planning process, plus impartial boards of review might give Congress sounder evidence on which to base their decisions. Alternatively, a Missouri Valley Authority might be set up, in which case Congress would be more concerned with the quality of the men it appointed to head the authority than with the remaining planning and operational programs which would be the responsibility of the authority.

(3) Congress cannot properly coordinate plans which are precluded from coordination by existing statutory provisions without amending such provisions.

(4) The annual review of appropriations by Appropriations Committees provides an opportunity for continuous coordination, (subject to the difficulties outlined above) though it offers a similar opportunity for

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5/ In saying this, the O'Mahoney Amendment, which was written into the Bill, is not overlooked. This was an important contribution for the semi-arid states and represents a measure of coordination.

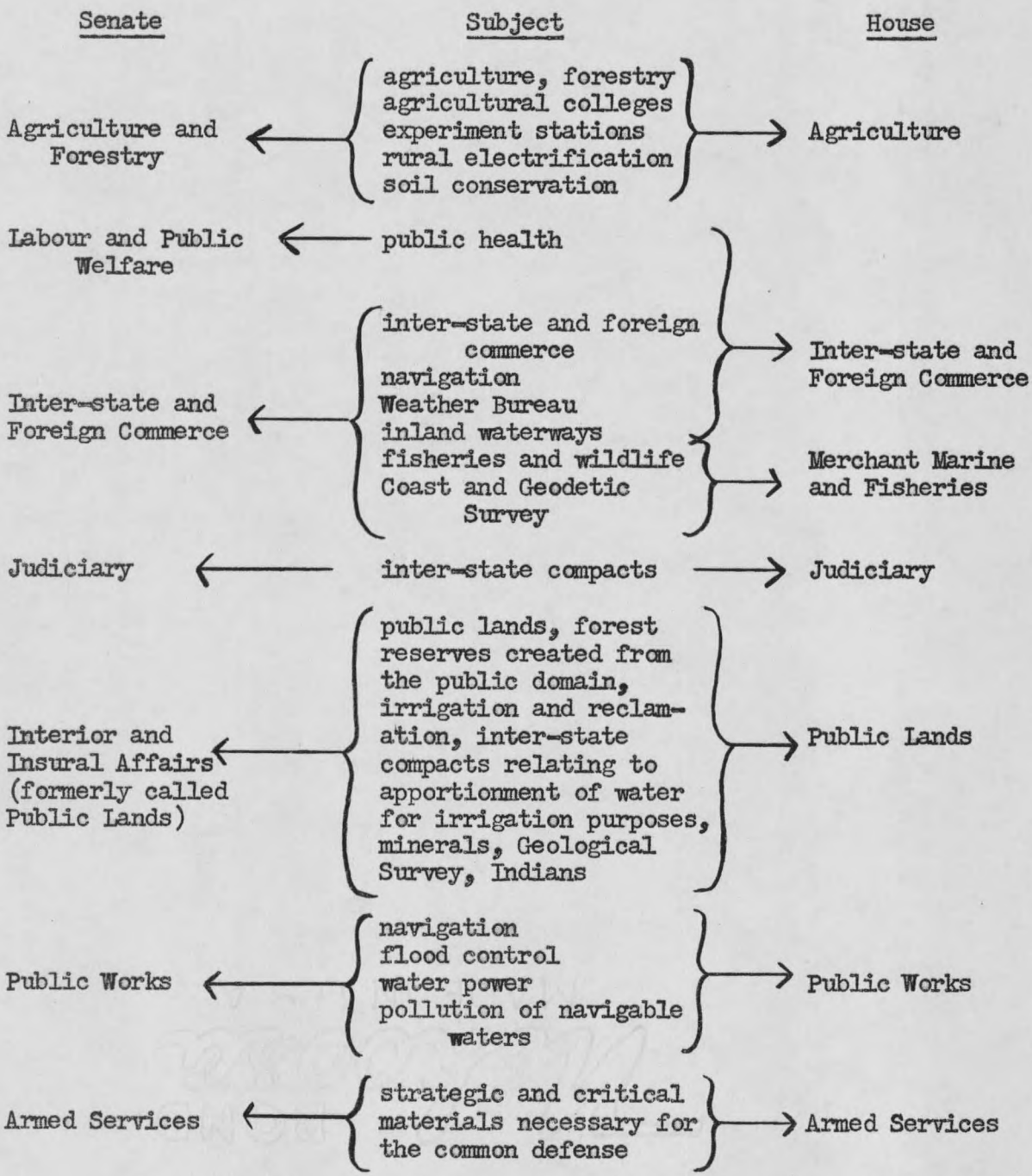

Figure 8 Congressional Committees and Basin Development 6/

6/ See Act of August 2, 1946, Sections 102,121, 60 Stat. 812, 814, 822.

dis-coordinating programs through time. The example of water-flow data collection is a case in point. The records are discontinuous partly because of variations in the attitudes of different Congresses to the need for such "academic luxuries." 7/

Federal Inter-Agency River Basin Committee

This Committee was established "to cooperate more completely in the preparation of reports on multiple-purpose projects and to correlate the results to the greatest practicable extent." It operates at the Washington level, and in 1950 its membership included:

Department of Agriculture
Corps of Engineers
Department of Interior
Federal Power Commission
Department of Commerce
Federal Security Administration

Most of the work is discharged through sub-committees:

Benefits and Costs
Hydrology
The Missouri Basin Inter-Agency Committee 8/, et al
Sedimentation
Energy Conservation Procedures

The usefulness of the Committee is limited by the following:

(1) It has no statutory standing and no budget

(2) The sovereignty and responsibilities of the member agencies are unimpaired; therefore, decisions, if any, are only advisory and in no

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7/ Verbal statement by a member of the Bureau of Reclamation, and reference in the "Report of the President's Water Resources Policy Commission," Vol. II, p. 195.

8/ See page 89 for fuller discussion of the Missouri Committe. See also Minutes of the Missouri Basin Inter-Agency Committee.

important instance has the Committee resolved a major conflict. 9/

(3) The members' willingness to cooperate may be negated by their statutory powers.

(4) Although the Committee is supposed to give clearance to the Corps of Engineers' and the Bureau of Reclamation's project plans, this only comes after their completion, by which time it is usually too late for clearance to be effective.

There seems little doubt that the most effective service which the Committee has rendered has been in the field of technical reports. 10/

Missouri Basin Inter-Agency Committee

The usefulness of this Committee suffers from the limitations (1) to (3) of its parent Committee outlined above. It consists of permanent representatives from the Departments of Agriculture, Interior, and Commerce, and from the Corps of Engineers and the Federal Power Commission. In addition, five Governors from the ten states affected by the Missouri Basin Program serve in a rotation determined by the Missouri Basin States Committee (see page 93).

The meetings are held in public, which probably accounts for the lack of acrimony between the agencies which might have been expected.

9/ Hoover Report, op. cit., Appendix L, p. 25.

10/ President's Water Resource Policy Commission Report, op. cit., Vol. III, p. 433.

The Committee holds private executive sessions where, presumably, disagreements are voiced and effective business carried out.

Perhaps the most valuable contribution of the Committee is in the field of education. At the meetings, state and federal representatives and the public at large may all learn something of the problems of resource development and something of the problems of each other. In addition, it provides an opportunity for personal contact between high-level officials of the state and federal agencies.

Bureau of the Budget

The review by this Bureau, which is the normal budgeting process, could exercise considerable coordinating powers, but:

(1) Project reports are reviewed only after they are completed and some time after they are publicisied. This means that many private decisions are taken on the basis of expectations that the report will be approved, thus increasing the possibility that they will be approved as publicised for political reasons. The Corps of Engineers usually appends the Bureau's comments without altering the report when it is submitted to Congress. 11/

(2) The Bureau does not have the necessary staff to do a decent job of coordination. This is not an insuperable obstacle, of course.

(3) The difficulty of reconciling and evaluating the differing

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11/ Hoover Report, op. cit., Appendix L, pp. 26-27.

views of the Corps of Engineers and the Bureau of Reclamation is immense without an explicit and consistent frame of reference. The provision of this was one of the important assignments of the President's Water Resources Policy Commission.

Reorganization Act of 1949 12/

This creates possibilities of coordination by providing for the means whereby agencies and their functions may be consolidated "according to major purposes" but the Act implies that agency reorganization shall not interfere with the operation of previously existing statues, unless new modifying laws are passed.

Department of Agriculture

The coordination of the activities of the member departments (see figure 7, page 81) in relation to land and water resources rests with the Assistant Secretary and the Departmental Representatives and Committees. One such group was responsible for the Missouri Basin Agricultural Program. 13/ These representatives do not act in an administrative capacity, though presumably the Secretary of Agriculture has some authority to make their recommendations effective within the Department.

Department of Interior

A Missouri Basin Field Committee among others, was set up by the Interior Department to coordinate the activities of its subsidiaries.

12/ Act of June 20, 1949, 63 Stat. 203, 5 U.S.C. 133 et. seq. (Supp. III).

13/ House Document No. 373, 81st Congress, 1st Session.

See figure 7, page 81. However, the order establishing these field committees states that none of its provisions shall be construed to authorize a committee chairman, a committee, or its staff to execute, administer, or otherwise direct any bureau activity within a region.

So much, then, for existing coordinating devices at the federal level. They suggest one of the costs of democracy—the rigidity of its institutions in a rapidly changing world.

Now let us consider federal-state relationships.

The preamble to the Flood Control Act of 1944 explicitly recognizes the rights and interests of states in developing watersheds within their borders. Moreover, it outlines a procedure by which this recognition is to be given effect. 14/ It is reasonably clear, from a perusal of the Act, that cooperation in the planning stage is very much at the option of the federal agencies, particularly the Corps of Engineers and the Bureau of Reclamation; and that the initiative for seeking appropriations remains with the agencies who need only append to their plans the comments of the states. The Corps of Engineers can apparently ignore the comments of the Bureau of the Budget Review in most cases, and it seems likely that they can do likewise with those of the states. However, the analogy can be drawn only with the reservation that Congress may be likely, under present conditions, (mid 1951) to listen more favourably to recommendations by the states than to recommendations by

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14/ Vide supra, pp. 65-66.

an agency of the administration.

On the whole, most of the states appear to have been rather slow to seize the opportunities which the 1944 Act offers them. Whether this is due to a feeling of futility in respect of the outcome of any decisions which they might take, or whether it is due to a non-realization of the implications of river basin development or to other more potent reasons is not known. However, the following is a brief summary of the steps which the Missouri Basin States have taken.

(1) MISSOURI RIVER STATES COMMITTEE

The Missouri River States Committee meets about once a year, and apparently its only function at present is the election of the five governors which will represent this Committee on the Missouri Basin Inter-Agency Committee.

(2) COLORADO

Colorado Water Conservation Board

The main provisions of the Act, (June 1, 1937 as amended) setting up the Board, which relate to state-federal coordination are as follows:

"Section 1. For the purpose of aiding in the protection and development of the waters of the State for the benefit of the present and future inhabitants of the State there is hereby created a Colorado Water Conservation Board with the powers and duties herein set out. Said Board is hereby declared to be an agency of the State and the functions it is to perform, as herein set out are hereby declared to be governmental functions for the welfare and benefit of the State and its inhabitants."

Section 3. Board to consist of fourteen members; the Governor, Attorney General, State Engineer, Director of the State Planning Commission and the Director of the Board are members ex-officio. The remainder are to be qualified electors of the State, well versed in water matters, who shall be appointed by the Governor.

Section 9. The Governor, with the approval of the Board, shall appoint a Commissioner(s) for negotiating the entering into inter-state compacts.

"Section 11, subsection (e). To cooperate with the United States and the agencies thereof and with other states for the purpose of bringing about the greater utilization of the waters of the State of Colorado and the prevention of flood damages.

(f). To cooperate with the United States, or any of the Agencies thereof, in the making of preliminary surveys, and sharing the expense thereof when necessary, respecting the engineering and economic feasibility of any proposed water conservation or flood control project within the State of Colorado, designed for the purpose of bringing about greater utilization of the waters of this state.

(h). To investigate the plans, purposes and activities of other states, and of the Federal Government, which might affect the inter-state waters of Colorado."

The following statement by Board Director Clifford H. Stone indicates his opinion of the effectiveness of coordination between the Board and Federal Agencies:

"There now exists a good and workable relationship between the Colorado Water Conservation Board and the federal agencies in the matter of water resources development in Colorado. Through a cooperative approach and under arrangements which have been worked out, we find that the State Water Board and its staff were able to exert influences with the Bureau of Reclamation and the Corps of Engineers. Some of the conditions which prevail in this respect and methods employed in Colorado are:

(a) It has been found that the federal agencies, including the Bureau of Reclamation and the Corps of Engineers, show a splendid and workable disposition to obtain, through the Colorado Water Conservation Board, the benefits of its studies and investigations and ascertaining the views of state and local interests. The Water Board, in turn, keeps other affected state agencies informed and arranges for obtaining and affecting, where applicable, the views of such other state agencies. In other words, the State Water Board in the program of development of the water resources of the State acts as coordinating agency for all interested state agencies and aids in coordinating the state viewpoint on projected development with interested federal agencies.

(b) Even before project reports are formulated by such federal agencies as the Bureau of Reclamation and the Army Engineers for submission for final official state comments under Section 1 of the 1944 Flood Control Act, the State Water Board has been accorded an opportunity in all instances of collaborating in the development of a final report of the federal agencies. Thereby there is reduced to a minimum adverse

comments to final official reports submitted under the above mentioned Section 1 of the 1944 Act.

(c) In all cases where necessary, the Colorado Water Conservation Board holds gearings in the field to obtain the views of local affected interests with respect to proposed project development. In addition, the Board meetings are open for further comment and submission of views by local interests when official comments as to a particular project development, submitted by a federal agency, are under consideration.

(d) In some instances, special committees made up of state and federal representatives are set up to study and review problems and programs, and report to the Colorado Water Board. As an example of the latter, there was created with the approval and encouragement of the Bureau of Reclamation, what is known as the Steering Committee. This Committee is made up of the Directors of Regions 4 and 7 of the Bureau of Reclamation, a representative of the Branch of Project Planning, Bureau of Reclamation, and the Director of the Water Conservation Board. This Steering Committee coordinates plans between Region 4 of the Bureau, which is in western Colorado, and plans of Region 7 in eastern Colorado with respect to the utilization of Colorado River water in this State. It involves in many instances the in-basin as against the out-basin use of such water, and it contemplates setting up of investigational programs by the Bureau of Reclamation as well as by the State Board.

(e) With respect to a large transmountain diversion project which has been under study by the Bureau of Reclamation in Colorado, there was set up about two years ago what is known as the Policy and Review Committee. This Committee has operated for about two years and is now concluding its work. This Committee and its work was in constant touch and consultation with the representatives of the Bureau of Reclamation, particularly Region 7 which surveyed and prepared the report on the project. Through this endeavor, there was recommended to the Board operating principles for the project. These were accepted by the Board, and they have been accepted by the Director of Region 7 of the Bureau and incorporated in his report. Later these operating principles were reviewed in Washington and certain recommended changes made. Subsequently, a joint meeting with the members of the Policy and Review Committee, representatives from the Washington office of the Bureau of Reclamation and of Region 7 agreed upon revision of these rules and regulations. This week (Feb. 8, 1951) they will be again submitted to the Water Board with prospects that revisions will be approved. We also have assurance from the Commissioner of the Bureau of Reclamation that such operating principles will be incorporated in the final report submitted by the Secretary of the Interior under Section 1 of the 1944 Flood Control Act. In other words, this procedure has all taken place prior to the formulation of the official report on the project for submission to the affected states for final official comment.

On the matter of water resources development with all its related phases, there is no other coordinating agency in Colorado.

There are no federal agencies on the Conservation Board. Missouri Basin matters are all reported to the Board, and in some cases a representative of the Board has been designated to special committees consisting of representatives of other states and federal agencies. This procedure is now being followed with respect to the proposed Glendo project on the North Platte River. In the case of the Narrows Reservoir on the South Platte in Colorado, a part of the Missouri Basin, questions have arisen with respect to local interests and views. The location, size, and plan of operation of the project became the subject of both state and local interests. Although the project was authorized and money appropriated for its construction, construction was delayed until a review of the project report, further studies by the Bureau as well as by the State Water Board, and studies and consultation with local affected interests were made. This has involved a lot of work, and conclusions have not been reached.

Recently the Bureau submitted a further report on the Narrows, and the Board and the Bureau are each engaged in getting out a report on separate phases of the matter. We plan before long to have further hearings to obtain the views of local interests. All of this time there have been continuing consultations between the Board and local interests and between the Board and the Bureau. This has been a troublesome matter, but we have had full and complete cooperation between the Board and the Bureau, and a situation worked out where the engineering staff of this Board and its policy making offices have worked toward finally agreeing on a project which will not conflict with either state or local interests.

The State Water Board is designated by the Governor under Section 1 of the 1944 Flood Control Act as a state agency to review and comment on reports for the proposed project development by the federal agencies."

15/

It is difficult to comment upon the opinion expressed by Judge Stone, who has a long and distinguished record in the field of water resource development. He seems very satisfied with the coordination arrangements which exist between the federal agencies and the State of Colorado, but one gains the impression that this is another case of making the best of a bad job. In other words, taking the over-all

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15/ From a letter in the writer's possession.

Pick-Sloan plan as given, there is some opportunity for the State to make its wishes felt in relation to the operational details. Perhaps the success of the Board in influencing federal programs is largely a function of the ability of Stone himself. At any rate, the Board is a state-supported institution aimed at preserving and improving the position of the State vis-a-vis, the federal government and other states; and to that extent its coordinating function is limited. 16/

Perhaps it is also worth pointing out that water rights provide one of the most lucrative fields of litigation for the western lawyer, and that simplifications in the law of water rights and appropriations which might result from some less confused machinery of basin development would be inimical to the interests of the legal profession.

State Planning Commission

This organization, which is also a state agency, is authorized to prepare and perfect a master plan for the development of Colorado, and to cooperate with the federal government and states and their agencies in conservation and development. 17/ Presumably it, too, inevitably uses the Pick-Sloan plan as a datum for its activities, which may prove to be rather hazardous if reservoir siltation exceeds the anticipated

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16/ See, for instance, Minutes of 42nd Meeting of Missouri Basin Inter-Agency Committee, July 20, 1950, where Stone states that the trans-continental projects of Colorado-Big Thompson and Blue South Platte are authorized by an agreement prohibiting the use of such diverted waters outside the State of Colorado.

