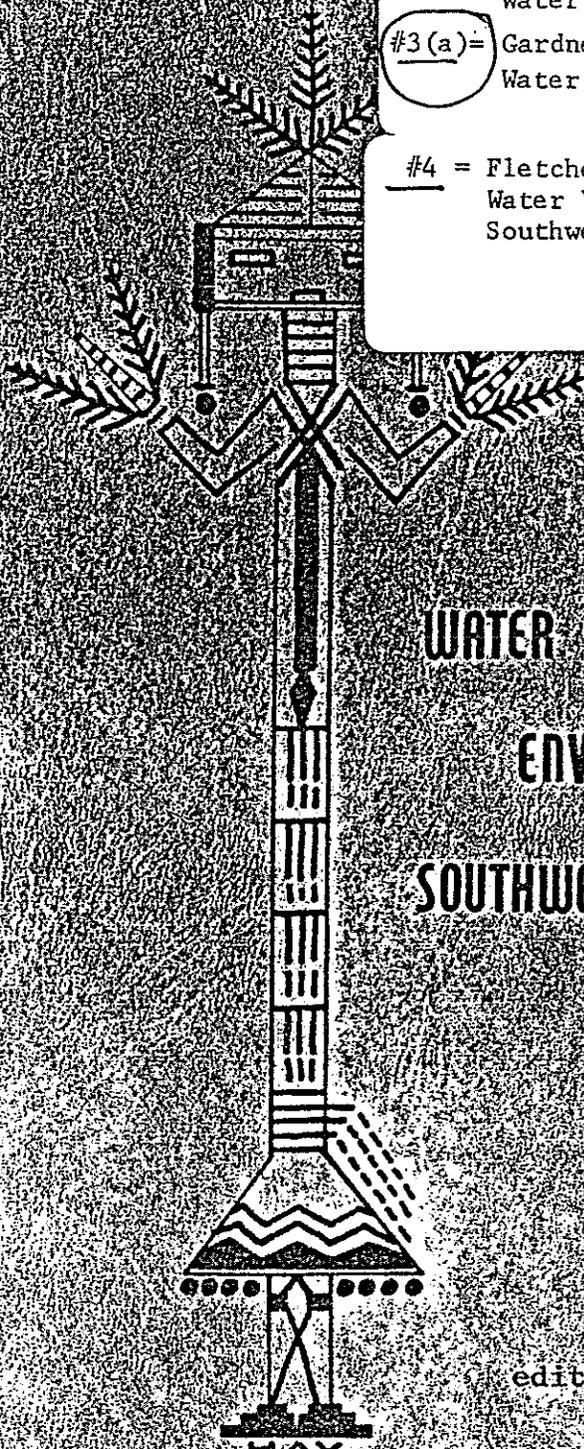


#3 = Keppel - p. 39  
Water Yield fr. SW Grassland.

#3(a) = Gardner - p. 1 (Introd. to Symp.)  
Water Yield in Relation to Envir..

#4 = Fletcher - p. 51  
Water Yield in Rel. to Environ. in  
Southwestern United States.



**WATER YIELD IN RELATION TO  
ENVIRONMENT IN THE  
SOUTHWESTERN UNITED STATES**

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HAY

## INTRODUCTION

by

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The Committee on Desert and Arid Zones Research, which has arranged this symposium, was established by the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science at the El Paso meetings in 1951. The purpose of the Committee is to encourage study and research on the phenomena affecting human occupation of arid and semiarid regions, primarily within the areas represented by the Division. This is interpreted to include educational and research activities, fundamental or applied, that would further understanding and efficient use of our arid lands.

One of the activities of the Committee has been the arrangement of a series of annual symposia on the Southwest, of which this is the fourth. The first of the series, held at the Tucson meetings in 1957, was entitled Climate and Man in the Southwest. The second, at the 1958 meetings in Las Vegas, New Mexico, presented aspects of the biogeology of the Southwest—both past and present. The one at Laramie, Wyoming, meetings in 1959, discussed agricultural problems in arid and semiarid environments. The papers of these symposia have been published by the respective host institutions—the University of Arizona, Highlands University, and the University of Wyoming.

The present papers discuss phases of a subject of ever increasing importance to inhabitants of arid and semiarid environments: yield of water from drainage areas and some of the factors that influence it. In thinking over what should be said by way of introduction to these papers, I began to wonder what concept the layman has when he hears the term water yield. To find out, I asked a number of my friends: "What is the water yield of an area?" The variety of answers to this question furnished convincing evidence that the term should be defined for the benefit of those to whom it is not familiar.

What, then, is the water yield of an area? As used here, it is that portion of the total precipitation falling on the area which passes the lowest point on the area as streamflow or seepage. To this should be added, I presume, any water that may enter the permanent water table above this point. Water yield may be expressed as a percentage of the precipitation falling on the area, as a volume per unit area—usually acre-feet per square mile—, as a depth—usually inches—that would cover the area, etc.

Water, as has been repeatedly emphasized in previous symposia of the series, is the most important single factor limiting human occupation of arid and semiarid regions. Its limited availability has resulted in what Koenig (1956) refers to as an "oasis economy," in which population is concentrated in areas where water is available and very sparse in those where it is not. Water supplies for these populated areas come from stored groundwater or from stream flow from more humid mountainous areas situated within or on the edge of the arid regions. Little of their water is derived from within the arid portions, which in spite of apparently large flash flows in ephemeral streams, produce very small percentages of their scant total precipitation as water yield.

The philosophy of water seems to be changing, even in humid regions. Until quite recently, water in regions east of the hundredth meridian was something to be gotten rid of with the least damage possible. Recently, with the increase in population and per capita use, this attitude seems to be changing. West of this meridian, it was

always something to save for beneficial use; but the concepts of what may constitute the highest beneficial use appear to be undergoing gradual revision. A few short years ago, anyone rash enough to suggest even to a group of scientists that the time might come when water would be put to more important use than irrigation was roundly jeered. Now, even some of the chief jeerers expound publicly that, in time, the available water may be used more beneficially than for agriculture. It has long been recognized that domestic use must be given precedence over any other, and the idea seems to be growing that, since many more people can be supported in industry than in agriculture with the same amount of water (Koenig, *op. cit.*), it may eventually become socially expedient to use the water thus and to import food from more humid areas, even though such use would entail adjustments in the laws governing water rights.

As population pressure increases, the need for water will become more and more acute, and the questions discussed in the ensuing papers will receive more and more attention. The Committee considers it appropriate, therefore, to present a resume of some of the work that is being done in the Southwest in this important field of water yield.

#### LITERATURE CITED

- Koenig, L. 1956. The economics of water sources. In: The Future of Arid Lands. Papers and Recommendations from the International Arid Lands Meetings. (At Albuquerque, New Mexico) Publication Number 43 of the American Association for the Advancement of Science, Washington, D. C.