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**PROCEEDINGS OF THE SYMPOSIUM ON
WATER POLICIES ON U.S. IRRIGATED AGRICULTURE:
ARE INCREASED ACREAGES NEEDED
TO MEET DOMESTIC OR
WORLD NEEDS?**

compiled by
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NATIONAL WATER COMMISSION AGRICULTURAL POLICY

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SUMMARY

Consideration of alternative future land and water requirements for agriculture suggest that no further expansion of the nation's agricultural plant will be required during the balance of this century to meet domestic food and fiber requirements. Export requirements are less certain but can quite likely be met by our present plant. In any case Federal programs of land reclamation do not seem to be needed and certainly subsidy to increase export production is unwarranted.

ALTERNATIVE FUTURES

The National Water Commission was created by PL 90-515 enacted in September, 1968. Its charge ^{2/} specified that the Commission should "(1) review present and anticipated national water resource problems, making such projections of water requirements as may be necessary and identifying alternative ways of meeting these requirements---giving consideration, among other things, to conservation and more efficient use of existing supplies,"

In reviewing this portion of its charge the Commission concluded that future water requirements of the nation were in no sense fixed values that could be represented by set of single valued projections for the various uses

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^{2/}Public Law 90-515, 90th Congress, S. 20, Sept. 26, 1968, 82 State. 868.

of water, such as had been presented by the Water Resources Council^{3/}. Rather the Commission saw future water use as the result of the interaction of many variables including population, income growth, energy consumption, demands for food and fiber, government policies, technological change, recreational preferences, and prices. Thus, projections of future water use can properly be made only in the sense of various alternative futures which might lie before the country---futures over which the nation possesses some element of control through the policies it chooses to follow.

The authorized budget for the Commission, five million dollars, was not large enough to fund a comprehensive study of alternative futures while simultaneously examining in depth the policy issues which would determine to a large degree the way in which the actual future would unfold. It had been expected that the Water Resources Council would complete its second national assessment of water availability and need during the five year life of the Commission and that this assessment would be available to the Commission, thus obviating the need for the Commission to undertake detailed projections on its own. Unfortunately, it soon became clear that the Council had insufficient funds for its study, which was, therefore, postponed to a date after that by which the Commission was required to complete its work.

In seeking a solution to this problem, the Commission felt that it was important to demonstrate the concept of alternative futures even if a comprehensive study could not be undertaken. Since irrigated agriculture consumes nearly 80 percent of the total water consumed in the United States^{4/},

^{3/} U. S. Water Resources Council, The Nation's Water Resources, U. S. Govt. Printing Office, Washington, D.C. 1968.

^{4/} Ref. 2, p. 8.

it seemed logical to explore alternative futures in agriculture. Fortunately, the model developed by Dr. Heady was available so that alternative projections could easily be made ^{5/}. Other studies of water demands in industry ^{6/,7/} and thermal power generation ^{8/} were also made for the Commission. Eleven alternative futures for agriculture were tested with the Heady Model^{9/} in which the demand for food and fiber (both domestic and export), Federal agricultural policy, technology, and price, were taken as variables.

Probably no portion of the Commission's report has received more criticism than its Chapter 5C on Food and Fiber Programs. It has been alleged that the Commission recommended withdrawal of irrigated land from production. A reading of the report will disclose that it contains no such recommendation. It is true that all of the eleven alternative futures analyzed by the Heady model show less land allocated to irrigated agriculture than is presently under irrigation. This includes future D which is based on a population of 325,000,000 in the year 2000 and a doubling of the 1967-69 export quantities. Thus one may conclude that within the limits of the model to accurately

^{5/} Heady, Earl O., Agricultural Water Demands, Nat. Tech. Inf. Service No. PB 206,790, 1971.

^{6/} Thompson, R. G. et al., Forecasting Water Demands, Nat. Tech. Inf. Service No. PB 206,491, 1971.

^{7/} Resources for the Future, Future Water Demands, Nat. Tech. Inf. Service, No. PB 197,877, 1970.

^{8/} Krenkel, P. A. et al., The Water Use and Management Aspects of Steam Electric Generation, Nat. Tech. Inf. Service, No. PB 210,355, 1972.