17/ See 1935 Act establishing the Commission.

rate, and if other aspects of the hastily-planned program fail to materialize. 18/

(3) IOWA

Iowa Natural Resources Council 19/

The Council was created in 1949 by the 53rd State General Assembly "to correlate and vest the powers of the State in a single agency with the duty and authority to establish and enforce an appropriate, comprehensive, state-wide plan for the control of water and for the protection of surface and underground waters of the State. The Iowa Natural Resources Council was created as the agency of the State government to promote the policies set forth in the act and to represent the State of Iowa in all matters within the scope of the act."

It is composed of seven members, electors of the State of Iowa, appointed by the Governor with approval of two-thirds of the Senate. They serve on a part-time per diem basis.

Its functions include the establishment of a comprehensive state-wide program of flood control, conservation, development, and use of the water resources of the state. It is authorized to perform its duties as to flood control in cooperation with other states or agencies thereof

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18/ C.f., for instance, the anticipated hopes for irrigable acres before and after detailed investigations in the Crosby-Mohall unit and the Moreau River lands. See Report of Third Meeting, June 28, 1950, North Dakota Natural Resources Council, and Minutes of the 38th Meeting of the Missouri Basin Inter-Agency Committee, March 23, 1950, p. 6.

19/ See "Report of the Iowa Natural Resources Council for the Biennium ending June 30, 1950."

or with the United States or any of its agencies. It shall conduct hearings, approve local projects, private or public, and its decisions shall be subject to the judgment of Iowa courts in the event of grievances.

"When the effects of a proposed project extend beyond the boundaries of this state, the Council, in consideration of the proposal, will view it as a part of the National Flood Control and Water Flow Retardation and Soil Erosion Prevention Program to which the people of the United States are presently committed."

The Council is responsible for reviewing and criticizing federal projects submitted under Section 1 of the Flood Control Act, 1944. The Council reported in 1950 that it must be able to command larger funds if it is to perform its statutory obligations.

This mechanism enables a continuous liaison between the state and federal agencies to be maintained on all aspects of resource development. This is desirable if effective reports on federal plans are to be prepared. It also places responsibility for the state program squarely upon the Council and ensures that this program, at least theoretically, will be consistent with federal programs. It does not encourage inter-agency contact, nor does it alter the basic position of the state as an accommodation party to the federal government.

(4) KANSAS

Kansas does not have a state-federal coordinating committee.

The Division of Water Resources of the State Board of Agriculture has been designated as the Governor's representative under Section 1 of the 1944 Flood Control Act. It deals with irrigation, drainage, flood

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control and related problems of the conservation and utilization of the water resources of Kansas.

There is also, in accordance with the provisions of a House Concurrent Resolution of the Legislature, a Special Advisory Committee of which the Chief Engineer (Division of Water Resources) is Chairman. This Committee reviews reports which are submitted to the state and advises the Governor in these matters.

(5) MISSOURI

State Commission of Resources and Development

The Commission was established by House Bill 502, 62nd General Assembly, to advance the economic welfare of the people through programs and activities, to develop both the State's natural resources and opportunities for gainful employment and the pursuit of happiness.

It consists of ten members appointed by the Governor with the advice and consent of the Senate; five to be from the party casting the highest number of votes for Governor at the last election, and five from the next highest party in the same election. They shall represent a cross-section of the economic and geographic composition of the state, and they shall be of known experience and interest in the development of natural resources.

The duties of the Commission, among others, shall be to investigate, assemble, develop, and study all information available regarding the economic resources and industrial possibilities of the state; to plan for the coordinated development of these possibilities for the welfare of the people.

The Missouri Division of the Commission is designated to coordinate

and review federal plans for flood control. This group, along with members of the University of Missouri, the Corps of Engineers, and the Bureau of Agricultural Economics has produced an outstanding report on the local effects of a reservoir upon the farm families and enterprises forced to move out of the area due to be inundated. 20/

Missouri State Inter-Agency Committee

This is an informal organization composed of the following state agencies: Department of Agriculture, Division of Health, Highway Department, Conservation Commission, Park Board, College of Agriculture, University of Missouri, State Geologist, and the Division of Resources and Development.

This Committee advises on planning and coordination within the State. Representatives of the federal agencies are often invited to attend if the agenda is of interest to them or if their advice is desired.

(6) MONTANA

Montana Natural Resources Council (formerly the Montana Missouri Basin Council of State and Federal Agencies)

The organization was formed October 6, 1948, with membership limited to State and Federal operational and developmental agencies legally authorized to participate in the resource conservation development and use in the Missouri River Basin of Montana. Fourteen State and nineteen

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20/ "Local Effects of the Wappapello Reservoir, Wayne County, Missouri, with Suggestions for Lessening Undesirable Effects of Reservoirs," Missouri Division of Resources and Development, Jefferson City, Missouri, Feb., 1950.

Federal Agencies were recognized as members. Its functions are to facilitate the coordination of the work of its member agencies and bring about among them a well-balanced, well-timed, integrated program of activities leading to the development of all the resources of the Montana portion of the Missouri River Basin. It has no statutory existence and is purely a voluntary organization. The secretary is a faculty member of Montana State College.

The Council meets roughly six times a year at various places in the state.

There seems to be some evidence that the Bureau of Reclamation has been one of the strongest supporters of the group since its inception. The Bureau's oft-voiced insistence that State agencies should play the leading parts in the Council sounds a trifle patronizing when the respective powers of the two groups are compared. To the outside observer, this would seem to be a small price to pay for better public relations for the Bureau.

There also seems to be some evidence that hopes were high and dissatisfactions lively in the early stages. Sub-committees were established to consider such problems as "the inefficient use of time and effort through more than one agency gathering the same data," "apparent duplication of effort in soil surveys," "the need for agreement on a standard uniform base map, including aerial mapping," "financial assistance available to farmers on new irrigation projects," "the formulation of a clear-cut statement regarding Missouri Basin development as a basis for education." The reports issued by these sub-committees create a combined

impression of sanity and futility. Take, for instance, the report on "Soil Surveys and Land Classification." The statement is made that the duplication of effort is more apparent than real because surveys and classifications are carried out for different purposes and are difficult to coordinate either technically or administratively. The next sentence of the report explains that the results of a meeting of Soil Scientists at Lincoln, Nebraska, were incorporated in the Missouri River Basin Agricultural Program, 21/ where a program of "basic soil surveys" is presented for Congressional approval.

The sub-committee on maps and mapping came to the conclusion that maps are prepared to do specific jobs, and the needs of different agencies vary greatly. They concluded that there was no such concept as a "uniform base map," 22/ and that some central machinery for collating and disseminating map information was desirable. The rub is, however, that insofar as an agency is not willing to participate in this way, it can, without fear of contradiction, say that its funds cannot be used for such a purpose.

The "Agricultural Credit" sub-committee brought its task to a successful conclusion because it was limited to the assembly of information.

The sub-committee on "Education and Information" reached an impasse

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21/ House Document No. 373, 81st Congress, 1st Session.

22/ This seems fallacious, unless it means that no one map will satisfy everybody, in which case it is a truism.

(January, 1951). After collecting most of the material for an educational pamphlet, the various agencies concerned seemed unable to agree upon the size of the contribution relating to their individual activities which was to be included in the final statement. Finally, some compromise was reached, and the publication will presumably be issued. (June, 1951)

What useful functions, then, does the Council perform?

It does provide a forum for the discussion of inter-agency problems and the presentation of information not otherwise freely transferable, but how far the results of the discussions are incorporated into the programs of each agency is a very moot point. It also provides an opportunity for the meeting of the individuals responsible for different aspects of the programs in the respective agencies. This seems very desirable.

The impossibility of seeing any results from the meetings is bound to breed a feeling of frustration and apathy among the individuals who attend.

Montana State Water Conservation Board

The Board is an agency of the state created at the 23rd Extra-Ordinary Session of the Legislature in 1933-34. The Board was created because the Legislature declared "that the public interest, welfare, convenience, and necessity require the construction of a system of works... .....for the conservation, development, storage, distribution, and utilization of water." (Section 89-101) It has considerable powers to regulate water development and may undertake construction activities. It is at the present compiling a centralized inventory of water rights. Its

projects represent 26.7 percent of the total acreage irrigated in the state. It is authorized to cooperate with federal agencies in all aspects of water resource use and development and to participate in Basin Inter-Agency Committees.

(7) NEBRASKA

Nebraska Coordinating Committee for Missouri Basin Resource Development

The Committee was established in January, 1950, and is composed of representatives of state and federal agencies. The agencies include the Bureau of Reclamation, the Corps of Engineers, and Soil Conservation Service, Federal Power Commission, Bureau of Agricultural Economics, Forest Service, and the following state departments: Roads and Irrigation, Fish and Wildlife, Agriculture, Health, and Resources, and the University of Nebraska.

Meetings are held monthly under the chairmanship of the Dean of Agriculture, Nebraska State College. The major function of the Committee is to secure greater coordination between the agencies and to review programs underway. One sub-committee has been set up to study the impacts of resource development upon local communities.

In passing it should be noted that the Constitution of Nebraska places water for agriculture as a superior use to water for power. This provision may introduce some nice problems of coordination.

As in the case of Montana, the Committee is voluntary and has no executive authority over state or federal plans. It, therefore, suffers from similar disabilities.

(8) NORTH DAKOTA

North Dakota Natural Resources Council

The Council was established in September, 1949, and is composed of state and federal agencies interested in river basin development. These include the Bureau of Reclamation, Farm Credit Administration, Farmers Home Administration, Fish and Wildlife Service, U. S. Geological Survey, Bureau of Mines, National Park Service, Production and Marketing Administration, Public Health Service, Corps of Engineers, Soil Conservation Service, and the Weather Bureau. The state agencies include the Fish and Game Department, Health Department, Research Foundation, the Water Conservation Commission, and the North Dakota Agricultural College.

The Council is a voluntary organization and has no statutory authority. Like the Montana Council and the Nebraska Committee, its activities are limited to statements on local aspects of the Pick-Sloan Plan and discussion of the operational details.

The secretary is a faculty member of the State Agricultural College.

North Dakota Research Foundation

The Foundation was established by act of the North Dakota Legislative Assembly in 1943 "for the purpose of executing a program of research designed to develop the natural resources of the state." The law provides that the Research Foundation shall include the members of the State Industrial Commission (the Governor, Attorney General,

and the Commissioner of Agriculture and Labour) Dean of the School of Engineering of the State University, the Dean of the School of Agriculture of the State Agricultural College, one citizen of the state primarily interested in agriculture, and one citizen primarily interested in the mineral resources of the state. The Director of Research was appointed by the Foundation.

The Foundation had a part in securing the U. S. Bureau of Mines Lignite Research Laboratory in the state.

It gathers and disseminates data concerning the resources of the state, and to this end it has published five informative reports. In five years it has assisted in the establishment of eight new industries, including the processing of potatoes, flax, alfalfa, sodium sulphate, and lignite. It has spent $100,000, and the state has received a $330,000 investment, employment for eighty-four people, an annual payroll of $175,000, a new annual market for $425,000 worth of raw materials, and new products to be marketed at $850,000 per annum. 23/

State Water Conservation Commission

The Commission consists of the Governor, the Commissioner of Agriculture and Labour, and five other members appointed by the Governor. It has been designated by the Governor for the coordination of federal programs under Section 1 of the 1944 Flood Control Act. Its functions appear to be analogous to those of the Colorado Water Conservation Board. (See pp. 93-96.)

23/ See statement by the Director of Research, undated, in the writer's possession.

(9) SOUTH DAKOTA

South Dakota Coordinating Committee for Missouri Basin Development

The Committee was established in June, 1949, and is composed of interested state and federal agencies. The Committee has no statutory existence nor executive power. Its functions are limited to the discussion of program implementation, the meeting of individuals representing different state and federal agencies, and the establishment of sub-committee groups. Sub-committees on Indian Affairs, Artesian Wells, and Recreation and Wildlife have produced workmanlike reports.

In October, 1950, the Committee outlined a draft enabling act for the control of ground water supplies which it proposed to present to the State Legislature for approval. 24/

On the face of it, this appears to be an able and virile organization, making sound recommendations and discussing important problems intelligently. It has the support of the Governor, often in person, and the services of the Natural Resources Commission, the executive secretary of which serves as Committee secretary. In addition, it meets once a month, always at the State Capitol.

South Dakota Natural Resources Commission

This Commission was established as a state agency in 1947.

The Governor heads the Commission, which has several paid employees.

24/ "Outline for Enabling Act for the Control of Ground Water Supplies," prepared by the Sub-Committee on Artesian Wells, October, 1950.

The activities of the Commission are research, general publicity 25/ and promotion, field and contact work, river development work, and administration to implement its function, which is to "formulate and adopt a plan or plans for the coordinated development, conservation, and use of these resources in ways that will promote and advance the economic welfare of the people of the state."

The Commission has been designated to represent the Governor in coordinating activities under Section 1 of the 1944 Flood Control Act.

(10) WYOMING

The Wyoming Planning and Water Conservation Board was abolished by Act of the 1951 Wyoming Legislature when they enacted Chapter 73, Session Laws of Wyoming, 1951, creating the Wyoming Natural Resources Board. Section 10 of this Act sets forth the duties and powers of the Board, which empowers them to act in a coordinating capacity with federal agencies.

There appears to be no state and federal agency council in Wyoming.

The constant use of the word "coordination" by the agencies mentioned

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25/ The absence of inter-state coordination, and the existence of minority behaviour, as described in an unpublished work by Carl F. Kraenzel, Montana State College, is indicated by the following statement of the Commission's Executive Secretary to the Appropriations Committees of the 1950 South Dakota Legislature. He said: "Persons this Commission have contacted in the East about industrial location in South Dakota have more often than not never thought about the state in this connection. Many of them think South Dakota is a state having only Indians and space. Many of them confuse South Dakota with its neighbouring state, North Dakota."

in Chapter IV and by the groups described above suggests that its repetition may, in fact, be a form of semantic self-deception. To test this hypothesis, and by way of concluding this chapter, a brief attempt will be made to evaluate the degree of coordination which exists among states and federal agencies on the basis of three assumptions:

(1) Coordination is defined as adjustment and harmonization. It is a process based on cooperation (with or without coercion, though it is suggested that some authority must be involved in any "free" society) and correlation leading to integration. 26/

(2) That the existing resource development program for the Missouri Basin will continue substantially unmodified, except as a result of its own inadequacies. This assumption is realistic on the basis of federal agency competition over the responsibility for the plans and on the basis of Congressional approvals so far.

(3) That the most that non-statutory and/or loosely-defined coordinating measures can do is to modify relatively minor operational details. This assumption would seem to be realistic on the basis of the historical evidence at present available.

The provision of Section 1 of the 1944 Flood Control Act for the protection of state interests has led to the use of two types of organization:

(1) The state agency designated to represent the Governor in his

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26/ See Renne, R. R., Land Economics, Harper and Brothers, New York, pp. 713-14.

dealings with the activities of the federal agencies in the state.

(2) Loose and non-statutory groups of representatives from interested state departments and federal agencies, as in the case of Montana, North Dakota, South Dakota, and Nebraska.

If the first assumption is acceptable, then it would be fruitful to test the effectiveness of these two types of coordinating devices against this assumption.

The designated agency has the right to participate in the drawing up of plans, though this was not the case in the preparation of the Pick-Sloan Plan except by way of Congressional Hearings. There is no guarantee that the federal agency will adopt the state's recommendations, and there is no real evidence that Congress, as the ultimate coordinator, will be favourably disposed to the state's interests. Moreover, the state agency is by definition concerned with state interests, and it would be doing less than was expected of it if it did not press its case, even at the expense of other states in the basin or the nation as a whole.

The designated state agency also has the right to be consulted about the operation of an approved program insofar as it affects the state. This means, in effect, that after the approval of a federal plan, the state agency may seek, by political means, to influence in its own favour the operation of the plan within the state. This situation might be regarded as indeterminate in the sense that the final position along the Edgeworth contract curve is indeterminate in a case of bi-lateral monopoly. But there is no doubt that the final locus will be nearer to the state's point of origin than it will be to that of the

federal agency. The position of Colorado may be better than the average because of the leadership and experience of Judge Stone. 27/ This process, as stated above, 28/ is little more than making the best of a bad job by the state.

The non-statutory organizations of state and federal agencies cannot be called coordinating groups. They may be called cooperative groups in the sense that the representatives meet in a friendly and conciliatory manner, or correlating groups in the sense that they discuss the inter-relationships which are inherent in the Missouri Basin Program as at present operated. Both these features are desirable and necessary, a fact which has been pointed out above. 29/ Coordination, as defined, means the selection and rejection of alternatives in order to secure integrated action. This must involve some authority, since all conflicts are not resolved by mutual and ungrudging compromise. The only authority in these voluntary groups is vested in the federal agencies by virtue of their Congressional mandate. It is because this is so that the federal agencies, particularly the Corps of Engineers and the Bureau of Reclamation, appear to be enthusiastic supporters of the arrangement. They have nothing to lose in that they do not surrender any of their sovereignty, and they may stand to gain through increased good will, fertile ideas, and possibilities of simplifying their operations by

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27/ Vide supra, pp. 94-96.

28/ Vide supra, p. 96.

29/ Vide supra, p. 104.

enlisting the aid of a state agency. An example of this is an arrangement between the Corps of Engineers and the Montana State Park Commission, whereby the latter operates and maintains the recreation areas of Fort Peck after the provision of basic facilities from the Engineers' funds. This example illustrates that the advantages of cooperation do not accrue entirely to the federal agency.

If we accept a situation in which these voluntary groups have a place, it might be well to emphasize those qualities which make for their success. In most cases, the State Colleges take an active part, and this is clearly desirable, particularly in their close connection with the Extension Services. The frequent presence of the State Governor, as in the case of South Dakota, is greatly facilitated by holding meetings in the state capitol, and it raises the morale of the group. The existence of a permanent state agency actively engaged in the study and promotion of resource development, again as in South Dakota, can provide a continuous and informed liaison between the paid employees of both state and federal agencies. Finally, as in most organizations, the quality and enthusiasm of the participants is all-important in the effectiveness of the group.

The second and third assumptions on page 110 limit the application of the first assumption to current practice. If they are dropped, an entirely new situation arises, and the whole concept of the responsibility for resource development must be reconsidered in the light of new alternatives, e.g., a valley authority or the suggestion of the President's

Water Resources Policy Commission Report. 30/

This is so because if state participation in federal resource development is desirable, it must, to be effective, occur during the actual planning process. Thus, by gradually building up from the local to the national interest, through the chain of desires and possibilities, a plan is adopted. It will then be put into more effective operation because there has been participation at all levels in its creation. It is most unlikely that this kind of planning process can exist under the existing institutional framework.

30/ President's Water Resources Policy Commission Report, op. cit., Vol. I, pp. 52 - 53.

Chapter VI

RESERVOIR SILTATION

It was suggested in Chapter I that the social and economic structure which is likely to arise in the Missouri Basin on a framework of water impoundment and controlled release might be quickly undermined by a failure to control reservoir sedimentation.

