An Agricultural Law Research Article

Arizona Law Where Ground and Surface Water Meet

Part 1 of 2

by

John D. Leshy and James Belanger

Originally published in the ARIZONA STATE LAW JOURNAL
20 ARIZ. ST. L.J. 657 (1988)

Arizona Law Where Ground and Surface Water Meet

By John D. Leshy* and James Belanger**

I. INTRODUCTION

A notable historical peculiarity of water law was its division of water, and the legal system applicable to it, into two categories.[1] In the nineteenth century, most states, including many Western ones, distinguished between surface water[2] and groundwater.[3] Surface water was governed by the riparian rights doctrine[4] or, as in most Western states, the prior appropriation doctrine.[5] Groundwater, on the other hand, was deemed "owned" by the owner of the overlying land.[6]

This bifurcation was artificial, at odds with hydrogeologic reality. Subterranean water is often physically connected in some way with water found on the surface.[7] Surface watercourses can both affect the supply of groundwater and in turn be affected by groundwater withdrawals. By walling off the two sources, the common law created a "hydrologic bicycle"[8] instead of conforming to the hydrologic cycle.

---

* Professor of Law, Arizona State University; A.B., J.D., Harvard.

** Associate, Lewis & Roca, Phoenix, Arizona; A.B. Brandeis, J.D. Arizona State University. The views expressed herein are solely those of the authors.

1. J. SAX, WATER LAW, PLANNING & POLICY 449 (1968).

2. This also included so-called "underground streams." *See* D. GETCHES, WATER LAW IN A NUTSHELL 221 (1984); C. MEYERS, A. TARLOCK, J. CORBRIDGE, JR. & D. GETCHES, WATER RESOURCE MANAGEMENT 592-93 (3d ed. 1988)

3. This is usually called "percolating" groundwater, to distinguish it from subterranean water in underground streams. D. GETCHES, *supra* note 2, at 221.

4. *Id.* at 15-16, 18.

5. *Id.* at 16-18, 82-89.

6. *Id.* at 232-34, 238-39.

7. *See infra* text accompanying notes 42-73. As a hydrologist noted in 1962, "water-rights concepts have been developed . . . chiefly with an objective that amounts to fitting a round peg into a square hole . . . . In the process we have created a pseudohydrology that is awe-inspiring but unacceptable to the scientist." H. THOMAS, *Water and the Southwest—What Is the Future?* 14 (U.S. Geological Survey Circular 469, 1962).

8. Moses, *Basic Groundwater Problems*, 14 ROCKY MTN. MIN. L. INST. 501, 503 (1968). Moses takes a brief, entertaining romp through historical conceptions of groundwater found in sources such as the Bible and the writings of the ancient Greeks. *See id.* at 501-02.

The origin of this division was, nevertheless, understandable. At the time these legal principles were established, substantial ignorance existed about possible hydrologic interrelations.[9] Even when the connection was too obvious to be ignored, the ability to predict or measure the effects of the use of one on the other was lacking. Further, until the use of high-speed pumps sufficient to withdraw large quantities of groundwater became common, the effect of the hydrologic connection was generally not very significant.[10] It was not until around the turn of this century, when groundwater began to be widely used, that the common law's shortcomings first attracted attention.[11]

The solution was obvious. Samuel Wiel, perhaps the most celebrated commentator on water law in American history, wrote nearly sixty years ago that the law "cannot prosper" in "ignorance or disregard" of the connection between ground and surface water.[12] Arizona's leading hydrologist, G.E.P. Smith, observed more than fifty years ago: "Groundwaters are derived from surface waters, and much surface water stream flow is derived from groundwaters. The effective protection of either one involves some degree of control over the other."[13] The late Frank J. Trelease, the modern dean of Western water law analysts, put the matter in his characteristically forthright way: "Where . . . the stream

---

9. *See, e.g.*, 2 S. WIEL, WATER RIGHTS IN THE WESTERN STATES § 1082, at 1022 (3d ed. 1911) ("more recent scientific investigation has dispelled much of this mystery concerning the movement of underground water"); 2 C. KINNEY, LAW OF IRRIGATION § 1194, at 2163 (2d ed. 1912).

10. *See* Bagley, *Water Rights Law and Public Policies Relating to Ground Water "Mining" in the Southwestern States*, 4 J. L. & ECON. 144, 152 (1961). *See also* Mann, *Law and Politics of Groundwater in Arizona*, 2 ARIZ. L. REV. 241, 242-43 (1960) ("Ground water was used for domestic and stockwatering purposes early in territorial days, but it was not considered a fruitful source of large-scale agricultural development . . . [and there was general agreement] that there was no relationship between the surface and underground water flow and water that percolated through the soil.").

