

Ground Water Conditions of the Unglaciaded Area in the Southern Part of Indiana

T. M. KINGSBURY, Indiana Department of Conservation

During the past few years there have been phenomena which have focused attention on our water resources as never before. Only a few years ago a new phrase was created to describe a new condition in the mid-western states. This phrase was "the dust bowl." More recently the nation was shocked by the news of a water shortage in the great city of New York. In the past summer widespread droughts have brought hardships and serious economic losses in many states.

While some of the reports of these circumstances have been exaggerated and sensational, the fact remains that water in sufficient amounts to meet present domestic and industrial needs is a serious problem. In our own state this problem is becoming of more and more concern. While there are areas of ground water shortage in various parts of the state, southern Indiana is usually hardest hit. More particularly this is true of the unglaciaded area and the hilly region along and for some miles back from the Ohio River.

The seriousness of the situation in a large portion of this general area is much greater than most people realize. During the summer and fall seasons just past, failures of water supplies were general. Wells went dry. The same is true of cisterns. Farm ponds, of which there are a great many in that area to furnish a supply of water for livestock, became stagnant pools. In some localities municipal supplies became so exhausted that warnings were issued to conserve the water by limiting its use to most essential purposes. The hauling of water to rural areas in tanks mounted on trucks became necessary over the entire area along the river and as far north as Brownstown and Bedford. The Evansville station of the U. S. Weather Bureau recorded only 6.85 inches of rainfall from the beginning of June through October. The deficiency from normal for this 5-month period was 9.28 inches. This period was marked by high temperatures which increased evaporation losses. The net result caused crop losses, especially to pasture land, and increased fire hazards in large areas of timber lands.

Conditions approaching in varying degrees those which occurred during the past summer are the rule rather than the exception in southern Indiana. Yet that part of the state normally receives a greater amount of precipitation than other parts. Why then are water shortages more common and the problems of obtaining an adequate supply more complex there, than in most of the northern three-fourths of the state?

Precipitation is the only source of our water supply. It is of first importance in considering water problems. This is especially true in southern Indiana. That part of the state normally receives more than 40 inches annually whereas the state as a whole receives slightly less than that amount. In parts of southern Indiana the normal yearly precipitation amounts to more than 45 inches. This is more than 10 inches in excess

of the normal received in portions of the northern part of the state. The area around Marengo receives more precipitation than any other part of the state. From a standpoint of water supply the annual precipitation is divided into three periods: (1) The storage period which in the latitude of southern Indiana is from December to May, inclusive, (2) The growing period, from June through August, and (3) The replenishing period from September through November. There is little runoff except in the storage period and a deficiency in precipitation at this time is rarely made up during the other periods. During the growing period more than the usual amount of rainfall is required by plant growth. Ground water storage is at a seasonal low at the end of this period. Precipitation during the replenishing period goes into ground storage.

The geology of the area under discussion is the second most important factor. The region as a whole is comparatively rugged. To the east and in the area commonly known as the Knobs, the topography is marked by deep, steep-sided valleys, with limited upland areas and broad flat valleys only along the larger streams. The Mississippian limestone regions to the west are characterized by a more rolling topography. It is a region of caves, sinkholes and uncertain underground drainage. Farther west are alternate strata of limestones, shales and sandstones. The topography is more like that to the east. It is rugged with deeply cut stream beds and excessive surface erosion.

This type of topography and rock formations are related to water resources in a number of ways: (1) In practically all of this unglaciated area there is an absence of loose material over-laying the native rock, and storage areas for ground water are therefore extremely limited. This condition is, of course, reversed in much of the glaciated areas to the north. (2) In areas of rugged topography, where hillsides are steep and valleys are narrow, the surface runoff is rapid. Rainfall is not retained long enough to permit much penetration below the surface. Also, in the central limestone area in southern Indiana much of the rainfall is lost through sink holes and subsurface drainage which form an intricate system of subterranean streams. (3) The character of the bed rock formations in a large portion of the general area are not well suited to holding or transmitting water. There are large areas of relative impervious shale. Some of the sandstones are so cemented that they are also impervious. Shallow wells yield water slowly and become practically dry in drought periods. Deep drilling does not solve the problem except in isolated cases. Some deep wells produce only 2 to 5 g.p.m., some may produce mineralized water.

The solution to the water problem appears to be to retain precipitation when and where it falls in well constructed ponds and reservoirs. The experience of the past summer should be a lesson. The reservoirs should be larger in size and greater in number than those which exist at present. The impervious character of the bed rock, the thin layer of soil, predominately clay, which overlies it, and the typical rugged topography of the surface, while unfavorable for the collection and retention of rainfall, are, in many areas, most favorable for the impounding of surface water supplies.