The danger has received considerable public recognition, and the following statement by H. H. Bennett in 1943 is worth quoting: "Many reservoirs that are vitally important.....are losing 1, 2, 3, and 5 percent of their capacity every year because of silting.....In some exceptional cases, important reservoirs have filled up in from one to five years..... The annual cost (1943) of reservoir silting is upward of fifty million dollars.....recently.....silting.....in certain Southern states reduced electrical production by ninety million K.W.H.'s. Water supply for many communities is in danger because their reservoirs are one-quarter or one-half filled with sediment." 1/ It is recognized that soil conservation has in H. H. Bennett a messianic advocate, but his opinion deserves respect.

More recently, the author of the Sloan Plan said, "If we are going to solve the problem in a positive manner and with assurance of success, we must realize that we are attempting to stop a geologic process and that

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1/ Foreword to "The Control of Reservoir Silting" U.S.D.A. misc. publication No. 521, Washington D. C., Aug., 1943.
See also Table IX of Appendix A for siltation figures of selected reservoirs in the West.

is going to be done only at an enormous cost." 2/ This is an encouraging change in the conception of the process, by planners. It is also a revealing statement by a man who proposed approximately eighty-seven dams for the Missouri Basin in Senate Document No. 191. An examination of thirteen of these dams, for which project data were available in 1948, 3/ shows that none makes provision for siltation beyond the allocation of a percentage of the reservoir capacity for dead storage. 4/

The following quotations from a paper in the writer's possession, prepared by a sediment specialist of the Bureau of Reclamation, demonstrates what seems to be a very negative attitude to the problem. "The useful life of a power reservoir is not terminated when it becomes three-quarters or entirely full of sediment. The dam is still performing its original function as a power drop. Stream regulation is lost and the firm power is now dependent on the minimum run-off. In sediment-laden streams the effect of sediment on power installations may create maintenance problems, and methods for sediment control may have to be initiated before the reservoir becomes entirely full.....It can be readily seen that the useful life of a reservoir cannot be fixed within definite periods of time.

2/ Minutes of the 41st meeting of the Missouri Basin Inter-Agency Committee, June 29 and 30, 1950, Sloan, W. G., "The Silt Problem in the Missouri Basin," Appendix C, p. C-10.

3/ "Reclamation Project Data," U. S. Dept. of Interior, Washington, D. C., Dec. 8, 1948.

4/ It is realized, of course, that the agency for whom Mr. Sloan prepared his plan has no authority over watershed control.

The ultimate termination of its useful life is elusive. Even when it cannot serve the functions for which it was designed, there will undoubtedly always be a small pool near the dam from which fish, wildlife, and recreational benefits will be obtained as long as the dam remains."

A similar position is outlined in a letter, also in the writer's possession, from the Army Engineers. It says: "In considering the economic life of projects such as those under discussion here, it is normally assumed that the useful life (of a dam) is from fifty to one hundred years. While there are numerous reasons for this assumption, the principal one is the impracticability of predicting the future needs further in advance. Therefore, the justification of a project-ratio of benefits to costs is determined on such a basis, disregarding a probable actual physical life far in excess of the assumed limited economic life." In passing, it might be mentioned that the present value of increments to the total value of benefits from a dam, discounted at 3 percent to infinity, are negligible after one hundred years.

It is suggested that such philosophies spring very largely from the history of America over the last one hundred years. In this period, technological changes were profuse. They created a belief in progress and a belief in the invincibility of man's technics when faced with problem situations. Norbert Wiener 5/ says that if an assessment of the direction

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5/ Wiener, Norbert, The Human Use of Human Beings, Houghton Mifflin Co., Boston, 1950, p. 20. Wiener is a mathematician at the Massachusetts Institute of Technology, who has been actively concerned with the development of "thinking machines."

of change is made in terms of statistical mechanics, the tendency of the world as a whole is downward. Of the depletion of American resources, he says: "I repeat, there is not the slightest assurance that when the need for a new product or process arises, we shall find it at hand; and failure of this replacement even in one important case may be fatal to humanity." 6/ Of belief in progress he says, "There is a certain cheap optimism in vogue among the more conservative sort of economists, which says substantially that because we have not yet been consumed by calamity, we never shall be." 7/ On the prospects of present research, he has this to say: "It may be thought that the development of invention from a sporadic manifestation of ingenuity to a large and universal technique has been solved by the great industrial laboratories and by the employment of the mass attack. This is not so. Valuable as the great laboratory is, it is at its best in the process of development of ideas already open to inspection, and at its worst and least economical in the origin of new ideas. That it stood us in such good stead during the war is due to the fact that at that time we had a huge inventory of past science, not as yet employed for inventive purposes. Already this inventory is beginning to run low. To replace it, we need a range of thought that will really unite the different sciences; shared among a group of men who are thoroughly trained, each in his own field, but who also possesses a competent knowledge of adjoining fields." 8/

6/ Ibid., p. 42.

7/ Ibid., p. 53.

8/ Ibid., p. 57.

Let us examine the nature of what appears to be a serious problem though not, in the opinion of the Bureau of Reclamation and the Army Engineers, a very urgent one.

The basis of the Missouri Basin Program is the regulated use-flow of a very irregular drainage system. This regulation is achieved by the erection of a series of dams. These dams are, for economic reasons, located at the best available physical sites. This does not mean that all of the best sites are to be utilized because their location is also determined by the use to which the impounded water is to be put. For instance, if a suitable irrigable area and a suitable dam site are conveniently juxtaposed, a dam is likely to be erected. On the other hand, a good physical site may be passed over if it is far removed from potentially irrigable land and power consumption areas and is not required for flood control. However, the best sites, physically and economically, are undoubtedly being utilized in the present program. Once their usefulness for their planned purpose is gone, any replacement developments, if they are available at all, will have to be in less favourable sites.

The durability of the dam structure itself would appear to be much greater than its useful life in most cases, though costs of maintenance would undoubtedly increase with time.

As already mentioned, most reservoirs have a dead-storage pool. Its size is determined by the following factors:

(a) A basic life of fifty years which is the minimum useful span acceptable to both the Bureau of Reclamation and the Army Engineers.

(b) Calculations as to the amount of silt carried by the feeder flows in relation to the total capacity of the reservoir

(c) Its purpose

(d) Its anticipated amortization period

However, the various methods of siltation measurement, i.e., suspended sediment records, and experiment station measurements are subject to quite large errors, particularly in the estimation of the amount of bed load transported. 9/ The error is usually one of underestimation, which may seriously invalidate the estimated length of useful life of a reservoir. The measurement of silt which has actually accumulated in a reservoir is still a very inexact science, but the following examples of siltation may be illustrative: "In the two following cases, the siltation rate appears to be alarmingly high. At Boulder Canyon, silt is accumulating at the approximate rate of 125,000 acre-feet per year (equivalent to 195 square miles, 1 inch deep) which would result in the filling of the space reserved for silt within twenty-six years from the first year of operation--1936. (Derived from Bureau of Reclamation Justification Book for fiscal year 1949.) The siltage rate at the Fort Randall project in South Dakota.....is estimated to be 65,300 acre-feet per year (after the Garrison Dam has been built upstream), which is equivalent to 102 square miles, 1 inch deep, and indicates that the space reserved for siltation would be filled within twenty-one years. (Derived from project reports,

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9/ See Brune, Gunnar M., Sedimentation Specialist, Region 3, Milwaukee, Wisc. of the Soil Conservation Service, "Rates of Sediment Production in Midwestern United States," revised Dec., 1948. SCS-TP-65, pp. 8-14.

Corps of Engineers.)" 10/

There are six general methods of silt control: 11/

(1) Selection of the reservoir site
(2) Design of reservoir
(3) Control of sediment inflow
(4) Control of sediment deposition
(5) Removal of sediment deposits
(6) Watershed erosion control

Methods (1) and (2) disregard the possibility of changing the rate of sediment output from the drainage area or the control of deposition in the reservoir, but represent an attempt, by controlling location and size, to assure the longest possible useful life for the reservoir. This means avoiding sites where silt loads are high, and arranging for a suitable capacity-watershed ratio. Generally, reservoirs that have an original capacity of less than 25 acre-feet per square mile of drainage area are likely to have a high rate of silting, 12/ unless the rate of erosion per square mile is almost zero. The ratios of capacity in acre-feet to drainage area in square miles for some completed Missouri Basin dams are as follows: 13/

Canyon Ferry, power and regulatory storage	129
Shadehill, irrigation	33
Angostura, irrigation	24
Cedar Bluff, multiple-purpose (no power)	69

10/ See Hoover Task Force Report on Water Resources Projects, (Appendix K) Jan., 1949, Washington, D. C., p. 32.

11/ Most of the data on silt control are taken from "The Control of Reservoir Silting," U.S.D.A. Misc. Publication No. 521, Washington, D. C., August, 1943, pp. 21-158.

12/ See Table IX of Appendix A for data on selected dam sites.

13/ "Reclamation Project Data" U. S. Dept. of Interior, Washington, D. C., Dec. 8, 1948.

Methods (2), (3), and (5) accept a fixed rate of sediment production from the drainage area as well as a fixed size for the reservoir, but attempt by various means to prevent all or part of the sediment from being permanently deposited in the reservoir. These methods may be effected in the following ways:

(a) Raising the height of the dam to increase capacity. This depends on technical considerations, and may be the cheapest way of evading the silt problem.

(b) Settling basins. This is usually a temporary expedient at best, and the cost is likely to be more per unit of storage than the reservoirs they protect. A vegetative screen, e.g., Tamarisk, may be helpful and inexpensive.

(c) Desilting works. This poses the problem of disposing of the silt. The best-known works are at the head of the All-American canal at the Imperial dam on the Colorado River in California; 80 percent of the sediment is deposited and removed by continuous operation scrapers. The evacuated silt is discharged into the river downstream from the dam.

(d) Off-channel reservoirs. They may be quite economic, though would inevitably mean a reduction in water storage, which the semi-arid west could ill-afford to lose.

(e) Venting sediment flows may help, but this requires a special modification of the dam which could not be made easily after the structure was complete. The data on this technique is limited and the results are not necessarily satisfactory. In addition, neither the losses of water nor the supply of silt-laden water to irrigation units would be tolerated in the semi-arid west.

(f) Removal of sedimentary deposits by excavation, dredging, draining, and flushing, and sluicing are only economic alternatives under very special circumstances. The sale of sand and gravel if suitable markets were near at hand (these materials will not bear high transport cost) might cover some of the cost of excavation. Silt and clay are not easily marketable, and the problem of dumping them close to the reservoir (to keep down the cost) where they would be readily erodible under most conditions, is difficult to say the least.

Finally, draining, sluicing, and flushing, even when possible, would be subject to the objections that the water loss could not be afforded, and that the silt problem would be merely transferred downstream.

Method (6), which will be discussed in more detail later in the chapter, attempts to reduce the quantity of sediment reaching the reservoir.

Full consideration should be given to all six measures, depending on the circumstances. It appears that methods (1)-(5) are all directed at the effect rather than the cause, and, as such, can only be regarded as palliatives. They are normally expensive and create almost as many problems as they solve.

We are, then, forced to the conclusion that if siltation is a serious problem, it must be tackled before it reaches the reservoirs. This would suggest an approach along the following lines: 14/

(1) Limit the silt-bearing water reaching the drainage channels by

- (a) increased grass and forest cover
- (b) conservation-farming by stubble-mulch, strip cropping, terraces, contour ploughing, crop rotation, covercrops, windbreaks
- (c) conservation-ranching by controlled grazing. This might also involve new varieties of sod-forming drought resistant fodder vegetation
- (d) conservation-lumbering by selective cutting and new plantings

(2) Reduce gullying, stream bed and bank erosion, and the transport of silt by slowing down the speed of water flow, whether from rain storms or snow melt.

14/ The practical details of these measures are described in section III of the "Missouri River Basin Agricultural Program," House Document No. 373.

(a) this will be in part automatic, as the result of the measures under (1) above.
(b) physical checks, such as dams, by causing a backing-up of water slow down the rate of flow between dams. Small retarding basins have a similar effect, though they are likely to silt up rather quickly.
(c) increasing the length of the channel by rerouting would reduce the gradient.
(d) widening the channel reduces the speed of flow, but in an area where the flow fluctuates very considerably, this would create an unstable stream bed.
(e) irrigation development which will reduce and regulate the amount of water returning to the main channel.

(3) Reduce the effects of flow by consolidating stream beds and banks with revetments, rocks, weeds, cement, or other linings developed by such agencies as the Bureau of Reclamation. 15/

It should be quite clear that the foregoing approach emphasizes technical rather than economic possibilities. However, there are some hopeful indications in the field of economic possibilities.

First, silt control by good land-use management often constitutes little more than sound economic farm and ranch practice for the operator. Moreover, a great number of institutional devices for conservation practices are already in operation and could probably be expanded without too much cost. Organizations such as the Soil Conservation Service, the Production and Marketing Administration, state and federal grazing districts, Soil Conservation Districts, Irrigation Districts, and the U. S. Forest Service have already made substantial contributions to erosion control.

Second, the silt does not originate evenly throughout the drainage

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15/ See Benson, Jewell R., "Bury the Lining," in The Reclamation Era, Bureau of Reclamation, Oct., 1950, Vol. 36, No. 10.

area, either geographically or temporally. This means that some sections of the basin contribute little to the silt problem, and that full-scale controls need only be applied to selected areas. The following case is informative. 16/ The Big Horn River has always been considered one of the worst for silt discharge in the Missouri Basin. For the past three years, a daily record has been obtained of the silt discharge of the Big Horn River at rating stations near Thermopolis, about sixteen miles downstream from the Boysen dam, and at the tributary Five Mile Creek. The results may be summarized as follows:

	Year	Drainage Area in Square Miles	Water Discharge in Acre-feet	Suspended Sediment in Tons	Erosion Rate Per Sq. Mile of Watershed in A.F. Per Sq. Mile
Wind River Basin	Oct 1, '48 Sept 30, '49	8,000	+1,000,000	3,600,000	000.55
Five Mile Creek Basin	Oct 1, '48 Sept 30, '49	397	68,000 (approx. 6 percent of Wind River Basin discharge)	1,600,000 (approx.45 percent of Wind River Basin sediment)	+003.00
Five Mile Creek Channel	Oct 1, '48 Sept 30, '49	7	68,000	1,440,000 (approx.40 percent of Wind River sediment)	+300.00

16/ See Sloan, W. G., op. cit., pp. C-7,8,9.

This means that protective measures applied to a little less than seven miles of area could reduce the silt flow of the Missouri River at Omaha, Nebraska, by 1,440,000 tons per annum on average. In other words, treatment to .0021 percent of drainage area will reduce silt by .93 percent--a ratio of 1:300. In fact, if the silt is not kept in place, it will be deposited behind the Boysen Dam when it is completed, but the implication is clear. Further data on a similar creek in the Wind River Basin, Muddy Creek, reveals that two storms in three days during July, 1949, produced 50 percent of this stream's silt discharge for the whole year.

It cannot be inferred from the cases quoted above that all the silt in the Missouri Basin is derived from such relatively small and isolated areas. But it does suggest that when more detailed information is available, the problem may prove to be less gargantuan than it would appear to be from a cursory examination. Sloan's conclusion is not unexpected. "Since we made provision for silt deposition in our reservoirs, we have plenty of time to study the problem, and, if, one hundred years from now we will have found the answers to the whole problem, it will be in plenty of time, and, perhaps by then, we can afford to build the enormous works that will be required to stop this geologic process. But it will take intensive study for many years along the lines I have suggested before control of silt can really be said to have become a science." 17/ Perhaps three comments are appropriate.

17/ Sloan, W. G., op. cit., p. C-10.

It is neither necessary nor is it probable that aggradation and degradation will be stopped; their reasonable reduction is all that is required.

In the absence of adequate data, it is likely--making allowance for the optimism and sanguinity of the planner--that we may have considerably less than one hundred years in which to deal with the problem.

Sloan, throughout his paper, makes no reference to the movements of bed loads, which may be large and are difficult to measure.

It is ironical and perhaps tragic that the U.S.D.A., which is responsible for watershed management and which appears to be most alive to the problem, has not yet been able to secure Congressional approval for its "Missouri Basin Agricultural Program." 18/ This program contains provisions for extensive research into the reduction of water run-off and sediment 19/ though there is no indication of how much money would be earmarked for such a purpose. The Pick-Sloan Plan has been in operation for five years and there are at least twelve dams complete, yet a program which would almost certainly increase the capital value of these structures, among other things, is not yet underway. It is true that the U.S.G.S., the Bureau of Reclamation, and the Army Engineers have some silt recording

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18/ House Document No. 373, 81st Congress, 1st Session N.B., the statement by W. G. Sloan to the effect that the Department of the Interior is in full accord with principles and aims of the program, but that his department could not endorse the report as a whole due to conflicts of jurisdiction. See Minutes of the 32nd Meeting of the Missouri Inter-Agency Committee, July 21, 1949.

19/ Ibid., p. 142.

stations, but there is no systematic program which is coordinated or large enough to secure the necessary data. This conclusion is fully confirmed by the Report of the President's Water Policy Commission, 20/ which also stresses the shortage of data, in addition to its inadequate distribution.

This report also lists other costs of siltation, e.g., reduction of light for photosynthesis and the production of oxygen, destruction of fish foods, and the encouragement of fungus and vermin leading to disease and epidemics. These are some of the additional advantages which would accrue from a reduction of silt at its source, and they demonstrate the many-sidedness but essential unity of water resource development. This further reinforces the conclusion that all these aspects must be brought into a balanced relationship if development is to be sound.

The Report of the President's Water Resources Policy Commission does not, however, except by implication, treat the problem of reservoir siltation in relation to the social structure to be erected upon water control with the emphasis that their other findings would suggest. It does, however, advocate watershed management as the prime factor in silt control.

In Chapter I, pp. 13-14 of this paper, it was suggested that the real problem of reservoir silting, apart from the loss of dam sites, will be the progressive removal of the productive services upon which an economic and social structure has been built. Let us consider some of these 21/

20/ President's Water Resources Policy Commission Report, Vol. I, pp. 102-103.