^{9/} Madsken, H. C. et al., Alternative Demands for Water and Land for Agricultural Purposes, Nat. Tech. Inf. Service, No. PB 211,444, 1972.

estimate the most efficient allocation of agricultural land, our current use of irrigation may not be efficient, i.e., we might produce the current and project amounts of food and fiber more efficiently with less irrigated land and more dry-land (rainfed) agriculture. It is, indeed, possible that we have as a nation overinvested in irrigated agriculture and have not developed the most efficient mix of agricultural land use. However, no model can be expected to predict infallibly the best mix of irrigated and rain-fed agriculture. Moreover, the investments in irrigation have been made. They are sunk costs and it would be foolish to abandon the irrigated land and shift its agricultural production to rain-fed lands at this time.

The alternative futures projected by the Heady model all indicated that the land presently available for agriculture would be adequate to meet future needs for food and fiber. If one compares future B based on a population in the year 2000 of 280 million with future D which assumed a population of 325 million plus doubling of export demands, there is a difference in total land requirements of 48 million acres. Since the lower population estimate is far more likely than the high estimate of Future D, the comparison suggests that there will be 48 million acres available to meet export demands in excess of the doubling assumed in Future D. Thus the Commission felt justified in reaching the conclusion^{10/} :

"....., there appears to be adequate productive capacity in the Nation's agriculture to meet food and fiber demand at least until the year 2000. In such case there would be no need in the next 30 years to continue Federally subsidized water resource development programs to increase the agricultural land base of the country,"

^{10/} National Water Commission, Water Policies for the Future, U. S. Govt. Printing Office, 1973, p. 141.

RECOMMENDATIONS RELATING TO AGRICULTURE

As of 1971, the U. S. Government had through water projects made some 45 million acres of land available for agriculture and projected at least 28 million acres for future development. Of these figures only 8.8 million acres were served by Federal irrigation projects and Federal projects for some two million additional acres were authorized. The balance (36 million acres developed and 26 million acres projected) are the result of flood control activities of the Corps of Engineers. In addition to the figures given above some additional lands are protected through the efforts of the U. S. Soil Conservation Service but accurate data on these lands are not available. Thus the Commission conclusion, which seems to be assumed by many to be directed solely at the irrigation programs of the Bureau of Reclamation, is in fact, much more directed at the development of agricultural lands by flood control and drainage activities in the Eastern States.

It is significant also to note the relatively small fraction of the nations agricultural land which has been developed through Federal water programs. The 45 million acre total noted above is only four percent of the total of agricultural land in use or in reserve (1117 million acres) in 1969. The lands under Federal irrigation projects in 1969 (8.6 million acres) constitute only one-fourth of the 34.8 million acres under irrigation. It is true that the irrigated land is usually much more productive than much of the rainfed lands, but it is difficult to believe that a moratorium on new Federal projects would lead to a catastrophe in view of the fact that most of the Nation's agricultural establishment has been developed by private funds. But the Commission did not categorically recommend the termination of Federal programs to develop agricultural lands. What it did recommend was:

"Legislation should be enacted to require full repayment of costs of Federal water resource development projects that result in increases in production of food and fiber."^{11/}.

THE ARGUMENTS PRO AND CON

The extent of Federal subsidy in Corps of Engineers projects is difficult to identify. An analysis of five small projects in the Eastern U. S. which add 238,000 acres of new agricultural land and improve 134,000 additional acres showed a total cost of \$37,000,000 or about \$100 per acre, most of which would be borne by the Federal government. For the Manson Project in the State of Washington, a Bureau of Reclamation project, the estimated full cost of water is about \$414 per acre irrigated of which annual water charges would recover only about \$32 per acre. Estimated gross yield of crops for this project is about \$218 per acre, or only slightly more than half of the cost of water alone. It is cases such as this which lead to the conclusion that Federally developed irrigation is not always an efficient national investment. Comparable figures for other projects will vary with the local conditions but in general the farmer pays 20 percent or less of the cost of water he receives from Federal irrigation projects. One must assume, therefore, that much of the outcry against the Commission recommendations arises from those who will profit from the availability of Federally subsidized water. This includes not only the farmers but local business and professional men who will provide goods and services to the farmers.

^{11/} Ref. [9], p. 142.

