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WATER - A PRIMARY NATURAL RESOURCE

Part I.

Flood Control Is One of Nature's  
Problems that Needs More Careful Study.

By  
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(Mr. Kenneth A. Reid of Chicago, Illinois, is Executive Secretary of the Izaak Walton League of America and has furnished two articles relating to our rivers, the first on flood control and the second relates to irrigation. Mr. Reid is to come west to attend the annual meeting of the Portland Chapter, to be held December 16th.)

Land, water and air are the three basic natural resources on which everything we eat, everything we wear, all the necessities and luxuries of life, in fact life itself, is dependent. Air we may take for granted; land has been the subject of much governmental control, presumably in the public interest, but water remains the orphan step-child in the natural resource picture, which to date has been neglected entirely in any rational scheme of management that would protect its real public values. It has been dammed, diverted, drained, polluted, stolen and wasted for private profit and political expediency with utter disregard for its broad public value; yet no natural resource is more truly public in its nature than water.

What a man, or a group of men, may do to a particular piece of land may be very bad for that particular piece, but it may have no effect, or at most only an indirect effect,



on other lands in that area. But what that same man, or a group of men, do to water that flows over the land, or even that flows under it in subterranean passages, has a very definite and frequently adverse effect on the whole public in the watershed below this particular piece of land.

Land is static; the effects of its misuse, except for the indirect ones resulting in wind and water erosion, are confined largely to the borders of the land so abused. Water is not static, but a mobile thing that moves on by gravity to its eventual resting place in the ocean. When a stream is polluted the ill effects are visited on all the downstream residents who are innocent victims of this selfish and unsocial practice. When a stream is dammed and diverted they are likewise robbed of the water that Nature intended to flow through their downstream property. When a stream is dammed and used for peak load hydro-power, the downstream residents suffer from alternate floods and droughts as the gates to the turbines are suddenly opened and closed. When an individual or community drains a piece of land or straightens a stream channel or lines it with levees or revetments to 'reclaim' a particular piece of land, it merely aggravates the extremes of floods and droughts in the valley below.

Public interest obviously demands that every use or misuse of water in any locality be carefully evaluated as to its effects on the entire stream system. Actually the exact reverse has been the history of our water management, or more



properly, mis-management. Individuals or communities have done as they pleased with it with bland disregard for the ill effects on others below them.

In recent years there has been a great deal of publicity on the great destructiveness of floods and the need for controlling them. One would gain the impression from the promotional publicity that floods are a man-made evil that must be eliminated in the public interest, and Congress has been moved to appropriate staggering sums for gigantic concrete dams, levees, revetments and other works to this end. As a matter of fact, floods are by no means a new thing, nor are they essentially man-made. Records of the early explorers coming up the Mississippi, tell of floods extending for miles back from the river to the height of the tree tops. That was before man's activities had in any way disturbed the drainage basin above. Floods are a definite part of nature, and their effects are by no means all on the debit side of the ledger. Much of our richest farm land was created by former floods depositing fine alluvial silt in the valleys along the courses of the rivers. The continuous fertility of this land on the long time picture is dependent upon recurring floods revitalizing these lands by further deposits. To entirely exclude them by artificial means would eventually reduce the fertility and productivity of these valuable lands.

Some years ago, at a flood control conference, I heard the bald facts of the flood problem tersely presented



by a prominent Army engineer. Quoting from memory it ran about as follows: "When we are honest with ourselves and get down to the bottom of the flood problem, about 90% of flood damage is the result of man's damfoolishness in building his roads, railroads, buildings, highways, and whatnot, on land that plainly belongs to the river. When he built there the evidence that the river had used it for flood purposes in past time was plainly visible, and when that evidence is there he can be sure that the river will again flood that land. It would be much more sensible and far more economical in many instances, to retire from human occupancy or use, such obvious natural flood areas and give them back to the river for flood purposes." These were indeed words of wisdom; would that the Army engineers might all be as frank and outspoken in their reports on some of the fanciful flood control projects with which Congress is being continually besieged via the pork-barrel route.

There is need for clear thinking and broad vision that sees all values in terms of an entire watershed, not merely the desires or fancied needs of one small community or area. We need to work with Nature, not ignore her and try to make her over according to man-made standards that are at variance with the natural scheme of things. The place to work on floods is at the headwaters, not in the lower courses where the actual damage will occur. We are too prone to attack effects and ignore causes. Where floods have been aggravated since man's



occupancy this effect can be traced to definite causes, and these causes will be found in the upper watershed.