21/ Ibid., p. 126.
Ibid., Vol. II, pp. 215-220.

possibilities in more detail:

(1) Loss of firm hydro-electric power. This could cripple an industrial machine attracted to the area by the lure of large blocks of cheap power. What are the possibilities of alternative sources of power being made available by the time the dams fail? The answer can only be that no one knows. Atomic power is still derived from a relatively scarce fund resource. Bertrand Russell has said that there is much concern lest the supply of uranium should run out before the human race has destroyed itself. No safe method of radio-active waste disposal is yet in sight. There are no large bodies of water suitable for power creation by temperature differentials. Direct use of solar energy by mirror concentration or photosynthesis seems to be a possibility, 22/ though no estimate of likely costs can be made and the whole idea is still very much in the theoretical stage. The basin has large deposits of lignite and bituminous coal (see figure 5) which might be the basis of a thermal generating system. However, the demands for synthetic fuel may have eaten into these reserves long before the need for substitute power is felt. Industry could move out of the area, but the social and economic cost might be very high and the whole purpose of Missouri Basin development would be undermined. Alternative power may be found, but at the present time it would seem to be very much of a gamble, and a careful husbanding of a flow resource would seem to be advisable.

22/ Ayres, Eugene, "Major Sources of Energy," an address before the American Petroleum Institute, Chicago, Nov. 8, 1949.

(2) Reduction of flood control. It can be argued that people who choose to live in areas liable to flooding should be prepared to pay the full price of their choice. However that may be, it is certain that if the Federal Government eliminates flood risk in an area thereby permitting its utilization for farming or building sites, and it then progressively allows the flood risk to rise again, it has a moral responsibility to bear all the resulting costs. This raises the question as to how far monetary repayment can compensate for the inconveniences of frequent flooding, the intangible losses of dislocation when people and firms finally move, and the loss of productive capacity and social services. This moral obligation may involve the government in some very costly subsidization.

(3) Reduction of irrigation water. The problems would be, in kind, not unlike those of (2) above. The establishment of small productive farms with homes, transport facilities, social services, processing plants, rural electricity and so on, is one of the cardinal points of the Missouri Plan. To create them and then fail to make adequate provision for their continuance seems a little short-sighted, to say nothing of the misuse of national capital. If the projects are to become derelict within the foreseeable future, then the resources had better be used where their amortization, in a physical sense, will be less catastrophic. Of course, it remains a possibility that national conditions will so change that such irrigation projects will not be needed in, say, fifty years. In this case, their dereliction need cause no serious misgivings; but there seems to be no way of anticipating such an event, so that it cannot be regarded as a planning alternative.

(4) Reduction in domestic and industrial water supply. In a region where water is seldom plentiful, e.g., the Great Plains, the growth of population and industrialization, which, it is hoped, will follow from the basin plans, may lead to a situation where all or nearly all the available water is allocated to one purpose or another. In this case, a slight reduction in the total supply would cause serious conflicts in any reallocation of water use and might lead to outbreaks which would make the old water rights and fence wars look like "kid stuff."

The Missouri Basin Plans are designed to make the region more diversified, stable, and productive economically. It is intended that a by-product of this development shall be increased populations and increased localizations of population. In other words, it is intended that the area shall become economically and socially strong and cohesive in its interrelationships with the Missouri River system. The resulting complex pattern of powerful social and economic forces might, if threatened by the deterioration of its basic resource, be strong enough to force the government of the day into measures based on political expediency and bearing no relation to a reasonably economic allocation of resources. If the "power" lobby, the "Engineers'" lobby, the "oil" lobby, and the "cattlemen's" lobby can sway Congressional decisions at present, it is not stretching the analogy too far to argue that Missouri Basin "industry," "flood control," and "irrigation" lobbies might similarly influence legislative action in favour of their special interests in the future, with a great deal more justification.

It is realized that any losses will appear gradually, but the longer the postponement of measures which attack causes rather than effects, the

greater will be the effort required to obtain stabilization.

In Chapter III an attempt was made to indicate the nature of the planning process. The formulation of alternative means-consequences relationships was emphasized as being an essential part of this process. It is now proposed, by way of an exercise in the technique, to present an example relative to the siltation of reservoirs. Let us approach the setting up of these relationships in the following way:

(1) The awareness, at an appropriate political or administrative level, that reservoir siltation constitutes a problem situation.

(2) The posing of the question "what's to be done about it?"

(3) The preparation of a schema showing alternative means for dealing with the problem situation and their probable total consequences. N.B., that the following suggestions as to means and consequences are not exhaustive--others could be outlined which may be equally pertinent--the reader is invited to share in the speculation. It is to be hoped that speculations at the legislative and executive levels will be grounded in more substantial evidence than has been adduced in this chapter.

(4) It will be assumed that in a democratic society, the ends cannot justify the means; it is therefore necessary to consider both means and consequences in the light of the assumed value premises.

ALTERNATIVE MEANS-CONSEQUENCES RELATIONSHIPS FOR A RESERVOIR SILTATION PROBLEM SITUATION IN THE MISSOURI BASIN

PREMISES

I. Assumed Value Premises:

(1) that an increasing standard of material and social welfare is desirable for a democratic nation

(2) that the "American way of life" is worth fighting for and that fighting requires a strong physical resource base. Among the aspects of the "American way of life" we might include such things as efficiency in both the private and public sectors, freedom of choice first as a right

and only second as a privilege, taxation to benefit the individual roughly in an over-all way proportional to the amount of his contribution

(3) that posterity should not be burdened excessively with the costs of present decisions either public or private

(4) that individual freedom may often be ranked above (1) and (3), depending on the circumstances

(5) that the policy of international cooperation pursued by the present Administration (June, 1951) reflects the values of the electorate, rather more than less

II. Factual Premises:

(1) general agreement that data on origins and amounts of silt being transported by the Missouri drainage system are inadequate

(2) some evidence that present measuring techniques are subject to substantial error

(3) some evidence that reservoir siltation may prove to be more rapid than had been anticipated

(4) substantial evidence that the removal of reservoir silt by current techniques is very costly in relation to the cost of creating storage capacity

(5) no evidence, only a statistical probability that an economic way of desilting reservoirs will be found

(6) Missouri Basin dams have a planned life of not less than fifty years, and some have a potential life of 500 years, but c.f. (1), (2), (3)

(7) some evidence that much of the silt may come from relatively small areas

(8) the number of available dam sites which are good both physically and economically is declining rapidly by present standards of evaluation

(9) the Missouri River Plan, authorized by the Flood Control Act of 1944, is being put into effect and at least twelve dams have been completed (March, 1951)

(10) not enough evidence to fully justify a judgment that the total cost of watershed control will be lower than the cost of reservoir desilting, having regard to land use values, and other social values which will be created thereby

(11) an inflationary situation and a rearmament program, (March, 1951) with other competing uses for federal capital

(12) an expanding population

ALTERNATIVE MEANS-CONSEQUENCES RELATIONSHIPS

Alternative A

means: allow the existing Flood Control Act of 1944 to continue with no new legislative provisions. (This would be generally consistent with the accepted functioning procedure of the federal government.)

consequences:

A(1) creation of economic and social values which are likely to be progressively undermined by the destruction of reservoir capacity. Services would probably disappear in the following order: (a) flood control (b) irrigation (c) navigation (d) hydro-electricity (e) water for domestic and industrial use (f) re-creation

A(2) temporary increase in the value of the national capital, economically and strategically defined. (This does not imply that the marginal efficiency of the capital to be applied will be the highest among alternative uses.)

A(3) possibility that social pressures will demand in the future, with moral justification, remedies which will be more costly, both economically and socially, than corrective measures planned and put into effect before that time

A(4) some possibility that alternative economic power sources will be developed to take the place of lost hydro capacity, but this is less true of alternatives for dam sites, irrigation projects, flood control works, water supplies for industrial and domestic use.

A(5) continued waste of land and water resources and of resources currently used in purifying streams

A(6) a probability that an increasing but temporary standard of material and social welfare will result for the Missouri Basin, but not necessarily for the nation as a whole

A(7) a probability that many of the problems resulting from the programs will be for posterity to solve

Alternative B

means: add to alternative A the authorization of the U. S. Department of Agriculture's "Agricultural Program for the Missouri River Basin" House Document No. 373, 81st Congress, 1st Session (this bill died in committee in 1950). (This would generally be consistent with the accepted functioning procedure of the federal government)

consequences:

B(1) a strong probability that the necessary data will be accumulated for properly evaluating the Factual Premises (1), (2), (3), (4), (5), (7), (10), and determining what corrective measures for A(1), A(3), A(4), and A(5) would be feasible; and a strong probability that some good results might be expected fairly quickly in relation to land use

B(2) in view of the rearmament program, the scale of the investment would require heavy bond purchasing/taxation/inflation/reallocation of government spending, in order that the program should not increase the present inflation nor hamper the rearmament program

B(3) this program would represent an investment with a long maturing period and may thus be a lengthy stimulus to inflation, though it might equally serve as a pump-primer in time of depression.

B(4) an increase in the potential production from forest, range, and agricultural land, though the short-run effects could be to reduce the forest and agricultural potential (timber reserves are sufficiently critical to merit serious concern)

B(5) increased departmental functional overlapping within the Missouri Basin, with resultant coordination problems

B(6) see A(2) above

B(7) see A(4) above, with the added possibility of the use of uneconomic dam capacity because public authorities usually regard the none-use of capital plant as economic "waste" under all circumstances

B(8) a probability that an increasing standard of material and social welfare will result for the Missouri Basin, but not necessarily for the nation as a whole

B(9) a probability that willing popular support for the program will be curtailed through inadequate "grass roots" participation in the planning stage

B(10) the possibility of widespread social controls over private activity to carry the program into effect, with the partial alternative of a substantial educational program to reduce the need for controls

B(11) a possibility that increasing retention of water where it falls may increase evapo-transpiration and cause profound changes in soil structures and water flows in relation to existing land and water uses.

Alternative C

means: add to alternative A a limited U. S. Department of Agriculture program to institute research into siltation and control and the assembly of all pertinent data. Funds to be guaranteed for a minimum of twenty years to secure adequate and continuous records. (This would be generally consistent with the accepted functioning procedure of the federal government, except for the fact that it is unconstitutional for a congress to pass legislation which is binding upon its successors; therefore, some alternative way of securing continuity of data collection would have to be divised. A government corporation might be one answer)

consequences:

C(1) the assembly of data, in the absence of which the evaluation of whether and what remedial measures are required, is largely speculation

C(2) a greatly reduced inflationary effect as compared with means B

C(3) allowing a probable waste of land and water resources to continue until the data is assembled. If a program is finally necessary, siltation may be well advanced before the plan is effective

C(4) no real increase in the problem of departmental coordination within the Missouri Basin

C(5) see A(2) above with a greater increase due to the more adequate data, though still smaller than the consequence B(6) because of the absence of watershed protection measures

C(6) no guarantee that the data will lead to congressional approval of a program, though there will be an improvement in its chances of success

Alternative D

means: the authorization of a Missouri Valley Authority. (There is some possibility of a shift in democratic freedom from its nature as a right to the nature of a privilege. As yet there is no clear cut evidence that the Valley Administration is the most desirable method of reconciling efficiency in resource development with social and political individual freedoms of choice)

consequences:

D(1) the full responsibility for the development of the basin as a whole, which should include an early and complete examination of the silt problem and an increased flexibility in the allocation of funds in an appropriate order of priority

D(2) other consequences would be more appropriately considered in a means-consequences schema on possible alternative types of administration

Alternative E

means: allow the existing Flood Control Act of 1944 to continue with no new legislative provisions. But institute a Point-Four Program of the magnitude of the U. S. Department of Agriculture's Program for watershed control, on the assumptions that without it there will be a catastrophic war soon, which will make all discussion of siltation in fifty years entirely academic; and that a Point-Four Program will greatly reduce this possibility. (This would be generally consistent with the accepted functioning procedure of the federal government)

consequences:

E(1) see A(1)-A(7) above

E(2) other consequences would be more appropriately considered in a means-consequences schema on the allocation of federal investment between domestic and foreign alternatives

Chapter VII

EVALUATING THE VOLUME AND DIRECTION OF FEDERAL INVESTMENT IN RESOURCE DEVELOPMENT

I. The Problem Situation

How should federal money be invested? Why should a sparsely populated area of the nation receive more federal investment per capita than a more populous one? Should the people who receive the benefit from a federal investment be compelled to pay full amortization charges? These questions, and many more of the same species, spring from public reaction to federal programs such as the Missouri Basin Development Plan. In some cases the questions are no more than expressions of envious criticism that development is taking place in some area other than that in which the critic is interested. In other cases the questions are intended to cast, by implication, aspersions on administrative "New Dealism." In still other cases, and these are the most important from the point of view of this paper, there is serious concern over the way in which the volume and direction of federal investment is determined in relation to the nation's needs and resources.

Here, then, apparently, is a problem situation which will be narrowed down, for analytical purposes, by the use of the following four assumptions.

The preamble to the United States Constitution sets out the major objectives of government policy, and the first assumption will be that the activities of the government are in fact directed to the following ends: "We the people of the United States, in order to establish justice,

insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and to our posterity, do ordain and establish this Constitution for the United States." It is true that the Constitution was designed to prescribe more than just the activities of the federal government, but this does not invalidate its use in connection with our problem of federal resource development. The President's Water Resources Policy Commission supports this view when it says: "The federal government is clearly charged with responsibility for safeguarding and developing our resources, but it is only one of the agencies involved." 1/

It should also be emphasized that the constitutional statement of objectives can be no more than a first approximation, because the words can be interpreted in as many ways as there are men, and their definitions also depend on the social context at any given time; they are not immutable, as many people, for a variety of reasons, would like to believe.

The second assumption is that federal investment in resource development is "normal," i.e., customary, habitual, (and, therefore, probably, though not necessarily, desirable.) This seems to be a fairly realistic assumption on the basis of U. S. history and existing program authorizations and appropriations. The critics of contemporary federal resource development conveniently ignore the fact that American industry was built up behind a tariff barrier--still extant though somewhat truncated--which represented a forced saving (and investment) of the nation as a

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1/ President's Water Resources Policy Commission Report, op. cit., Vol I, p.8.

whole. This undoubtedly benefitted certain groups relatively more than it benefitted the total population. A similar calculated silence surrounds the railroad land grants, which represented a government investment benefitting some people relatively more than the rest. It is not suggested that these two instances are analogous to present development programs--many other examples could be given which are--but they are certainly illustrative of a long-established policy of government sponsored and publicly financed resource development (in terms of potential alternatives foregone). Continued federal investment seems likely, though as projects become more marginal in the strict economic sense, i.e., in terms of the theory of the firm, (it will be argued later that this theory is not applicable in its entirety to federal investment) opposition will undoubtedly grow, and purely political considerations may play an increasing part in future decisions.

The third assumption constitutes the writer's opinion as to the essential nature of the problem situation, which is that because every tax paying member of the United States is obliged to contribute to the costs of resource developments, he or she is entitled to a maximum possible return on his contribution in the long run, which is in some measure proportional to the size of his contribution. Such an assumption involves a consideration of the following critical factors:

(1) investment alternatives in relation to

(a) space
(b) function
(c) magnitude
(d) time

These factors cannot be adequately examined except in conjunction with

(2) investment returns in relation to

(a) economic values
(b) social values
(c) political values

The final decision on a federal investment is a part of the socio-economic and political framework of the United States, and is only partly explicable in strictly economic terms, which alone—though to a limited extent—are capable of quantitative assessment. Arthur Lewis states the situation in the following way: "Consider the inhabitants of the hamlet of Little Misery, who live on the ledge of a high hill, and whom it is exceptionally costly to supply with water, gas, electricity, frequent transport, bread, milk, and postal services. There are arguments in favour of the community deciding that these unfortunate people should be helped by subsidy to the amenities of life; there are also arguments in favour of making the silly fatheads pay the full cost of choosing to remain in such an inaccessible spot. But they are not economic arguments, and economics cannot decide them." 2/ However, it may be pointed out that the economic arguments will represent, in greater or lesser degree, a part of the evidence on which the normative decision is based. These factors suggest that the problem of how the third assumption can be most nearly realized is not capable of being quantitatively measured. However,

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2/ Lewis, W. Arthur, Overhead Costs, George Allen and Unwin, London, 1949, pp. 185-6.

this need cause no serious anxiety, provided that the nature of the problem is understood and that adequate information and tools of analysis are available to the persons responsible for taking the major decisions.

On the fourth and final assumption that decisions as to the volume and direction of federal investment will continue to be made willy nilly, the information and tools of analysis which can aid intelligent decisions will now be examined, with particular reference to the Missouri Basin Development Program.

It seems desirable, for analytical purposes, to distinguish between two types of problems which face the planner, particularly at the national level. The first relates to existing urgent maladjustments in society, such as heavy floods or cyclical depressions; the second relates to real or imagined long-run maladjustments between needs and resources, such as declining timber and oil reserves. However, there is one objective for society which must take cognisance of both these maladjustments, and that is homeostasis, as used by K. E. Boulding, i.e., the maintenance of its (society's) assets. In general terms, this is no more than the will-to-survive of the living organism. This concept is exceedingly valuable because it implies that the life of a society is longer than that of any of its individual members. The mere fact of parenthood makes highly probable the taking by parents of decisions whose effects can only be enjoyed directly by the children. Moreover, the concept can be given an omnibus quality which includes everything from sheer physical survival to the perpetuation of such a nebulous abstraction as "the way of life," even when "the way of life" includes a notion of "progress." Homeostasis,

then, provides the first parameter for governmental action. However, inasmuch as a society's will to survive is dependent upon individual wills to survive, it follows that the individual must believe that his society gives him or has the potential to give him an environment which is, by and large, closer to his preference than any other of which he is aware or to which he can move. So long as any substantial section of the population is acutely dissatisfied with the inability of society to allow him the possibility of realizing his preferences, then to that extent his will to contribute, by whatever means, to society's homeostasis is likely to be diminished. Something of this kind occurred in France in 1940, when a large proportion of Frenchmen neither had the will to perpetuate their society by force of arms, nor the confidence in its ability to survive in a total war. The spread of communism since 1917 may be attributed to the dissatisfaction of large, and sometimes not so large, frustrated groups, cunningly and ruthlessly exploitated by small incisive revolutionary cells. The cohesive strength of the American democracy appears to stem, not from the existence of any "ideal" environment for the individual at any given time, but from the belief, founded partly on fact, that the individual has an opportunity of creating his "ideal" in the future.

There appear to be two principle ways in which federal resource development can contribute to, and affect, the ability and willingness of American society to survive. It can help to "....insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and to our posterity, ..."

by:

(1) strengthening the physical resource base of the nation both now and in the future
(2) strengthening the human resource base of the nation by building confidence in the system and by removing immediate problem situations with which the individual is unable to cope.

These interrelated aspects will now be treated in more detail.

