

localities, is no reason which justifies the condemnation of all public improvements which make for the conservation of our vast resources, any more than the "high financiering" of a few American railroads should be a just cause for setting up a bitter feeling of the public against all common carriers. We seem to have reached a climax in unjust legislation which caters to private interests, boodling, high financing, fraudulent mining schemes, etc., which has produced a state of unrest and skepticism among the honest and fair-minded people of our country. But we are now entering upon a new area, and while we may not be the last of the generations to be visited by the sins of our fathers, yet let us hope that these experiences, however costly they have been or will be, will guide us in choosing the servants of the people in future legislation. There never was a time in the history of this great country when the responsibility for the proper use of our resources rested more heavily upon its people than the present. There should be concerted action on the part of all who are interested in our future welfare. Great undertakings cannot be successfully and economically carried to completion without thorough preliminary studies and adequate provision for financing.

The conservation of our natural resources covers such a large field that an attempt will be made here to touch upon a few points only which bear directly upon inland waterways. There has been a great amount of publicity given to this subject during the past decade by the associated press as well as through our engineering journals and engineering society proceedings. The question now arises upon whom rests the responsibility of the proper guidance of the servants of the people in appropriating vast sums of money to be judiciously expended in carrying these extensive projects to completion. The engineering profession has contributed practically all of the data which we now possess relative to this all-important subject, and it would seem that upon the engineers of our country rests the responsibility. In all of our great developments such as our transcontinental railroads, canals, etc., the engineers were the pioneers and upon their judgment and counsel rested the future of the project.

Someone has said, "An engineer's reward lies in his promotion." Many engineers would prefer to change this phrase to "An engineer's reward lies in the satisfaction of doing great things." The engineers to whom will be entrusted the task and honor of the proper guidance in the expenditure of the vast sums of money necessary for this work will find great reward in having served their fellow men in the saving of life and property from the destructive agencies of floods as well as in providing a means of cheap transportation by water and utilizing the energy of streams for manufacturing and other purposes.

Certain sections of our country have been calling for federal and state protection against floods, others for increased transportation facilities in the way of deep waterways, and practically the whole population have awakened to the necessity for immediate action in the matter of conserving our resources. If this problem is to be solved from the standpoint of economy, and if the greatest "income" is to be derived from the investment, broad and well-developed plans must be made for carrying out all of these projects at the same time. Flood protection work cannot be economically and permanently completed without any consideration of the others, neither can canalization be economically done while flood protection is being postponed for the future. The matter of inland waterways to be used as a protection during times of warfare

has received a great deal of consideration during the past few months, which has been largely due to our experience gained at the expense of those who are at present engaged in the great European conflict. It is a difficult matter to even estimate what the value of such inland waterways, which would provide passage for our largest war vessels, would be to the country in times of war. There can be no disputing the fact that these would be of inestimable value. It is not the intention, however, in this short paper to give a complete discussion of inland waterways, neither is it intended to give a general discussion on inland waterways as applied to protection of property from floods and the canalization of inland streams. The object of this paper is to cover a few points which bear directly upon the Mississippi River and its tributaries, namely, protection work which will reduce damage by floods and canalization of the main stream and the larger tributaries.

Engineer's Interests Two-fold.—The engineering profession will be interested in this great problem from the standpoint of citizenship as well as that of engineering. The layman can ordinarily judge a project of this kind only from the results which it produces, while an engineer is capable of judging it from its inception to its completion. When we consider that about forty per cent. of the entire area of the United States is drained into the Mississippi River and that probably more than one-half of the cultivated land of the country is contained within this drainage area we can form some idea of the magnitude of the feat to be accomplished. There is but one way possible for such a project to be financed. The United States government must appropriate large sums annually for years to come. This is a project which will outrival the Panama Canal in extent of cost and benefit to our entire population. In view of the great cost (and there will be a demand for like improvements throughout the other drainage areas) and diversity of opinion in regard to methods to be pursued, it would be unwise to delegate this work to a few engineers whose powers are limited and whose decisions might be influenced by political means. We need only to view a few projects of this kind which have been completed recently to justify our claim for more care in expending public money. The New York barge canal, now nearing completion, is an example of mismanagement due largely to selfish interests centered in Buffalo. The national engineering societies would gladly co-operate with the government in deciding questions of vital interest as they might arise from time to time. These societies are representative of the best engineering talent available and committees delegated by them would render strictly conservative and unbiased reports whenever called into consultation. The feasibility of canalizing a stream in connection with flood protection, power development or municipal water supply should be studied from every angle and should include a study of traffic statistics and conditions by experts in that branch of engineering. Power development and municipal water supply should receive like consideration. Such a body of engineers would safeguard the interests of the public and should not be actuated by personal motives, neither could they be dominated by politicians. It behooves the national engineering societies to enter this field with a solid front and to protest against extravagant legislation or methods of construction which are not in keeping with good practice.

Relation of Floods to Storage Reservoirs and Forests.
—The commonly accepted theory regarding the influence of forests upon stream flow is that deforestation at the