Let us consider the picture of the environmental changes that have been wrought in the average watershed by man's activity. We have heard much about the destruction of forests as a major contributing cause of both floods and droughts. We have heard little of other activities that may often be larger and more serious contributing factors. Unrestrained grazing by livestock may easily have an equal or greater adverse effect on run-off; and tilled lands, essential as they are to the national economy, accelerate run-off more than the most ruthless logging of the forests. Furthermore, even in mountainous regions some sort of limited drainage is usually a corollary to putting the land under agriculture.

Another important factor that has been given scant, if any, attention by flood control enthusiasts is the cumulative effect of our vast network of roads and highways in accelerating run-off. A cardinal principle of highway construction is drainage and our modern road system, particularly in hilly or mountainous sections, affords a most effective drainage system, catching the water that would normally seep slowly down the slope, and rushing it down highway ditches to the nearest stream. Much good could be accomplished by cooperation of our highway engineers in a coordinated program that recognized the part that roads take in aggravating floods by present construction methods. Thousands of highway fills could be utilized as small



breather dams, by the simple expedient of building a small U-shaped weir or dam on the up-stream side of the present culvert to the desired height and providing it with an automatic high and low water discharge. They would hold back the flood waters until they filled up to the high-water spillway; then after the rain ceased they would automatically fall slowly to the predetermined low water level, thus greatly minimizing droughts as well as floods, and helping to stabilize the underground water table. Unfortunately many highway engineers are rather stubborn in their hide-bound adherence to their basic engineering idea of getting water away from the highway as quickly as possible. The principle of highway fill dams is, nevertheless, highly practical and has been successfully employed without damage to highways. Even railway fills have been so used without damage to the fills.

So much for the headwaters: now let's go down along the rivers to see what has been done by man to invite increased flood-damage. Particularly in hilly or mountainous country we are likely to find a railroad along one side of the river and a highway along the other. In many cases we find that increased transportation needs have necessitated the widening of one or both, and the additional width has been gained by filling out into the river channel. In a mining section, vast slate or other refuse piles dumped into the river channel on the outside of the railroad or highway, are common sights. Similarly many factories will be found erected on filled land in what was formerly the river channel.



Now let's go on downstream until we reach the lower course of the mighty Father of Waters. Here for many miles on one or both sides of the river we find great levees confining the river to a narrow channel and preventing the river from spreading out into the vast natural flood plain that had acted as a natural safety valve for dissipating and slowing down the flood waters before man attempted to make everything over according to his own notion. In the vicinity of New Orleans one has the odd and rather weird experience of looking up from a train window to see a boat above him on the river behind the levee.

On the upper watershed we have a picture of deforestation, wholesale drainage of lakes and swamps for a fancied need for more farm lands, vast areas of cleared and tilled land, an intricate system of highways and roads with their efficient drainage ditches--all contributing to increased run-off in times of heavy rainfall and decreased streamflow in times of drought. Along the middle courses we find the river channels progressively restricted by railways, highways, factory sites, and other works of man accelerating the flow, and on the lower courses we have the picture of a deliberately walled-in river preventing the natural spread of the waters over the vast flood plains. Is it any wonder that on occasion Old Man River goes on a rampage and causes tremendous destruction of improved property, when we so flagrantly ignore all Nature's laws governing precipitation and run-off. There is

indeed a vital need for better coordination amongst our governmental agencies so that the weird spectacle of one agency conducting drainage works while another carries on flood control works (and sometimes it has even been the same agency) in the same watershed may be eliminated. We need more men with a broad understanding of nature and natural laws, and fewer specialists.



*Sent to Legman*

## WATER - A PRIMARY NATURAL RESOURCE

### Part 2.

#### Irrigation in the West and Its Effect on the Natural Aquatic Values of the Rivers.

By  
Kenneth A. Reid.

Irrigation is another use of water that may, and often does, adversely affect public rights in water. It may be either a public asset or a public liability, depending upon the source of the water and on whether or not consideration is given to public values in the management of the project. Where catchment and storage dams are constructed in arid country on intermittent streams, any public aquatic values that they may have will be a clear gain, but where an irrigation dam is built on a live stream that in its original condition has important public aquatic values, and the whole or a large part of the water is diverted from that stream, the public loses important aquatic values. Even where the dam is not used for diversion, but merely for storage and the water is discharged down the river channel for lower diversion, public aquatic values in the river below are often materially impaired or ruined by single purpose operation of the dam for the sole convenience of down river water users, without any consideration of the general public's interest in, and right to, the natural aquatic values of the river. Many of our Rocky Mountain trout rivers that have not been dried up by diversion have been practically ruined by the widely fluctuating volumes of water released from the storage dams - one



time being practically dry while water is being stored and the next day in flood while it is being delivered down to the irrigationists. Many of these flagrant abuses could be eliminated, or at least greatly minimized, by the practice of that simple rule of good social behavior - consideration for the rights of others. Again, we need more broad vision and less specialization.