II. The Relation of Physical Resources to Homeostasis

A study of America's needs and resources 3/ shows that although the world has large untapped resources of energy and mineral resources, the exhaustion of the reserves within the continental United States in certain critical materials is now foreseeable, e.g., petroleum, copper, lead, chromite, and manganese. 4/ The probability of discovering large new reserves in the United States is decreasing rather rapidly, and the rate of use is increasing similarly. The industrial growth of hitherto agricultural countries will increase the demand for United States manufactures which will also increase the use of resources, but perhaps more importantly it will increase the competition for world supplies of fund resources. This in turn is likely to result in an increase in world prices (assuming that external economies and economies of scale do not offset the rise in prices in a historical short run) which may make the domestic exploitation of lean reserves economic in the relatively

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3/ Dewhurst, J. Frederic and Associates, America's Needs and Resources, 20th Century Fund, New York, 1947, Chapter 23, pp. 573-598.

4/ Zimmermann, E. W., World Resources and Industries, Harper Bros., Revised edition, 1951, p. 446.

near future. 5/ However, the development of material substitutes can be an ameliorating factor, particularly in view of the giant technological strides which have been made in the last thirty years, though as indicated in Chapter III, this possibility should be estimated conservatively.

For some time now, timber destruction has exceeded timber growth in the United States. One estimate gives a probable annual depletion of some sixteen million board feet. 6/ Dewhurst does not regard this situation with alarm, but one of his other conclusions seems to be inadequately evaluated. He says: "In spite of these upward trends in non-lumber uses, the downward trend of lumber consumption results in a net decline in total wood consumption. This decline places a heavier demand on minerals and on cultivated crops for plant fibers and raw materials for plastics." 7/ One is tempted to ask how far this increased reliance on minerals may reduce reserves and raise their prices. Forests have great value for watershed protection, and when this is added to the fact that in the long period they are a flow resource, there is some evidence for thinking that national forest programs may be a productive and relatively low-cost way of improving the resource base of the nation in a very real physical sense. This is particularly true

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5/ It should be noted that in an absolute sense the conservation of fund resources by the U.S.A. can only be effected by the purchase of chromite from Turkey, manganese from India, nickel from Canada, copper from Chile, etc.

6/ Dewhurst, op. cit., p. 591.

7/ Ibid., p. 592.

when it is realized that forests also offer grazing and recreational facilities and generally occupy lands which have a very low alternative-use value.

Mechanical energy is a fundamental catalyst in the American productive process. On January 1, 1950, it was estimated that only 18 percent (approximately) of the hydro-electric potential of the United States had been developed. 8/ It must be assumed in the absence of further information that (a) this is a purely physical magnitude which reveals nothing of the costs of developing the remaining potential, (b) the economic use of such power, if developed, would involve a great deal of new industrial location and perhaps relocation relatively near the power sources. Most estimates of the comparative costs of producing power from thermal and hydro resources are based on static computations, i.e., they include only the costs recognized by the "firm." This is important, but from the viewpoint of society, three things must be recognized:

(1) Hydro power represents the use of a flow resource capable of amortizing its costs of generation over a very long period of time, without significantly affecting the fund resources of the nation.

(2) Thermal power represents the use of a fund resource, usually coal. Present technological trends call for increasing quantities of chemicals of the most diverse kinds; coal represents one of the most fertile sources of chemicals, and it is reasonable to ask whether its

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8/ President's Water Resources Policy Commission Report, Government Printing Office, Washington, D. C., 1950, Vol. I, Table VII, p. 241.

use for this purpose will not, or in fact should not, increase in the future at the expense of its use for energy. In this respect, it is interesting to note that many plastic raw materials are today in very short supply, particularly the chemical constituents without which no substantial production increase can take place. Most of the chemicals in short supply are recoverable from coal. 9/ Moreover, the more quickly the easily won seams are worked out, the more quickly will increasing amounts of coal be consumed to make decreasing amounts available for other uses.

(3) The depletion of rich fund resources will make the use of leaner ores mandatory, and this will almost inevitably involve increasing the amounts of power required to produce the same amount of pure mineral. This could very quickly cause a change from a variable cost structure favouring thermal power to one favouring hydro power. It is important to remember that the use of less productive ores will greatly increase the significance of power costs in the total cost of producing a marketable product.

Agricultural production seems to be one sector of the United States economy where the long-run outlook seems more or less satisfactory. 10/ It is, of course, true that much agricultural land is at present in

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9/ "The Effect of Government Regulation on Commercial Chemical Developments Chemicals and Plastics," by F. H. Carman (formerly Chief of the Plastics Section of the Chemicals Bureau of the War Production Board) in Chemical and Engineering News, April 30, 1951.

10/ Dewhurst, op. cit., p. 609.

sub-marginal uses and that large areas are experiencing soil deterioration (as opposed to depletion). But one estimate concludes that even allowing for higher nutritional rates, an expanding population, and increased industrial requirements, the basic physical resources are adequate to satisfy potential agricultural needs. Two further points should be noted. The first is that a significant portion of agricultural production comes from high risk areas. A high demand coinciding with a low production may seriously handicap the nation's agricultural strength in any short period. The second is that another significant portion of American agricultural production is derived from poorly farmed areas, e.g., the Southeast; so that increases of production from these areas would be difficult to secure and might be at the cost of a great deal of soil deterioration.

Water supplies have seldom been regarded with concern, except in obviously arid regions. As a result, their availability in humid areas has been taken for granted, at least until recently. Now depleted reservoirs and falling water tables in widely scattered areas have drawn attention to the fact that water, like air, is not a free good in areas with high population densities and intense economic activities. There seems little doubt that the total water supplies available in the United States are adequate for most foreseeable human purposes, but shortages in certain areas, at certain times and for certain purposes, are now a reality and must be faced.

Finally, the physical strength of the productive system cannot be divorced from its location. The air age requires a dispersion of production rather than a concentration of it, in order to minimize the

risks of damage from aerial attack.

With this brief outline of some of the pertinent physical and technological data on the United States resource base, let us examine their relationship to the Missouri Basin.

Figure 5, page 47 indicates the type and location of minerals in the Missouri Basin, many of which have been proved by the United States Geological Survey and the Bureau of Mines "to occur in quantities and under conditions making possible their recovery in significant amounts by present technology." 11/ The three most important are coal, phosphate, and manganese, all generally of a low grade. Discussion of a chromite reduction plant at Glendive indicates that the exploitation of another strategic mineral is approaching the economic feasibility stage. Recent technological changes at Butte will make economic the mining of large reserves of lean copper ore previously neglected. 12/ As pointed out earlier, conservation of fund resources by the United States logically implies their import from other parts of the world. From the strategic point of view, the domestic reserves of these minerals should remain unused, but should be ready for exploitation at a moment's notice. Here, however, is the rub. It has been suggested that large amounts of power will be required for their exploitation; therefore, the problem is whether (a) to develop hydro power potential and leave it less than fully

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11/ "Missouri River Basin Power Market Survey, Part I, Power Requirements," Federal Power Commission, Chicago Regional Office, July, 1950, p. 32.

12/ Life magazine, Dec. 4, 1950.

employed until an emergency arises; (b) to produce the full power potential and allow it to be absorbed in alternative uses, making its redirection into mineral exploitation very difficult and perhaps costly in an emergency; (c) to plan on using thermal power, which is likely to be a more flexible production factor with its lower fixed/variable cost ratio; though the use of coal for a liquid fuel might have a very high priority under war conditions. It would appear that the Missouri Basin may be capable of contributing substantially to the strategic materials position of the nation if the development programs now underway are more carefully planned and coordinated than they appear to be at present. For instance, the allocation of federal power to priority customers, e.g., public authorities and consumer cooperatives, may leave little power for vital purposes unless they are publicly operated. Experience in the 1930's with T.V.A. shows that private power producers completely failed to appreciate the shape of the demand curve for their product, and have consistently underestimated its elasticity. This may also lead to an energy consumption for private purposes which would inhibit the processing of strategic materials in the absence of far-sighted federal control. Incidentally, one of the most needed techniques of the modern age is a device for the mass storage of electricity. This would constitute a major contribution to the field of energy-use.

Trees are not a part of the natural vegetation of the Great Plains. In the mountainous areas of the Missouri Basin (see figure 2) they constitute the only vegetation except for varying amounts and qualities of grass and scrub. The quantity of timber and the regulation of its cut

would be substantially improved if the Agricultural Department's Program (House Document 373, 81st Congress, 1st Session) were to find Congressional approval. This could help regulate the water flow by slowing spring run-offs and reducing the amount of silt carried off into the drainage system. All three effects would greatly enhance the resource base of the nation, though it would be the result of a long-term program.

The President's Water Resources Policy Commission estimates that on June 1, 1950, the Missouri Basin had 9 percent of the nation's hydro power potential, 4 percent of its developed power, and 10 percent of its undeveloped power, in terms of average annual generation. 13/ This is an indication of the part which the basin can play in increasing the energy supply of the nation. Present federally authorized capacity represents approximately 27 percent of the basin's potential capacity.

The importance of the Missouri Basin in the nation's agriculture is shown in Tables V and VI, Appendix A. The difficulty is that the Great Plains section of the basin is a high risk area and will continue to be so even with possibilities of cloud seeding and irrigation. For instance, in the period 1935-44, the production per acre of grain seeded in North Dakota was eleven bushels. In 1945 it was 15.5 bushels. 14/ It can be argued that dryland farming techniques have made big strides in this period and that some of the improvement in yields is due to this.

13/ Water Resources Policy Commission, op. cit., Vol. I, Table VII, p. 241.

14/ "Agricultural Statistics, 1947," Government Printing Office, Washington, D. C., 1948, Table III.

However, this claim has still to be put to the empirical test of a prolonged drought; and in any case the 1935-44 period includes four good rainfall years so that the figure of eleven bushels almost certainly overestimates yields per acre seeded during the drought. In the case of animal units, the numbers on rangeland in Montana were 1,316,200 in 1937 and 1,652,130 in 1947. 15/ This difference should be interpreted with caution. It may be that the ranges were understocked in 1937 and overstocked in 1947 or that the grazing acreages were different in those years. But an increase of around 26 percent in ten years (assuming no errors in the comparability of the statistics) is highly likely to be associated with moisture conditions in those and preceding years. Farms which are areally diversified to include irrigated and dry land are more stable because of their flexibility. They are sufficiently flexible to meet operational risks and to meet changing production needs in time of emergency. The original "Sloan" plan (Senate Document 191) envisages 4,760,000 acres of new irrigated land and supplemental water for 547,000 acres. This seems to have been a very hastily judged figure, because 63 percent (by sampling) of the 1,000,000 acre Crosby-Mohall (North Dakota) project was declared unfit for irrigation in February 1950 by a special reviewing committee of the Bureau of Reclamation. 16/ However, even if the final

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15/ "Montana Agricultural Statistics," Montana Dept. of Agriculture, Labor, and Industry, Helena, Montana, December, 1948.

16/ See North Dakota Natural Resources Council, "Report of the 3rd Meeting," June 28, 1950, at Riversdale, North Dakota.

total figures are revised sharply, the new irrigated land can materially aid the agricultural strength of the nation. To this must be added the improved agricultural conditions which will exist in the lower basin as a result of the flood control portion of the Missouri Basin Development Program.

The Missouri Basin faces two basic problems in relation to water supplies. There is too much in the lower basin during the spring rains and run-off period and in isolated areas in the upper basin during the same period, e.g., the Heart River at Mandan, N. D.; and too little during the summer and fall period in the Great Plains. The regulation of the system's flow to suit human purposes is the fundamental objective of the Missouri Basin Development Program. This regulation will become imperative if the further aims of the program are not to backfire. Increased industry and population are the assumed consequences of the program. Both will require increasing amounts of water for consumptive use, e.g., domestic consumption, the liquefaction of coal, and irrigation, which may be up to 40 percent of the amount applied.

Finally, the Missouri Basin provides very ample opportunities for industrial and settlement dispersal, though the inadequacy of transport services might prove to be a severe handicap to any thorough-going program of dispersion.

The foregoing has been an attempt to show the ways in which resource development, with special reference to the Missouri Basin, can contribute to the material strength of the United States. It is essentially a non-economic appraisal. In wartime or extremely unsettled world conditions,

the "normal" economic process of resource allocation may not operate. If chromite is indispensable to the economy and unobtainable from overseas, then, until substitutes are found, lean domestic ores will have to be used regardless of the opportunity cost. The higher the opportunity cost, the more it is likely that increasing resources will be applied to the search for a substitute. But it must be remembered that research is often a very high risk enterprise, and researchers may be sufficiently scarce to make it costly in real terms to switch them from other equally or more urgent problems.

The President's Water Resources Policy Commission brings attention to the fact that national security requires a rather special evaluation. It says: "A commercial property has dollar value according to scarcity; a nation's resources have security value if they are so plentiful as to be cheap." 17/ Such a doctrine appears to have considerable validity as a first approximation, but it ignores two rather awkward points.

In the first place, a nation's resources do not have security value only if they are so plentiful as to be cheap. During a war, or potential war situation, uranium may be one of the most critical "security" resources. It is certainly not plentiful in terms of real cost; its security value then becomes a complex function of the relative supply available to the enemy and his capacity for using it, plus other strategic factors affecting the whole conduct of the war--either "hot," or "cold." Furthermore, it is also true that the supply of certain fund resources, e.g., oil,

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17/ Water Resources Policy Commission, op. cit., Vol. I, pp. 60-61.

could be increased rapidly at a price which could be called "cheap," but the complement would be rapid resource depletion. 18/ This could only be justified if an adequate energy substitute could be made available in sufficiently large quantities to replace the disappearing fund resource.

In the second place, it cannot be assumed that short period plenty inevitably contributes to national security. The divergence between a physical surplus and its resulting social surplus may often be critical for a society. Small physical shifts in the supply and demand of products whose market functions are inelastic are likely to cause serious social and economic repercussions. Apparently the physical divergence between the "surplus," "scarcity," and "equilibrium" for commodities having inelastic demand or supply is relatively small in relation to the total flow of a commodity over a relatively short given period. Thus we have the industrial paralysis in Britain in 1947 lasting for several weeks and causing widespread unemployment because of a coal shortage, representing something like 1 percent of the annual consumption. In the United States in 1941 and again in 1950 the public emotions were whipped up against agricultural surpluses which, it was said, were costing the nation fabulous sums of tax-payers' money. Some of the facts are that in 1946 the grain "surplus" was roughly one-eighth of what it had been in 1941—this despite five years of excellent climate and

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18/ This is "depletion" in the sense in which Ciriarcy-Wantrup uses it, i.e., "all actions resulting in a redistribution of rates of use over time in the direction of the present." See Ciriarcy-Wantrup, S von, "Private Enterprise and Conservation," Journal of Farm Economics, Feb., 1942, Vol. XXIV, No. 1.

increased acreages. 19/ In July, 1950, stocks of creamery butter held by the government were at a high level--as were many public tempers. By December, 1950, these stocks were only one-third of the July figure. The story is identical for cheese except that the peak occurred in September, 1950. 20/ There is little talk of surpluses now (May, 1951). The critic will immediately point out that these were exceptional war conditions; regrettably, either war or its threat appear to be typical of the Twentieth Century. The statesman must beware lest governmental programs which are designed to improve the national security be undermined by false-economy scares over short period surpluses. It is interesting to note that in a recent speech, 21/ O. V. Wells, Chief, B.A.E., USDA, warned against the danger of allowing short period fluctuations to influence long-term objectives. In his opinion, the maintenance of employment and nutrition and the rapidly growing population can absorb all the prospective agricultural production from the Missouri Basin Program, provided that it is reasonably consistent with market prices. This is especially the case if one assumes what seems very likely, i.e., that the irrigated land will be put mainly to meat production. There would appear to be a considerable "social shortage" of meat at present without allowing for

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19/ "Agricultural Outlook Charts," U. S. Dept. of Agriculture, 1951, p. 65.

20/ "Summary of State and Regional Holdings for 1950," U. S. Dept. of Agriculture, Production and Marketing Administration, table 64.

21/ "Probable Effects of River Basin Programs on the U. S. Agricultural Economy," an address before the Joint Meeting of the Columbia Basin Inter-Agency and the Missouri Basin Inter-Agency Committees at Bozeman, Montana, May 24, 1951.

probable demographic trends. Finally, it must be remembered that irrigation projects now authorized are unlikely to affect the nation's meat supply significantly for five to twenty years.

The evaluation of the physical needs and resources of the United States under many different assumptions as to anticipated world conditions and technological changes, should properly fall within the responsibility of a government department of resources. It is not known whether the National Security Resources Board attached to the executive office of the President is adequately staffed for the proper fulfillment of this task. The final decision as to the direction of federal development should lie with Congress, but the investment recommendations of such a resources department should carry a weighting which bears some relation to the contemporary and anticipated height of international tension at the time of the decision.

A strong actual and potential resource base should help to build up the citizen's confidence in the ability of the nation to survive.

III. The Relation of Human Resources to Homeostasis

Under this heading we shall be concerned mainly with the evaluation of government resource development programs which will affect the individual's faith in his society. It may, therefore, be helpful to relate the problem of evaluation to a series of hypothetical questions which the "typical" citizen might be expected to ask.

The identification of value with the dollar is sufficiently characteristic of the United States to make the first question almost inevitably

"will the program pay?" 22/ This means explicitly, will the program, conceived of as an enterprise, be able to cover all costs including amortization and interest within its estimated physical life by purchasing inputs and selling outputs freely and without special privilege? It also means, though this is seldom explicit, is the program that one which will be the most profitable of all the alternative production possibilities? These are two of the economic problems analyzed by the theory of the "firm," and its application to our problem will now be examined on two very strict assumptions. First, only those factors will be taken into account which have a clear and unambiguous dollar value. Second, the government "entrepreneur" (planner), like the private entrepreneur, is only concerned with his personal input-output relationship, without any consideration for the further consequences of his decisions. The federal planner is dependent on Congressional action for his funds, and he must attempt an evaluation of the economic advantages of spending such moneys as Congress may allow; therefore, his planning should be more precise than that of the private entrepreneur, who not infrequently operates on the basis of "hunches." This means that he must have: (a) some notion of the demand schedules for the products of the various lines of development, both now and in the future, (b) an estimate of the probable supply schedules of both his inputs and outputs, (c) some idea of the

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22/ Report to the Federal Inter-Agency Committee, "Proposed Practices for Economic Analysis of River Basin Projects," prepared by the Subcommittee on Benefits and Costs, Washington D. C., May, 1950, p. 26.

scale of activities which will come most nearly to the realization of the principle of equating marginal costs with marginal returns, (d) some notion of appropriate periods of analysis and rates of discount. 23/ On the basis of such information, the planner should consider the preparation of tables of economic costs and benefits on the following lines:

PROGRAMS 24/ a,b,c,d, (representing alternative investment opportunities in resource development)

Table I Programs at the Optimum Level of Investment (I_{oa}, I_{ob}, I_{oc}, I_{od})

Program	Optimum Investment	Maximized Net Returns
a	I_{oa}	R_a
b	I_{ob}	R_b
c	I_{oc}	R_c
d	I_{od}	R_d

23/ For discussion of appropriate discount rates and periods of analysis, see ibid., pp. 21-26.