The most frequently recurring argument against the Commission recommendations regarding agriculture is that we need to expand food production for the export market in order to correct the Nation's unfavorable export balance. The Commission did not propose any reduction in current agricultural acreage and in fact presumed that acreage would continue to expand both in rainfed and irrigated agriculture under continuing private investment. It surely does not seem reasonable that the United States should subsidize food production for sale abroad. None of our major customers subsidize products sold to the United States. If the export-import balance is to be corrected it must be through competitive sales of unsubsidized products. Indeed, subsidized cotton purchased by the Japanese is returning to us as textiles in competition with our own mills. The argument for food exports was heard most loudly at the height of the Russian wheat purchase in 1972-- a purchase which apparently cost the American taxpayer a sizeable sum of money. It is significant that the 1973 Russian purchases were smaller because of a good wheat harvest on the Russian steppes. It is also significant that the Soviet Union has announced plans for a large expansion of agriculture to meet its needs for food and fiber. The point is not that exports should be avoided. Indeed, they should be encouraged to improve our balance of payments. However, in the long run, an extraordinarily high export market may not exist. Other countries seek self-sufficiency in agriculture and this is desirable in their own interests. For many, it would be preferable that we export technology to help them produce their own food. While we have shipped considerable food to India, she cannot afford to continue purchases for she too has an export-import balance to maintain. A balance made more difficult because of increased oil prices. Moreover, India has the potential for self-sufficiency if it can be developed.

It has also been argued that the Commission failed to properly consider the U. S. population growth. Those who raise this objection have themselves failed to observe the population trends in the U. S. With the birth rate now near the level required to sustain zero population growth, it is quite possible that the lowest population assumed in the alternative future computations 280 million, will not be reached by the year 2000.

Other arguments invoked have been the threat of drought, plant disease and a possible constraint on the use of agricultural chemicals. While the threat of drought always hangs over rain-fed agriculture, the probability of a nation-wide drought of long duration is very low. Indeed, as irrigated agriculture is expanded in the relatively water-short regions of the western U. S., the threat of drought increases because the margin of surplus water is reduced. Two of the alternative futures considered constraints on use of nitrogen fertilizers but even these futures indicated that the available farmland would be adequate. All indications seem to be that technological improvement will keep a reasonable pace with increasing demands, even if technological advance is slower than it has been in the past.

Surely it is possible to postulate a combination of circumstances that will lead to a future for which the only rational preparation is an accelerated program of agricultural production. However, such a future would be most improbable in the light of present trends. The reports of the Commission on Food and Fiber and the Commission on Rural Poverty in 1967 both recommended termination of subsidy for the land development programs of the Federal government. The Economic Research Service of the Department of Agriculture in 1972 projected 3 percent decline in farmland by 2000 even with a projected population of 308 million and a 55 percent increase in domestic consumption of farm products.

On the other hand, the 1969 report of the National Academy of Sciences Committee on Resources and Man recommended that world-wide capacity for agricultural production be increased to the maximum levels possible. They assumed a U. S. population between six and seven billion, nearly double present levels. The OBERS projection (1973) estimates irrigated cropland at 39.8 million acres in the year 2000, an increase of about five million acres. These estimates are based on a projected U. S. population of 307 million. The OBERS projection is a single-valued projection to be used as a basis for planning by the Federal agencies. It assumes no policy changes of an important nature--i.e., a continuation of the present policy of subsidy for irrigated agriculture. Without a policy change it is quite probable that the projection would come true, but this is no basis for judging a proposed policy revision.

CONCLUSION

This paper can perhaps best be summarized by quoting the final paragraph of the discussion on page 141 of the report which reads as follows:

"If our Nation, or the United Nations, concludes that food shortages may be caused by sudden and catastrophic events, whether climatic or biologic, the Commission believes the proper policy to guard against this disaster would be a national or world program for food storage. A World Food Bank would make sense for many reasons, not the least of which would be its symbolizing the dependence of nations upon each other, the 'One World' of Wendell Wilkie. If there is to be a national or world catastrophe that causes food shortages, the addition of a few million more acres of farm land will not prevent it. And if for

whatever reason there should arise a need for more farm land in the United States to meet an unexpectedly rapid increase in exports of farm products, the sensible way to meet such need would be to allow a free and unsubsidized market to do so in the most economic manner. That might or might not involve bringing new land under irrigation or draining and protecting new land from floods. It should depend on what at the time proves to be the least-cost method of increasing farm production. The cost, in any event, should not be borne by the taxpayers, but should be incorporated into the price of the crops exported, so that the United States will no longer be buying imports at today's prices and selling exports at prices of the 1940's and 1950's."