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EDITORIAL

ECONOMIC PROBLEMS OF FLOOD MITIGATION.

This State is still suffering the effects of a major flood disaster which has once again highlighted the problems involved in flood mitigation and control. Heavy concentrations of settlement have occurred in the flood plains and periodic inundation of these regions has resulted in considerable losses in production and has inhibited further intensification of settlement. Scientific research has developed a variety of techniques for mitigating the effects of floods, involving works of varying magnitude and cost. On the one hand, small-scale measures embracing sound techniques of farm management have been devised to conserve soil and diminish run-off from farms in headwater regions, thereby improving the productivity of farms and materially reducing the severity of many floods. On the other hand, major engineering measures are available, including flood control dams, levee banks, drainage channels and improvements to stream courses, all of which offer effective means of mitigating flood damage. Each river basin presents its own special problems and no two are identical. Notwithstanding these developments, it seems clear that complete flood control is economically impracticable and technically unachievable in most river valleys. Therefore, settlement on most flood plains will always remain a calculated risk.

From a national standpoint, investment in flood mitigation competes with investment in other forms of development. As far as possible, it will always be incumbent on interested public bodies to make detailed comparisons between the benefit-cost ratios of investment in one form of flood mitigation compared with investment in other forms of flood mitigation, as well as in other avenues of investment. This will help to assure that scarce resources are used in the public interest.

An economic evaluation of projects for flood mitigation in a region will serve a number of functions. First, it will indicate whether there is sound economic justification for spending money on the scheme. Second, the analysis will provide an estimate of the relative merits or alternative ways of mitigating floods in the region. Third, the analysis will provide a sound basis for determining appropriate measures for financing the works adopted. To this extent, an economic study of the flood problem in a region will provide a basis for devising equitable ways of allocating costs between different areas, and it will show to what extent local beneficiaries can finance all or part of the costs.

One great difficulty in sound planning for flood mitigation is that comprehensive and detailed surveys of flood losses over a long period of years are not available. Many attempts have been made to assess flood damage in various parts of the State, but for the most part these tell an incomplete story. In particular, they relate only to recent history. To be of maximum value to the overall design of sound schemes for mitigating floods, estimates of *past* flood damage should provide a sound statistical basis for predicting the probable pattern of *future* flood damage. It is most desirable, therefore, that the present work of collecting this data be continued in a more intensive fashion, otherwise it may prove exceedingly difficult not only to decide appropriate measures for flood mitigation, but also to set up equitable measures for financing the erection and maintenance of the necessary works.

The calculation of benefit-cost ratios for flood mitigation schemes raises a number of difficulties. Not only is it often difficult to obtain reasonable agreement on appropriate definitions of benefits and costs, but both these elements are difficult to compute. No appropriate measure can be given such benefits as the saving of lives or the prevention of serious disruption of essential services over a wide area. It is also difficult to predict the increased production which will arise from the mitigation of flood losses and the removal of some of the elements of uncertainty which attend flood plain occupancy. Similarly, the mitigation of flood damage will often set in train a series of benefits which multiply through time. Thus in some situations where benefits might be small in the short run, long-term benefits might prove very much more substantial. Of course, the same difficulties are associated with predicting the outcome of other forms of investment.

Measuring the costs associated with major flood mitigation schemes is also fraught with difficulties. The prime costs of erecting the necessary works are relatively easy to compute, but there are other costs associated with major works which are more difficult to measure. For example, the erection of a flood mitigation dam will require the resumption of land of some value for the site, whilst the dam may cause temporary or permanent flooding of valuable land, roads and rail routes, and even townships, in some instances. Some attempt will have to be made to assess such losses.

How should flood mitigation be financed? Where comprehensive works are required, it is inevitable that the State will bear a large part of the burden. However, consideration should always be given to encouraging the maximum amount of local participation without undue embarrassment. In view of the difficulties of measuring and securing agreement on benefit-cost ratios, it has been argued by some authorities that a more suitable measure of the economic merits of flood mitigation schemes is their worth to the beneficiaries. This worth can be measured by the extent to which these beneficiaries are willing to provide a *proportion* of the costs. Encouraging a greater degree of local participation will give persons benefiting from flood mitigation a more intimate interest in such measures, and it will encourage a greater concentration on more worthy projects. To the extent that financing flood mitigation is a direct subsidy to local beneficiaries, it has been argued that further heedless occupation of flood hazard areas will be encouraged unless these beneficiaries are required to share in the costs of flood mitigation. Of course it will always prove difficult to design efficient programmes for local participation in flood mitigation. Equitable ways of devising how the costs should be shared in different proportions by different beneficiaries can only be solved on the basis of a detailed assessment of the flood hazard in different parts of riverine areas. This will require a detailed examination of the flood hazards confronting each landholder.