24/ Program is here used in the sense in which it is used by the President's Water Resources Policy Commission.

Table II Programs at Given Levels of Investment (I_1, I_2, I_3 ..... I_n, I_o) (I_o, equals optimum level)

Program	Investment	Cost/Benefit Ratio
a_1	I_1	r_{a1}
a_2	I_2	r_{a2}
:	:	:
a_n	I_n	r_{an}
a_o	I_o	r_{ao}
b_1	I_1	r_{b1}
b_2	I_2	r_{b2}
:	:	:
b_n	I_n	r_{bn}
b_o	I_o	r_{bo}
c_1	I_1	r_{c1}
c_2	I_2	r_{c2}
:	:	:
c_n	I_n	r_{cn}
c_o	I_o	r_{co}
d_1	I_1	r_{d1}
d_2	I_2	r_{d2}
:	:	:
d_n	I_n	r_{dn}
d_o	I_o	r_{do}

The use of such tables would be as follows:

(1) If all non-economic considerations are irrelevant; and if the objective is the maximization of net returns; and if the funds available are sufficiently flexible to permit development of the optimum size; then, using Table I, program "a" would be selected first at the investment level I_{oa}, because its net returns are greater than b, c, or d.

(2) If all non-economic considerations are irrelevant but if Congress desires to allocate federal investment in various different parts of the country; 25/ and if funds are not likely to dovetail into development at optimum levels; then, assuming a given level of total investment and using Table II, divide the total investment between a, b, c, d,; multiply the proportion of the total investment responsible for each resulting cost/benefit ratio, and calculate a weighted average cost/benefit ratio for the total investment. Repeat this for differing distributions of a given total investment and for differing total investments. The possibilities of maximizing the cost/benefit ratio under varying assumptions as to the level and distribution of investment can then be determined. It is almost superfluous to remark that the number of permutations is likely to be large.

The simplicity of this procedure is, in a sense, misleading, even when we continue to exclude considerations which are not measurable in monetary terms. Resource development programs tend to be multi-purpose, so that a similar type of analysis must be applied to the component parts of any program. Furthermore, many factors which would be capable of dollar evaluation are still unknowns in the technical sense, e.g., the rate of reservoir sedimentation; so long as such deficiencies exist, they should be clearly stated. Certain other components of the evaluation sheet are equally recondite; for example, the construction of probable demand curves, particularly in areas where demand may have to be created, (the experience

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25/ a, b, c, d, represent investment alternatives which combine spatial as well as functional differences.

of the southeastern power companies in relation to the elasticity of demand for electricity is of interest here) is one such component. In the case of benefits, the future trend of price levels becomes crucial, but predictions almost inevitably have a wide margin of error. Price levels, at least for relatively fixed costs, may be less important economically, but they certainly complicate the political picture. For instance, the estimated cost in 1937 of the Colorado-Big Thompson project was $44,000,000; in 1947 it was $128,110,120; and in 1948; $131,850,665. 26/ This raises questions as to whether the original cost was not deliberately underestimated. In view of the fact that development programs are essentially long term, say plus fifty years, and that the secular price trend has been consistently upward; the amortization of major water control works may become a subsidy of the future by the present. This will operate in two ways--present alternatives foregone to provide long-term benefits, and reduced real returns in the future to bond purchasers in the present.

So far we have assumed that federal resource development will involve the direct production and sale of outputs by the federal government, with fixed and working capital supplied out of federal tax receipts. This

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26/ Task Force Report on "Water Resources Projects, Appendix K," prepared for the Commission on Organization of the Executive Branch of the Government, Jan., 1949, Washington D. C., p. 61. It is somewhat risky to draw conclusions from the data given because (a) the report suggests that government agencies appear to underestimate the initial cost of projects, (b) all prices have risen substantially since 1937.

is not an entirely unrealistic conception of the existing process. It adequately reflects the generation and disposal of hydro-electric power, which is sold at prices which will cover the long-run costs of that portion of a dam which, it is calculated, is responsible for power production. In this case, the question of "will the program pay?" is answered in the affirmative if supply is equal to demand at this price. In practice, the sale of power is often intended to subsidize other types of resource development to which the dam contributes. This is frequently the case where a dam provides both power and irrigation water storage. The tax-paying citizen would seem to be entitled to ask whether the beneficiaries of federal investment should not be obliged to pay the full cost of their benefits. This is the much vexed question of reimbursement; who shall pay, and how much?

The President's Water Resources Policy Commission studies this problem at some length 27/ and concludes that every beneficiary should pay "an amount corresponding roughly to the value of the service." This seems to be an economically unexceptionable conclusion, but it cannot be the last word on the subject. First, to be ethically unexceptionable, every person who is harmed by the program should receive an amount of compensation corresponding roughly to the value of the services lost. This involves complications of economic contraction which are much more intractable than those of economic expansion. Second, a policy is one

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27/ Water Resources Policy Commission, op. cit., Vol. I, Chapter 5.

thing; an appropriate program is another. It is in the latter that the real difficulties will be encountered, i.e., defining how much reimbursement and compensation should be and by whom and to whom it should be paid, which runs into the difficult problem of joint costs. Someone has likened federal investment to a stone cast into a pond, and the effects of the investment to the ripples proceeding from the point of entry to the perimeter of the pool. The problem of reimbursement lies in the attempt to measure the amplitude of the ripples at the various concentric circles on the surface of the water. The difficulties of measuring such a dynamic process are immense and will entail a great deal of research.

It should be borne in mind that whatever the final solution, be it full reimbursement or no reimbursement at all, it will have uneven consequences; there will be windfalls, hardships, and other inconsistencies. The success of the program will depend on the education, discretion, and sense of responsibility of people, administrators, and politicians alike. At some future date, the question of whether reimbursement for resource development shall be mandatory may become as effete as the question of whether education should be reimbursable is today. However, before this stage is reached, if it ever is, a great deal of research and education will have to be carried out.

The foregoing has indicated some of the problems and possible means of economic evaluation. Some such analysis is undoubtedly needed, and we may ask how far it is incorporated into present practice. The answer seems to be hardly at all. The writer knows of no comprehensive comparison of investment alternatives. Indeed, the federal framework precludes

such an analysis. The Bureau of Reclamation is responsible for the seventeen western states only, which immediately divides the opportunities for investment comparison by excluding alternatives in the remaining thirty-one states. It is doubtful whether review by the Bureau of the Budget makes the necessary nation-wide comparison for reasons given in Chapter V, page 90. There is also very little uniformity of practice in accounting between the governmental agencies responsible for development (see Chapter IV.) This makes comparison difficult, even when possible. Finally, the policy of announcing projects before they are fully evaluated often leads to political pressure for their implementation, to which the federal agency reacts by making them feasible on paper. The assumptions which would attend any evaluation are so numerous and so subject to question that this artifice is relatively easy.

The President's Water Resources Policy Commission has recommended that, for accounting purposes only, a uniform basin account system be adopted. 28/

In many ways it may be an advantage that alternative investment programs also involve a large number of non-monetary costs and benefits. This may make the final decision as to which investment alternative to adopt less dependent on small monetary differences in net returns, based on assumptions which are only verifiable pragmatically and may be subject to very large error.

This leads to the citizen's next question: "What kind of advantages

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28/ Water Resources Policy Commission, op. cit, Vol. I, pp. 79-80, Chap. 6.

will the alternative programs provide for the nation and for me as a member of the nation?"

This question is too vague to be very meaningful. Therefore, on the assumption already enunciated, that the U. S. citizen's faith in his society rests on his belief that he has a wide range of possibilities for realizing his "ideals" (see page 143), the question will be broken down as follows. What possibilities do the various investment alternatives create for more tax payers in relation to:

(a) employment?
(b) consumer goods?
(c) social freedom?
(d) political freedom?

No evaluation of these possibilities can be made without taking into account the possibilities which are destroyed and those which are foregone, as a result of the investment process. These possibilities fall within the purview of welfare economics. The modern school of welfare economists (Hicks, Hotelling, Kaldor, Lange, Lerner, et. al.) by invoking what is known as the "compensation principle," postulate a change in welfare as follows: "Welfare increases (decreases) whenever one or more individuals become more (less) satisfied without any other individuals becoming less (more) satisfied." 29/

This is an indicator which makes it unnecessary to define welfare. But it is subject to one serious weakness. The modern foundation of the

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29/ Reder, Melvin W., Studies in the Theory of Welfare Economics, Columbia University Press, 1947, p. 14.

theory of choice rests on the hypothesis that interpersonal satisfactions can be ranked but not measured, this makes the whole question of satisfactions a relative one. In which case, an increase in some individual satisfactions must logically result in a relative decrease in the remaining individual satisfactions. There is little doubt that problems of welfare measurement are most difficult to handle, and changes in welfare properly lie within the orbit of political decision. Let us examine the four critical factors about which the politician should be informed, and once again illustrations will be taken from the Missouri River Basin.

IV Human Resources in Relation to Employment

Federal projects create employment during the construction period, and it depends on the prior level of unemployment whether construction creates new employment or merely bids for workers already employed elsewhere. A brief study by the writer indicates that dams and similar construction works have very definite limitations, for technical reasons, to their efficacy in countering cyclical depressions.

The 160-acre irrigation farms proposed for the Missouri Basin are labor-intensive, as compared with neighbouring dry-land farms and stock ranches.

A reduction in the drought hazard may help to make irrigation farmers at least subsistence farmers in times of acute cyclical depression, should they recur, though the present high fixed costs of farming will require special credit arrangements in such periods. In addition, irrigation can increase the flexibility of farm land by converting it from single-use to multiple-use. This may be very important in maintaining farm incomes, if

for example, the demand for wheat should fall substantially.

Stabilization of agricultural production in the Missouri Basin should help prevent the collapse of farm incomes through drought, and hence the subsequent reduction in industrial employment. This could be achieved by spending large sums on farm relief, but as the increased food supply is needed, this appears to be no substitute for irrigation.

The control of floods will reduce the employment which the repair of flood damage creates, but will prevent the forced unemployment of flooded factories and farms; the latter is greatly to be preferred from the national and from the individual point of view.

The establishment of new industry in the Missouri Basin will undoubtedly provide new possibilities for employment. Particularly, it will provide new employment alternatives for the residents of the Great Plains area. The hoped-for increase in this population will strengthen the local tax base and should reduce the per capita cost of needed social services. This should mean better education and therefore opportunity for the youth of the area. It should also free some personal income for increased effective demand and employment. It may be, however, that the investment will draw labor from other areas and occupations either directly or indirectly by competitively forcing a reduction in the level of industrial activity along certain lines in other areas. In which case, the increase in employment may be negative, zero, or positive. The establishment of new industries in an area like the Missouri Basin raises a number of interesting questions on employment. There seems little doubt that after one or two, or even three, of Marshall's "long periods"

it is often easier to take advantage of new technology in areas which are relatively undeveloped industrially than it is to convert the technology in well-established industrial centres. In a general way, this phenomenon manifested itself in the United Kingdom after 1914, and more recently in the United States. The main problem which results is the question of what can be done about the area from which industry is migrating. An old industrial area represents a heavy accumulation of fixed and relatively indivisible social assets, e.g., sewage and transportation systems designed to cater for the maximum volume of use which the area experienced historically. It also represents an aggregation of complex and multifarious private property claims and is often the repository of a number of increasingly redundant skills supported by a tight union organization and high wages. 30/ Very briefly, the area tends to develop social and economic rigidities which are anathema to new ideas and processes and which usually involve mechanization and a reduction in the need for large numbers of skilled labor. The result is that a decline in the area's volume of production and number of new industries usually sets in. The burden of maintaining assets increases locally per capita, and this is a further deterrent to new industry. The problem then arises as to whether the social capital sunk in the area is so significant in relation to the nation's resources that it cannot be allowed to go to waste (as in Britain,) or whether the social capital can be allowed to waste away until

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30/ Hoover, E. M., The Location of Economic Activity, McGraw-Hill, New York, 1948, pp. 174-6.

the new level which the area can support is reached (as is probably the case in the United States).

It is frequently argued that the encouragement of industry in such areas as the Great Plains by the provision of cheap hydro-electric power will lead to the closing down of similar plants already located outside the Great Plains. It is implicit in the argument of those opposing industrial development in such areas that the new industries will be "subsidized" by cheap government power. The President's Water Resources Policy Commission effectively disposes of the "subsidy" confusion, 31/ but let us examine the remaining substance of the argument. It is based on a first assumption that the demand for the product will remain fixed. This seems very unrealistic. If the demand curve shifts to the right for, say, food products, then an expansion of processing plants could take place in either Chicago or Billings. It is a matter of locational advantage which one will be chosen. Socially, the effects may have wider significance. 32/ If the plant is located at Billings, it will help to increase western population density and lower social costs in the area. By shipping a higher value product, the social and economic costs of space may be significantly reduced, provided, in this particular case,

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31/ Water Resources Policy Commission, op. cit., Vol. I, p. 78.

32/ It must not be forgotten that increasing population eventually runs into diminishing social returns. However, it would be difficult to maintain that the Great Plains area is even approaching this stage.

that the freight rate structure can be reorganized to suit contemporary needs. 33/ Under these circumstances, the setting up of new factories is likely to result in a net increase in employment.

If the new industry which results from government investment does in fact tend to replace old established firms in other areas, then with normal competitive conditions, this merely reflects Marshall's view of industry as a forest with old trees dying, new ones springing up, and all ages of trees in between. This involves no special case of technological unemployment other than that with which a modern society must always be faced. It may even assist in breaking the excessive control which certain industrial and commercial centres and firms exercise over their "colonial hinterlands"—to the eventual economic detriment of the latter and the economy of the nation as a whole where monopolistic elements are involved.

There is one further question which is frequently raised. If new federal resource development programs were abandoned and the taxes which would have been collected for this purpose were allowed to remain in the tax-payers' pockets, then wouldn't the new potential effective demand create employment just as readily and with more direct public satisfaction? It might, depending on a goodly number of things, but the

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33/ On freight rates see:

(a) House Document No. 363, 78th Congress, 1st Session, "Letter from Board of Investigation and Research Transmitting Report on Rate-making and Rate-publishing Procedures of Railroad, Motor, and Water Carriers," 1944.

(b) House Document No. 264, 75th Congress, "The Interterritorial Freight Rate Problem of the U. S. A.," a report of the T.V.A., 1937.

purpose of federal investment is much wider than the creation of employment opportunities, and since employment is likely to be created by both methods, a valid objection must rest on considerations other than increasing employment. This has not been an exhaustive discussion of the employment consequences of federal resource development, but some of the more important implications have been considered.

V. Human Resources in Relation to Consumer Goods

For many years the estimation of national welfare was equated with the calculation of net national income. 34/ Today the validity of this equation is seriously questioned. Historically, there seems to be little doubt that rapid gains in real income per capita have been at the expense of a great deal of human misery because, unfortunately, expectations and factor mobilities have proved to be less "efficient" in practice than they are supposed to be in classical economic theory. In addition, as already mentioned, 35/ the increasing involvement of man with man through specialization and of man with his environment through ever-expanding fixed investments makes a basic stability and a regulated change prime objectives of human purpose. By combining the ideas of the harsh personal costs for many individuals under rapid change and an increasing individual stability as to location under increasing numbers

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34/ Since all economic activity can be defined as ultimately directed at present or future consumption, net national income is to be regarded as consumption for our purposes.

35/ Vide supra, pp. 18 and 63.

of social and economic linkages, we may venture a tentative hypothesis that federal resource development programs, designed to stabilize and conserve, may tend to slow down the growth of real income per capita. In other words, we may be assisting a tendency toward a constant but slower increase in consumption instead of a sharper but more erratic increase. This may raise average real income at the expense of certain groups in society. The new concept of economic welfare may rest on more equitable but less rapid rises in per capita real income, and it will thus include a substantial social element in its evaluation.

So much, then, for what may be one underlying possibility in the field of consumption. What about the more specific changes in consumption possibilities which federal resource development may entail?

We have already said that taxation for federal investment reduces the consumer's disposable income. However, one of the purposes of federal investment is generally considered to be the creation of an improved environment for the operation of free enterprise. Therefore, the question arises, does the insertion of federal investment between private consumer and private producer increase the variety of consumption alternatives to the consumer after discounting for the longer production period? Again, it must be emphasized that federal investment in resource development is not single purpose and the answer to this question is not the ultimate criterion for such investment decisions. The following quotation refers to the supply of farm produce from irrigation farming, i.e., public plus private enterprise. "With increasing demand for farm products, the needed additional supply (of food) could be obtained from existing farm

land by higher prices for farm products which would result in cultivation of additional marginal lands and more intensive production on cultivated lands. This would raise the cost of living for the entire nation. Developing an irrigation project, however, by increasing the acreage of farm land might make possible the needed increase in supply at the existing level of farm prices. Prevention of the increase in the cost of living would be a national benefit and would justify a public subsidy up to the amount of the increase in cost of living thus prevented." 36/ As this same writer puts it elsewhere, referring to irrigation and livestock production in the eleven western states, "If consumers would have to pay an additional ten cents per beefsteak in order to get farmers to produce enough of them from the presently available land, but by putting the equivalent of five cents per beefsteak into subsidizing irrigation could get as many beefsteaks as they want without an increase in price, it obviously would be to their advantage to subsidize irrigation development." 37/

The development of hydro-electric power on the basis of large turnover with low profit margins per unit generated rather than restricted output at higher prices is another way of reducing total costs of private output. Assuming that this does not cause severe technological unemployment, which seems unlikely, the net result must be, ceteris paribus, an

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36/ Selby, H. E., "Indirect Benefits from Irrigation Development," Journal of Land and Public Utility Economics, Vol. XX, No. 1, Feb., 1944, pp. 46-47.

37/ Selby, H. E., and Griffith, Donald T., "Livestock Production in Relation to Land Use and Irrigation in the Eleven Western States," U.S.D.A., B.A.E. Berkeley, California, March, 1946, p. 19.

increase in consumer goods for the nation without a comparable increase in prices. 38/

This by no means exhausts the possibilities of improving consumption alternatives, but it does indicate some of the possibilities which must be taken into account.

VI. Human Resources in Relation to Social Freedom

One of the most important expressions of social freedom in the United States is economic freedom. This area of alternatives has already been discussed generally under the above headings (a) employment and (b) consumption, and, for this reason, it is not proposed to examine the matter further in any detail.