But the effects of irrigation are not confined entirely to surface waters. In many sections water for irrigation has been derived from underground sources, from both artesian wells and by pumping. As long as there were only a few such wells there were no apparent ill effects, but in some sections the drain on the underground water supply has been so great as to lower the water table materially, which in turn has adversely affected the fertility of the farm lands above it. Again we have been cursed by the short-sighted specialist and are obliged to pay the penalties for failure to understand, or heed what knowledge we have of Nature's laws.

The economic side of irrigation presents some amusing inconsistencies - if the effects were not so tragic alike to the taxpayer's pocketbook and his natural resources. The federal agencies conducting this work naively refer to it as "public water conservation." As a matter of fact, it is often the rankest sort of private or group water exploitation in which true public values are given no consideration whatever. Furthermore, many of these projects are so fanciful and the capital cost per acre so great that no private agency would touch them.



Take the case of the much publicized Grand Coulee dam in Washington. Let's analyze the government's own figures: it estimates \$400,000,000 for the cost of construction, from which a maximum of 1,200,000 acres of land are susceptible of irrigation. Divide 1,200,000 into 400,000,000 and we have a capital cost mortgage of \$333.33 on every acre of land, plus the annual water rental. The government arbitrarily charges off half of this to power for a fancied, but presently non-existent, market while blandly ignoring in its economic picture the great loss from its destruction of existing salmon fisheries. Even so, we would still have a mortgage of \$166.66 on every acre of land for the capital cost of irrigation.

The Bureau of Reclamation in the Department of Interior spends many millions of dollars every year to irrigate more land, to make more farm land, to make more over-production, to make more farm relief necessary. At the same time, under the Department of Agriculture, existing farmers are paid staggering sums to take present farm lands out of cultivation, presumably because of over-production. Now either putting more land under cultivation, or taking existing land out of cultivation, might conceivably be justified, but both at the same time by the same government cannot, by any stretch of the imagination, be justified. It is plain economic nonsense that the taxpayer is obliged to pay for both in cash and in loss of valuable aquatic resources. Like flood control, irrigation presents a wonderful opportunity for pork barrel schemes for the benefit of selfish local promoters, job-hungry engineers and vote-seeking politicians.



The Izaak Walton League is not opposed to irrigation per se any more than it is to flood control honestly conceived. It is, however, definitely opposed to the flagrant abuses of public aquatic values resulting from many of these pork barrel schemes that wholly ignore them. It insists that the existing natural values of water; namely, the biological functions and recreational uses from a truly public standpoint be given proper consideration prior to authorization for construction of dams or other works for power, irrigation, navigation, drainage, flood control, or any other purely utilitarian uses of water. We feel that this position is entirely fair and very definitely in the public interest. It is high time that real public values in water be given consideration. To date, those who would exploit it for private group profit, or political expediency, have been given all the consideration. Apparently there is much truth in the old saying that everybody's business is nobody's business, for it certainly applies for our failure to protect true public values in water.

In the construction of high dams, both private and governmental, the effect on fisheries has commonly been given no consideration, or only afterthoughts when it was too late to do anything. Many competent authorities estimate the annual loss of fish in the western states by diversion through the irrigation ditches out over the fields, to be greater than the total take by all the rod and line fishermen. However this may be, the loss is tremendous and it is preventable. Most



of the states have laws requiring the screening of irrigation ditches, but these laws are seldom enforced. One of the reasons is that the Bureau of Reclamation, a federal agency which incidentally is now a brother of the Fish and Wildlife Service under the Department of Interior, commonly builds its dams without any provisions for preventing loss of fish through diversion. Under the circumstances one could hardly expect proper enforcement of state laws against individual ranchers when the federal government in its large diversion dams is a prime offender. Certainly by all that is reasonable, the federal government should set the example, and the place for fish conservation of this type to begin is at the main headgates of these large diversion dams.

The League urges and insists that such preventable loss of fisheries resources be stopped by making proper screening of these headgates an integral part of the engineering plans for the construction of any dam, and proper maintenance of these screens a positive part of the operating plans thereafter. It further contends that proper consideration of true public values demands that when such dams are constructed on perennial streams, maximum and minimum water levels commensurate with fisheries needs be agreed upon with the Fish and Wildlife Service and the equivalent state agency, in advance of authorization; and that where such dams are used for storage and the water is released to the river channel below for downriver diversion, that maximum and minimum flow commensurate with requirements for fisher-



ies be similarly agreed upon prior to authorization for construction. We feel that these recommendations are both feasible and entirely reasonable, and very definitely in the public interest. Again the need for better coordination is apparent in the administration of our natural resources.