Social freedom is increased when the number of alternatives of social action from which the individual may choose is increased. This is a concept which is not too illuminating except that it carries the germ of the idea of freedom, i.e., the number of real alternatives available to the individual. To give the concept concreteness we have to ask, alternatives in relation to what? One of the major limiting factors to the number of economic alternatives which are available to the individual is social stratification. In a recent article 39/ William Miller concludes as follows:

38/ For the sake of completeness, it should be pointed out that product differentation may constitute a spurious increase in consumption alternatives, first by adding to production and selling costs, and second by adding to the difficulties of consumer choice. There appear to be diminishing returns to consumer choice after a certain number of near-alternatives is reached.

39/ Miller, William, "The Recruitment of the American Business Elite," Quarterly Journal of Economics, Vol. LXIV, May, 1950, no. 2, pp. 242-253.

"If it be true, as leading American businessmen and leading American historians continue to assert, that, so to speak, anyone can become president of large business firms, it appears to be true also that at least in the early twentieth century most of the successful aspirants had certain social (my italics) characteristics that distinguished them sharply from the common run of Americans of their time. Such distinguishing characteristics may have been less marked among American business leaders in the first half or three-quarters of the nineteenth century, though too little is known about that period to generalize with safety. In the bureaucratic twentieth century, however, many of these characteristics were so prevalent among business leaders and so rare among the rest of the population that the presumption, at least, is strong that they constituted genuine advantages in the competition for business eminence."

It is very probable that some form of social stratification is both endemic and chronic in all societies. The crucial problem is how to prevent its becoming so institutionalized into a rigid heirarchy as to restrict occupational mobility, assuming that this is one of the ends of society. Education for living appears to be the most potent long-term measure which will, at the very least, secure a reasonable consonance between the ideal of "from log cabin to White House" and the practice of advancement through merit rather than through privilege.

It cannot be assumed that federal resource development will have any significant effect for the nation as a whole on this aspect of social freedom, though it may lead to increased educational and entrepreneurial opportunities for the residents of the area to be developed.

A second aspect falls within the purview of property rights. The Jeffersonian ideal of family farms still persists despite the unquestionable growth of tenancy in relation to ownership over the last seventy-five years. Schultz argues 40/ that the social drive towards farm ownership is frequently such that farmers accept lower standards of living than they could earn as tenants. Whether farm ownership and/or improved tenancy arrangements should be the social ideals is extremely pertinent to any consideration of irrigation development. But the idea of strengthening democracy through family farms seems to be solidly rooted in the American philosophy. Bureau of Reclamation irrigation projects by the legislative limitation of farm units to 160 acres and the creation of large numbers of intensive farms certainly implements the family farm philosophy

A third and most important concept of social freedom exhibits itself in the alternatives open to the individual for worship, recreation, cultural activities, health services, social clubs, and local public expression through the press. Generally speaking, unless the group is culturally homogeneous and self-contained, e.g., the Hutterites, it would be true to say that the denser the settlement pattern, the more of these alternatives exist for the individual. Here again resource development programs of irrigation and industrialization which will result in increased localized populations for areas which are sparsely populated at

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40/ Schultz, T. W., "Capital Rationing, Uncertainty, and Farm-Tenancy Reform," Journal of Political Economy, Vol. XLVIII, June, 1940, No. 3, pp. 310-324.

the moment are beneficial to the social freedoms of the residents of the area developed. Can this be justified if it is substantially at the expense of persons not so benefited? This is not an easy question to answer, but one point deserves much consideration. The public land policy of the federal government has been to encourage settlers to move west under the various Homestead Laws. The trials and tribulations which beset these settlers in the Great Plains were many, but, with the passage of time, various capital accoutrements of living were built up at considerable cost to the settlers. Having encouraged this settlement by every means, even to the extent of millions of dollars for relief in the '30's, has the federal government any right to deny the legatees of this social capital those social advantages which are mentioned above and which are now generally accepted as basic to the standards of living of the American democracy as a whole? This issue, which is largely ethical, must be weighed against the similar economic and social handicaps of residents in, say, the agricultural South.

Finally, we ought to regard the right to live as a part of our social freedom. The annual toll of deaths from floods is high, though the President's Water Resources Policy Commission Report refers only to the property damages resulting from flooding. 41/ The question is whether the nation should, as part of its resource development program, prevent a recurrence of such deaths or should it insist that these persons should

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41/ Water Resources Policy Commission, op. cit., Vol. II, pp. 171-173

never have settled in the path of potential floods and must, therefore, bear the costs of removing themselves from the threatened area? Is it not possible also that flood conditions might have been different when settlement took place from what they are now? On the other hand, it is a somewhat disturbing fact that as irrigation ditches multiply, so do the deaths of children by drowning.

VII. Human Resources in Relation to Political Freedom

If we accept government by the majority through its elected representatives as desirable, which we do, then three basic conditions must be fulfilled which have special relevance for federal resource development. They are:

(1) The influence of pressure groups should be limited roughly to the number of persons they represent, instead of the present situation where they tend to represent the political acumen of the group, i.e., the ability to influence state and federal politicians by all means other than popular support. It is beyond the scope of this essay to analyze the desirability and effects of lobbying, but it may not be unconnected with the rigidities of the American governmental system, which does not respond readily to changes in the political climate. This may be a good thing if the climate is erratic.

(2) The wishes and desires of as many electors as possible should be reflected at as many points in a development program as is administratively possible. This condition should be interpreted with a good deal of caution. It is not intended to suggest that there should be what might technically be called a referendum on every planning decision of the state or federal government. This might be an administrative impossibility, and it might also inhibit governmental programs which may be conceptually sound but just a little ahead of popular and vested interest thinking. This is where public relations become important. It should also be remembered that the excuse of administrative impossibility may be used as a cloak for curbing public participation in the development process.

(3) The need of the public for rather special safeguards as to the integrity of men in high places, and as to administrative procedure which is sufficiently consistent and lucid to permit a wider public inspection than is now possible. 42/ This is necessary because the administration of such vast resource development programs as are now in progress or prospect puts a great deal of power in the hands of the politician and administrator. It may be argued that this is not really unusual, but the scale and intricacies of modern development increase the opportunities for corruption and "pork-barrelling" to a marked degree.

In addition to a consideration of the above elements of political freedom, cognizance must also be taken of the relationships between existing branches of government. One example will suffice, the attitude of the States' governments to water rights. The method of interstate compact is espoused by the western states as being preferable to the centralized allocation of water resources by a supra-state organization. Take the case of Colorado. This state has made a number of compacts which are generally favourable to itself, but note the following clause in one of these compacts: "The compact may be terminated at any time by the unanimous (my italics) agreement of the signatory states. In the event of such termination, all rights established under it shall continue unimpaired." 43/ What kind of political freedom exists for the downstream states under such an arrangement? Suppose that unanimity is obtained, which seems very unlikely, and suppose the waters have been

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42/ Vide supra, Chap. V.

43/ "Interstate Compacts, a Compilation of Articles from Various Sources," prepared by the Colorado Water Conservation Board, 1946. See in particular Article X of Colorado River Compact, Aug. 19, 1921, p. 42 of Volume IV.

substantially appropriated during the life of the compact. What leeway remains for future adjustments of use through political means? This is another rigidity of the governmental system.

How do the present governmental arrangements for resource development affect political freedom? Does the competition of two major developing agencies in the Missouri Basin for appropriations imply the enlistment by each of all available support in Congress, including the lobbies, thereby strengthening the influence of the latter? Isn't it just possible that the administrative confusion and absence of clear accounting and evaluating which is part of present resource development programs also confuses Congress in its deliberations and decisions so that it may not be adequately carrying out the wishes of the people it is supposed to represent? Are the present coordinating arrangements 44/ adequate for representing public opinion at all stages of development? Would the interests of the Missouri Basin be better served by a Valley Authority which could become very undemocratic in its operations if not administered by high-minded directors and watched over by a vigilant Congress? And if such an Authority did in fact serve the interests of the basin better than the existing governmental agencies, would it also serve the interests of the nation better?

These are indeed complex and critical questions, which depend for their successful answers on a high level of democratic responsibility throughout the nation. Real democratic responsibility can only develop

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44/ Vide supra, Chap. VI.

through education in all its aspects. This necessarily involves a great deal of informed discussion about these critical issues, so that the electorate itself knows what the real issues are before it goes out to vote for this or that party, or this or that individual.

Finally, it should be stressed that one of the basic needs for evaluating resource development programs is data. Public reports are unanimous that current programs are inadequately underpinned by research data.

VIII. Concluding Remarks

To sum up very briefly, we may say:

(1) Federal investment in resource development is an established and desirable feature of American democracy.

(2) That the investment alternatives should be carefully considered as to possibilities in

(a) the area in which federal investment is applied
(b) the time at which federal investment is applied
(c) the function for which federal investment is applied
(d) the magnitude of the investment

which depend on

(i) physical resources in relation to strategical consideration
(ii) human resources in relation to employment, consumption, social and political values

(3) A decision to adopt a pattern of alternatives must, if it is to meet the problem situation (i.e., that every taxpayer is entitled to a maximum possible return on his contribution in the long run which is in some measure proportional to the size of his contribution) take into

account all of the factors listed under (2) above.

The reader will have noticed many questions but few answers. Answers presuppose questions, and it is on these grounds that it is sought to justify this approach. Appropriately, therefore, we may conclude with a question. Is it not possible that the economic, social, and political welfare of the United States might not be better served by investments in resource development in foreign countries under the Point-Four Program?

Chapter VIII

REGIONALISM AND THE MISSOURI BASIN

"Region," "regionalism," and "river basin" are three expressions which figure prominently in discussions of the Missouri Basin Development Plan. Unfortunately, they are frequently used indiscriminately on the basis of loose or erroneous assumptions about their nature and about their interrelationships whenever a distinction between them is made.

If the development of the Missouri Basin is to be understood, and this is a prerequisite for its successful accomplishment, it is necessary to remove the confusion which surrounds these concepts. As a starting point, let us briefly examine the positions of several students of the regional concept.

The Region 1/

The region has been described in the following way:

(1) an area exhibiting homogeneity in one or more of its physical and/or human aspects. It therefore represents an areal or spatial generalization. The delineation of the region depends on the aspect(s) selected for generalization. Theoretically, then, there can be almost any number of regions of almost any size. Odum and Moore restrict the number of regions which should be distinguished by the use of item (4) below, but there is general agreement on the size of a region only

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1/ See "Regional Factors in National Planning," National Resources Committee, Washington, D. C., Dec., 1935, p. 145-157. Also see Odum, H. W, and Moore, H. E., "American Regionalism," Henry Holt and Company, New York, 1938, pp. 14-16.

to the extent of postulating wide limits to it. A region is not commonly applied to small areas, e.g., a city, nor to very large areas, e.g., a continent. Hartshorne expresses the relation between the size and significance of a region in the following way: "(there is a)... small but fundamental element of fiction in the assumption of homogeneity of the smallest units of area, (which)... increases progressively as one advances to larger divisions. Consequently, the determination of these larger divisions requires increasingly arbitrary distortions of fact." 2/

(2) the boundaries of a region are usually indefinite, although it is possible to define them with considerable precision, e.g., a river 3/ basin. This is one reason for the current vogue for planning resource development by river basins. The region is characterized by extension from a centre of defined attributes, with the result that zones of indifference are more typical of a region's periphery. For this reason, exact boundaries are normally very arbitrary. 4/

(3) the definition of the region and the nature of its homogeneity will normally be given by some structural or functional purpose. For

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2/ Hartshorne, Richard, "The Nature of Geography," Annals of the Association of American Geographers, Vol. XXIX, No.'s 3 and 4, 1939, p. 442.

3/ It will be argued that a river basin is not necessarily a region as defined later.

4/ (a) See, for instance, Figure 2, p. 29 where the boundary between the spring wheat region and the corn belt region has not been drawn. It fluctuates, depending on relative forces for the two commodities, but the two regions exist and can be identified.
(b) See also Sviatlovsky, E. E., and Ellis, W. C., "The Centrographical Method and Regional Analysis," Geographical Review, No. XXVII, April, 1937, pp. 240-254.

instance, the classification of an area as semi-arid is merely the prelude either to understanding the functional significance of such a classification for human use purposes or to studying the causal relations which produce these classifiable effects.

(4) to limit the multiplicity of possible regions, Odum and Moore postulate a fourth attribute: "(the)... composite homogeneity of the largest number of factors for the largest number of purposes in view, to the end that the region may be a practical workable unit susceptible of both definition and utilization." 5/

(5) it must be a constituent unit in an aggregate whole or totality, which means that its regional nature is definable because it differs from its extra-regional environment, and it can only be understood in relation to the whole. This criterion runs the risk of banality because it is of the essence of our contracting world that practically no area, region or otherwise, can be fully understood except in terms of itself and its environment. However, the purpose of this restriction is expressed by Odum and Moore in the following way: "In this more vital sense, urbanism or metropolitanism is not regionalism insofar as urban centers seek their own ends regardless of relationship to other great centers or in opposition to national or rural ends." 6/ It should be noted, however, that Vidal de la Blache regarded the regional capital

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5/ Odum and Moore, op. cit., p. 15.

6/ ibid, p. 16.

city as the principal cementing or orienting factor in a region. He wrote: "It is not the number of its inhabitants, still less the number of its functionaries; it is not even the type of occupation which constitutes the regional capital. It is a superior element which enters into all aspects of its activity." 7/

(6) the region should be organic. 8/ In other words, Odum and Moore define their region in such a way that it connotes growth and development.

In summing up the essential nature of the region, Dickinson defines it as a "geographical association of human space relationships. Then, while such a region may be defined from many points of view as an area with, for example, the same type of farming, the same type of industrial structure, the same type of culture or language, the chief factor in the integration of the life and organization of society into such regional associations remains the settlement centre, be it the village, the town, or the great city." 9/ Compare Hartshorne's summation of the notion of the region: "It is simply the device by which finite minds can comprehend the infinitely variable function of many semi-independent variable factors. The fiction involved is threefold: we have arbitrarily assumed each small unit area to be uniform throughout; we have delimited it from its neighbours arbitrarily, as a distinct unit (individual);

7/ de la Blache, Vidal, "Les Regions Francaises," Revue de Paris, Dec., 1910

8/ Odum and Moore, op. cit., p. 16.

9/ Dickinson, R. E., City Region and Regionalism, O. U. P., New York, 1947, p. 11.

and we have arbitrarily called very similar units identical in character." This is undoubtedly true, but the significance of the degree of fiction involved depends almost entirely on the purpose of the finite mind in wishing to comprehend the variable factors. 10/

Regionalism

Regionalism is defined by the National Resources Committee as follows: "Regionalism is a clustering of environmental, economic, social, and governmental factors to such an extent that a distinct consciousness of separate identity within the whole, a need for autonomous planning, a manifestation of cultural peculiarities, and a desire for administrative freedom are theoretically recognized and actually put into effect. Regionalism is something to be realized and further developed, as well as a phenomenon which has already appeared and taken form. In one sense, and perhaps the best one, regionalism is a way of life; it is a self-conscious process. Regionalism, as defined in these terms, is not to be entirely identified with that political segmentation which we have been wont to call sectionalism. .... Finally we may refer to what is sometimes called cultural regionalism, namely, the development of distinctive patterns and folkways such as those found in the South, in New England, and in every major portion of the country. .... Regionalism is not merely a manifestation, however, it is a problem and a necessity. Nevertheless, it is an abstraction which takes on form, shape, and reality only as it

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10/ Hartshorne, Richard, op. cit., p. 440.

is expressed in the region. It is possible, then, to develop a concept and definition of the region which will be in accord with actual developments which have already protruded themselves upon the national consciousness, and at the same time will form the foundation of that solution between the several levels and functions of government which is so much needed at the present time, not only in the field of execution, but also in the more recently emphasized field of planning technique and procedure." 11/

The foregoing suggests that even the academic use of the terms "region" and "regionalism" is not very precise, and some clarification seems desirable. If we define a region as an area which exhibits the features of regionalism in some degree and chorography as the study of regionalism, then we are left to formulate a satisfactory definition for regionalism. The following is a tentative suggestion. Regionalism is a philosophy which maintains:

(1) that there are dynamic and static realities which lead to certain unique physical, economic, social, and political cohesions in social space and in social time.

(2) that areas which exhibit these non-telic cohesions should be critically distinguished and analyzed, so that--

(3) the further development and application of these cementing forces may be consciously guided, politically and otherwise, by the

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11/ Natural Resources Committee, op. cit., p. 138-9.

members of the region, because—

(4) the conscious study and guidance of non-telic forces is desirable for the welfare of the region, and—

(5) the physical and emotional welfare of the region is inseparable from that of the nation, and that, therefore, the region should seek to participate constructively in inter-regional and national affairs, accepting the principle that a democratic society involves rights and responsibilities for groups as well as for individuals.

This conception of regionalism raises two problems, one semantic, the other philosophical.

It severely limits the use of the word region, so that any spatial unit which exhibits a homogeneity of attribute(s) but not regionalism (as defined above) requires a new verbal abstraction to identify it. It is suggested that the word "area" is a perfectly adequate substitute, since the connotations of "region" in common usage and "area" are almost always qualified adjectivally. As corollaries to this, we may define an area which exhibits the non-telic characteristics of regionalism as an "intermediate region," and an area which might reasonably be expected to develop non-telic characteristics of regionalism but which is prevented from so doing at any given time by the pressure of outside forces, as an "embryo region."

The second difficulty is that regionalism (as defined above) connotes a normative element. This means that regionalism is assumed to be a desirable end and not necessarily an accomplished fact, which leads to the urgent practical problem of how to bring reality nearer to the ideal.

The implications of this problem for the Missouri River Basin will be examined later.

Historically there have been two main thought-flows on the social validity of regionalism, and they have centered on the region as an economic unit. This seems to be realistic. As Hoover puts it: "For all but the envied minority there is also the question of 'producer location,' i.e., the best place to earn an income." 12/ Moreover, we have to realize that for many people there is no best locational alternative because there is no other occupational alternative for them, e.g., small farmers in certain agriculturally-depressed areas of the South. The non-telic linchpin of every embryo and intermediate region must be its ability to provide opportunities for employment, though when regionalism is effective, this factor may become rather less important.

The first economic defense of regionalism runs as follows. The economic, and, therefore, social, welfare of a region depends on its ability to weather fluctuations; consequently, its economy must be flexible through diversification. This idea springs quite naturally from productive specialization, but more particularly from colonial experience where the metropolitan power, be it intra-national or extra-national, is interested only in that type of production which has a clear cut comparative advantage for the economy of the dominant power. As examples, we might quote the cocoa of the Gold Coast for the United

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12/ Hoover, E. M., The Location of Economic Activity, McGraw-Hill, New York, 1948, p. 4.

Kingdom, and the minerals and cattle of the American West for the American East. This means that if the product of the colonial area becomes non-competitive through obsolescence or new sources of supply, the metropolitan power may adjust to the new situation almost entirely at the expense of the colonial area. The latter, because of the control exercised by the exploiting power, is then left with no immediate alternative production possibilities and suffers an economic eclipse. Therefore, so the argument runs, it must seek to diversify its economy by whatever means are possible in order to avoid the full impact of technological and other changes in the demand for any single product. Taken to its logical conclusion, this probably means an artificial production diversification where the lines of least comparative advantage are subsidized by those lines in which comparative advantage is greatest. This means that a part of the benefits accruing from comparative advantage are sacrificed for the sake of minimizing the effects of technological, cyclical, and taste fluctuations. It should be clear that this concept of the function of regionalism requires the imposition of artificial trade barriers, for, otherwise, an artificially-stimulated diversity of production could not be maintained.

The second economic defense of regionalism runs like this. The region is but one part of the nation (except for the unusual case where the two coincide). The comparative advantage principle enables a nation to maximize the use of its resources; ergo, regionalism based on this principle not only maximizes the nation's material wealth, but, through the interdependence of the regions, increases the internal cohesion of

the nation.

It should be apparent that both of these approaches have merit, and that as we might expect, the most fruitful conception of regionalism will lie somewhere between the two extremes.

In an attempt to demonstrate the superior validity of a "middle way" reference must first be made to the unnecessary artificiality of many colonial economies. This artificiality usually stems, as we have said, from the initial power of the exploiter. It may be that this mono-productive capacity which it generates is an essential prerequisite of the diversified development of the area. In other words, it may be the first step from a variable productive capital structure to a fixed-variable productive capital structure which the economy was unable to make without external help. Once the step is made, the subsequent development of the area, ceteris paribus, depends on the degree to which a regional strength develops in relation to the dominant power. Frequently it happens that the exploiting influences conspire to increase and maintain the dependent status of the satellite. An example of this might be the manipulation of freight rates in favor of eastern markets and against the semi-arid and mountain West. This economic power, exercised through political devices, may perpetuate the initial relationship of exploiter and exploited long after it would have atrophied under the forces of supply and demand, and all that is thereby implied.

The ability of the hinterland to remove its condition of economic subservience depends upon three things:

(1) The development of a sense of unity among its members, leading to—

(2) The ability to express itself from strength in wider courts than those of its exploiter

(3) Its ability to develop a reasonably balanced economy operated largely by members of its own community.

The "middle way" further requires that reference be made to the relationship of the specialized region to the national economy. A region which has few comparative advantages, but which develops them to the full, becomes extremely dependent on the other areas of the nation. This, as has already been pointed out, is one way of ensuring that the region shall identify its own interest with that of the nation, thus minimizing the risk of a growing sectionalism. But if the region is to identify its interest with that of the nation, it is entitled to expect that the risks which it undertakes by specialization will be underwritten, at least in part, by the society as a whole. Without such assurances we may be sure that, as far as it can, the region will look after its own interest through diversification, even if this is at the expense of the national output. The decision to put all of one's eggs in one basket implies that the depositor must feel confident that the one basket is insured against breakages.

We are now in a position to outline the essential conditions for an approach to a regionalism of the "middle way."

First, the principle of comparative advantage should be applied to each region where the results of such a division and interchange of

production offers clear cut advantages.

Second, the encouragement of areal specialization should be implemented by guarantees of national assistance to any region which experiences adversity beyond its control because of its specialized economic activity. Assistance may take the form of relief in periods of temporary distress, and investment in longer periods when a major reorientation of production is needed. Such assistance should be promised on condition that the region does not set up artificial trade barriers. This is, indeed, one of the most urgent questions of the day, whether, and how, to curb protectionism of whatever kind.

Third, the dominance of one region by another should be eliminated, or institutional devices must be created to render such power innocuous.

Fourth, where the comparative advantage differential between regions is negligible for certain products, then local diversification should be encouraged even at the expense of foregoing the cheaper prices which might result from mass production in one or two regions. This could be defended on two grounds. First, we have assumed that opportunity cost differentials are small; therefore, the aggregate production from given resources would be affected but little. Second, the diversification of production would increase employment alternatives for the individuals in the region and help to cushion the effects of a slump in the major specialized industries of the region.

At this point, the critic may argue that the above conditions require regional political organizations to make them effective, and that this would cut across existing political boundaries. He may also

point out that inasmuch as a region's boundaries are imprecise, a great deal of regional overlapping will result, as compared with existing political boundaries which, at least, have the merit of being precise geographically if not necessarily functionally. Both of these arguments contain an element of truth and, perhaps, conservatism.

Intermediate regions already exist, e.g., New England and the Pacific Northwest, and they do not have anything approaching a regional political organization. 13/ Such an organization, if it were set up, need not necessarily emasculate existing political institutions. If properly developed, it could supplement them, perhaps along the lines of the Tennessee Valley Authority. Embryo regions also exist, e.g., the Mountain West and the Great Plains.

Some regional overlapping may be expected, but this need not be regarded with dismay. Any spatial circumscription on a functional basis will face this disability, even as it does today. The scientific approach is to set up the alternative means-consequences relationships of various spatial organizations so that the democratic processes may have clear and scientific guidance for their operation.

It will be evident that there is a close connection between regionalism and planning. In the first place, it has been argued that regionalism is a desirable goal of human organization. In the second place, it has

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13/ They had Planning Commissions with coordinating functions (1) between federal agencies within the regions (2) between states within the regions (3) between state and federal agencies within the regions (4) between governmental and non-governmental organizations within the regions. "Regional Factors in National Planning," Ch. X.

been pointed out that there is a large disparity between this goal and what actually exists. Telesis must intervene between what is and what should be. But there is still another point in the connection between regionalism and planning which is that a region, be it embryo, intermediate, or mature, exhibits a degree of basic homogeneity in its problems which makes it most appropriate for planning. In other words, it may be the largest social unit to which any one plan may be applied with probable economies of scale; and it may be the most democratic planning unit, because of the likely homogeneity of purpose of its members. 14/

In the light of the foregoing, let us examine regionalism and the planning of the Missouri River Basin.

The Missouri River Basin

The Missouri River Basin can be most fittingly defined as a hydrographic area. Its unity lies in the water flow system which causes any change in water use (very broadly defined) at a given point, to be reflected in greater or lesser degree at all other points of the system. This interrelationship and interdependence of the various parts of the basin makes water use planning unsatisfactory on any other basis than the drainage basin. On this point, the President's Water Resources Policy Commission says "No precise determination of such (planning) regions can be made when all resources are considered. But for water

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14/ For a thorough discussion of the organizational features of regionalism, see ibid., Part V.

resources planning, the river basin or ..... groups of river basins will be found to provide the most useful regions for planning purposes." 15/

It will be remembered that in Chapter II, the Missouri Basin was divided up into four parts. 16/ These sections were distinguished in order to facilitate a general description of the basin, and, reasonably enough, they fall nicely into the "possible planning regions" of the National Resources Committee. 17/ There is little doubt that if regionalism were to flourish in the United States, these four sections, having quite different fundaments, would belong to different regions. The pull of the hydrographic area would neither be strong enough nor reasonable enough to reverse such a fragmentation.

Let us consider the Great Plains section. At the present time, the Great Plains can only be defined as an embryo region. It has an obvious and unique ecology which could readily provide the basis for a healthy regionalism of agricultural and mineral specialization. The reasons why a Great Plains regionalism has not developed seem to be three:

(a) The seat of economic power has always been outside the area.

(b) The humid civilization imported into the Great Plains has never been properly adapted to the semi-arid environment, so that social instability is still the keynote of the area.

15/ Water Resources Policy Commission, op. cit., Vol. I, p. 47.

16/ See Figure 2, p. 29.

17/ Natural Resources Committee, op. cit., figure 20, p. 166.

(c) Because of (a) and (b), no "chief-lieu" 18/ has ever had a chance to develop within the area to encourage the cohesion of a divided population and to give powerful expression to the needs and problems of the area--and they are many.

It may well happen that the area will soon burst its chains, provided that the Missouri Basin River Development Program increases economic stability and occupational diversity, though this will not be enough in itself. The diligent efforts of educators and other influential persons will be required to take advantage of the changing situation. If an increasing areal unity accompanies an expanded resource base, then the principle of cumulative causation may quickly operate to bring about a mature regionalism.

Of the remaining sections of the basin, the Rocky Mountains may become a part of an Intermountain Region or a Mountain West. 19/ Here, again, it cannot be said that such an area is anything but an embryo region, with the exception of the Pacific Northwest. It would be true to say that the section of the basin which is in the Corn Belt is already a part of an intermediate region. The agricultural specialization of the Corn Belt with its power and influence both in and out of Congress are well known.

There seems to be no real case, rational or otherwise, for attempting

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18/ Term used by the French advocates of regionalism to denote the idea of a regional capital.

19/ See Garnsey, Morris E., America's New Frontier, The Mountain West, Alfred A. Knoff, New York, 1950.

to foster a Missouri Basin Region. The cohesive force would be a single function; namely, water use, and, as has been pointed out elsewhere, 20/ the upper basins of two watersheds have more in common with each other than either has with the lower basin.

There would appear to be two main objectives of resource development which are intimately connected with water use. They are:

(1) The unified regulation of water use within a river basin to ensure that water is controlled on that basis which will mean the greatest benefit to the nation as a whole, and not to any individual state. This is so because water use within a basin affects more than one state, and the mere geographical coexistence of a state with a given drainage area should not mean autocratic control by that state at the expense of other states affected by the same hydrographic system.

(2) The development of all resources on a regional basis where possible because:

(a) it should prove more economical for the region and the nation

(b) it should prove more democratic

Means for attaining these ends might be devised in accordance with the following principles:

(1) Basin control of water use by a public corporation where the drainage system is inter-state, with some arrangement for close state participation, though not single state veto. Any serious objections

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20/ Natural Resources Committee, op. cit., p. 148.

of a particular state to the corporation plans might be finally adjusted through the Supreme Court. The functions of the corporation might be data collection, water control, and allocation. The corporation should have a simple unified system of accounting and should insist that its employees live in the basin.

(2) The organization of the administrative areas of the federal agencies should coincide with sound embryo, intermediate, or mature regions.

(3) Some arrangement whereby the states which are wholly or partly within a region, of whatever stage of development, may pool their resources and common problems for the betterment of the parts of their states within any given region, and may also see its problems in relation to the other regions into which the remainder of the state falls.

(4) Some kind of continuous advisory group of state and federal bodies for the regions which are distinguished, so that the problems of the region are fully understood by all parties concerned.

(5) The growth in the idea of regionalism to be fostered by an intensive and enlightened educational program. The problem of paying for such a program would probably run into acute political difficulties, and might, in the long run, be achieved only by the action of private individuals and groups.

(6) The extension of the public corporation institution to the development of a region on a group-of-states basis.

Regionalism in the past has faced serious political criticism from the states. Perhaps the states' representatives should think again, for

in protecting the immediate interests of their state, they may lose sight of the longer run advantages which might accrue from an organization of society on a regional basis. Unless they give less myopic consideration to the areas which they represent, the states' representatives may find that they have missed the boat.

APPENDIX A
STATISTICAL TABLES

Table III Peak Acreage of Wheat Harvested in Basin States and Acreages Harvested for 1941, 1943, 1945, and 1949

State	Date of Peak Acreage of Wheat	Peak Acres of Wheat Harvested	Acreage Harvested in			
			1941	1943	1945	1949
		Thousands	Thousands	Thousands	Thousands	Thousands
	(1)	(2)	(3)	(4)	(5)	(6)
Montana	1929	4,419	3,703	3,490	3,777	5,140
Wyoming	1928	342	236	214	232	378
Colorado	1922	1,878	1,368	1,410	1,483	2,884
North Dakota	1928	10,828	8,155	8,343	9,855	10,466
South Dakota	1919	4,427	2,864	2,889	3,201	4,074
Nebraska	1938	4,691	2,354	2,948	3,596	3,761
Kansas	1938	14,494	11,799	10,159	13,416	14,279
Iowa	1874	3,420	181	129	140	416
Missouri	1919	4,427	1,336	973	1,304	1,946

Sources: (a) Columns (1) - (5) quoted in Senate Document No. 191, p. 177.

(b) Columns (3), (4), (5), Agricultural Statistics, U. S. Department of Agriculture.

(c) Column (6) Crop Production Annual Summary, 1949, Bureau of Agricultural Economics.

Table IV Net Changes in Population Numbers in the Missouri Basin by States, 1920-1950

Missouri Basin States	Net Changes in Population Numbers			Total Changes 1920-50
	1920-30	1930-40	1940-50 1/	
Colo.	75,989	59,081	182,280	317,350
Iowa	4,324	(-) 8,363	(-) 35,032	(-) 39,071
Kan.	47,625	(-) 47,195	31,170	31,600
Minn.	1,100	-5,718	320	7,138
Mo.	176,957	64,418	58,239	299,614
Mont.	(-) 14,818	2,712	11,294	(-) 812
Nebr.	81,591	(-) 52,129	(-) 5,029	24,433
N. D.	33,973	(-) 38,870	(-) 25,790	(-) 30,687
S. D.	62,284	(-) 55,870	7,064	13,478
Wyo.	24,738	22,302	37,106	84,146
Total	493,763	(-) 48,196	261,622	707,189

(a) Figures obtained by computing population for counties wholly or partly within the basin.

(b) Based on U. S. Decennial Censuses

(c) 1/ Provisional--no significant changes expected.

Source: Derived from "Progress," a monthly report of the Department of Interior in the Missouri River Basin, Aug., 1950, pp. 35-38.

Table V Number of Counties in the Missouri Basin That Gained Population, 1920-50

Missouri Basin	Number of Counties That Gained Population			Number of Counties That Gained Consistently
	1920-30	1930-40	1940-50 1/	
Colorado	15	12	12	8
Iowa	21	15	7	6
Kansas	38	11	21	7
Minnesota	4	4	3	3
Missouri	15	21	9	7
Montana	13	17	13	6
Nebraska	48	16	15	6
North Dakota	35	10	11	4
South Dakota	50	8	20	2
Wyoming	12	13	12	7
Total	251	127	123	56

(a) Figures obtained for counties wholly or partly within the basin.

(b) Based on U. S. Decennial Censuses

(c) 1/ Provisional--no change expected

Source: "Progress," a monthly report of the Department of Interior in the Missouri River Basin, Aug., 1950, pp. 35-38.

Table VI Number of Counties in the Missouri Basin That Lost Population, 1920-50

Missouri Basin	Number of Counties That Lost Population			Number of Counties That Lost Consistently
	1920-30	1930-40	1940-50 1/	
Colorado	9	12	12	5
Iowa	19	25	33	13
Kansas	28	55	45	24
Minnesota	2	2	3	0
Missouri	52	45	58	40
Montana	29	29	33	19
Nebraska	45	77	78	33
North Dakota	18	43	42	14
South Dakota	18	60	47	14
Wyoming	6	5	6	1
Total	226	353	357	183

(a) Figures obtained for counties wholly or partly within the basin.

(b) Based on U. S. Decennial Censuses.

(c) 1/ Provisional--no change expected

Source: "Progress," a monthly report of the Department of Interior in the Missouri River Basin, Aug., 1950, pp. 35-38.

Table VII Value of Livestock and Livestock Products Sold in the Missouri River Basin, 1944

Commodity	United States	Missouri River Basin	Percent of U. S. Total
Live animals, wool, meat, etc.	$4,527,000,000	$1,220,000,000	27
Dairy Products	2,531,000,000	185,000,000	7
Poultry and Poultry products	1,587,000,000	197,000,000	12
All livestock and livestock products sold	8,645,000,000	1,602,000,000	19

Source: 1945 Census of Agriculture.

Quoted in House Document No. 373, 81st Congress, 1st Session, Missouri River Basin Agricultural Program, 1949.

Table VIII Value of Crops Produced in the Missouri River Basin and Percentage of U. S. Total, 1944.

Crop	United States	Missouri River Basin	Percent of United States Total
	Million Dollars	Million Dollars	
1/ Value of specified crops	14,440	2,090	14
All wheat	1,459	495	34
All corn	3,291	813	24
Oats threshed	721	169	23
Barley threshed	262	104	40
Rye threshed	23	9	39
Flax threshed	60	28	47
Sorghum	307	46	15
Alfalfa cut for hay	606	110	18
Sugar beets	73	26	36
Irish potatoes	520	35	7

1/ Includes some crops not listed in this table but does not include all minor crops.

Source: 1945 Census of Agriculture

Quoted in House Document 373, 81st Congress, 1st Session, Missouri River Basin Agricultural Program, 1949.

Table IX Summary of Sedimentation at Selected Reservoirs for Selected Periods

Reservoir	Stream and Major Basin	Period of Record	Watershed Area	Area of Reservoir		Capacity of Reservoir		Original Capacity Per Sq Mile of Watershed	Total Sediment	Sediment Accumulated Per Year	Ann. Sediment Production Per Sq Mi of Watershed	Depletion of Storage	
				Original	Present	Original	Present					Per Year	To Date of Survey
			Sq.Mi.	Acres	Acres	Acre ft.	Acre ft.	Acre ft.	Acre ft.	Acre ft.	Acre ft.	%	%
Altus (Okla.)	No. Fork, Red River (Red)	1940-48 7.5	2,560	6,772	6,793	156,668	148,640	61.2	8,028	1,070	.42	0.68	5.12
Arrowrock (Idaho)	Boise River (Columbia)	1915-47 32.6	2,170	3,089	3,089 (1941)	279,250	271,550	128.7	7,700	236	.11	.085	2.76
Buffalo Bill (Wyoming)	Shoshone R. (Missouri)	1910-41 31.	1,470	6,682	6,711	455,838	439,851	310.1	15,987	516	.35	.11	3.51
Elephant Butte (New Mexico)	Rio Grande (Total to San Marcial)	1915-47 32.3	25,923 Below Crest	40,060	36,772	2,634,800	2,197,600	101.6	464,600 437,200	14,370 13,523	.55 .52	.51	16.59
Guernsey (Wyoming)	North Platte (Missouri)	1927-47 20.	5,500	2,405	2,386	73,810	49,150	13.4	24,660	1,233	.23	1.67	33.41
Possum Kingdom (Texas)	Brazos	1941-49 7.75	14,066	20,600	20,600	729,985	672,420	51.9	57,565	7,428	.53	1.02	7.89
Tongue River (Montana)	Tongue River (Missouri)	1939-48 9.4	1,740	3,497	3,497	72,510	69,439	41.7	3,071	327	.19	.45	4.24

N. B. Depletion of storage column, per year percent--the rate of storage depletion will increase even if the volume of silt remains constant, because of the falling ratio of capacity to drainage area.

Source: Sloan, W. G., "The Silt Problem in the Missouri Basin," Appendix C, Attached to Minutes of Missouri Basin Inter-Agency Committee Meeting, June 29, 1950.

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