11. In his provocative book, THE TRANSFORMATION OF AMERICAN LAW, 1780-1860 (1977), Morton Horwitz offered another explanation for the nineteenth century common law distinction between ground and surface water. He suggested that groundwater disputes did not come to the fore until after the common law had generally changed into a consciously exercised instrument of economic development. Surface water doctrine, on the other hand, developed before this transformation. In Horwitz's view, the courts perceived that economic development was better served by a rule that gave landowners (principally, mining enterprises) broad rights over the water found underneath their land. Thus, he concluded, "the difference in treatment accorded underground and surface waters can largely be explained by the fact that the first cases directly involving the former arose only after laissez-faire assumptions firmly took hold of the imaginations of American judges." *Id.* at 105.

12. Wiel, *Need for Unified Law for Surface and Underground Water*, 2 S. CAL. L. REV. 358, 369 (1929).

13. G.E.P. SMITH, GROUNDWATER LAW IN ARIZONA AND NEIGHBORING STATES 47 (U. of Ariz. C. of Agric. Tech. Bull. No. 65, 1936).

and the groundwater are so closely connected that the use of one affects the other, the same law must be applied to both sources."[14] The National Water Commission, a blue-ribbon body created by Congress as part of the political compromise that paved the way for the Central Arizona Project,[15] was equally blunt:

> State laws should recognize and take account of the substantial interrelation of surface water and ground water. Rights in both sources of supply should be integrated, and uses should be administered and managed conjunctively. There should not be separate codifications of surface water law and ground water law; the law of waters should be a single, integrated body of jurisprudence.[16]

Responding to the hydrologic imperative and the overwhelming weight of thoughtful opinion, nearly all states have abandoned the old, artificial distinction between ground and surface waters. In some states the courts—exercising their historic prerogative to change the common law of water rights to keep abreast of emerging knowledge and changing conditions—have made the necessary adjustment.[17] In other jurisdictions, state legislatures,[18] or administrative agencies with supervisory responsibility over water use,[19] accomplished it. A few states used some combination of these techniques.[20] Trelease summarized the situation this way in 1982: "Today it seems clear that the basic rule of prior appropriation will be applied to connected ground and surface waters in the western states."[21]

In Arizona, however, the legal waters are more opaque. In 1974, Professor Robert Clark characterized Arizona as following the "anomalous path" of maintaining the historic division between types of water.[22] Other commentators have followed Clark by noting that the separation, "rooted in history but long abandoned in reality, must be reexamined if any meaningful unitary attempt at water management in Arizona is

---

14. Trelease, *Conjunctive Use of Groundwater and Surface Water*, 27 ROCKY MTN. MIN. L. INST. 1853, 1856 (1982).

15. *See* National Water Comm'n Act, 82 Stat. 868, 868-870 (1968).

16. NATIONAL WATER COMM'N, WATER POLICIES FOR THE FUTURE 233, Recommendation 7-1 (1973).

17. *See, e.g.*, Trelease, *supra* note 14, at 1857-58.

18. *Id.* An early example is a 1909 Kansas statute, § 4428 (1909), *cited in* 2 C. KINNEY, *supra* note 9, § 1194, at 2167 n.11.

19. Trelease, *supra* note 14, at 1858.

20. *Id.* at 1857.

21. *Id. See also* Clark, *Ground Water Legislation in the Light of Experience in the Western States*, 22 MONT. L. REV. 42, 50-51 (1960).

22. Clark, *Arizona Ground Water Law: The Need for Legislation*, 16 ARIZ. L. REV. 799, 801 (1974).

to be made."[23] Despite revolutionary changes in the state's water law in the past decade, however, the Arizona Court of Appeals characterized Arizona water law in 1986 as "a bifurcated system in which percolating groundwater is regulated under a set of laws completely distinct from the laws regulating surface water."[24]

This article argues that this recent description is in error—that, properly understood, Arizona's constitutional, statutory, and common law framework already furnishes a sound basis for unitary management of Arizona's limited water resources. It urges the Arizona courts, who are beginning to examine this issue in pending general stream adjudications,[25] to acknowledge that Arizona water law recognizes hydrologic reality. It also advocates that the state's principal water managing agency, the Department of Water Resources (DWR), take the steps necessary to fully implement the unitary management that is essential for fair and efficient management of the state's water supplies.

We first briefly examine some hydrogeologic variations in the relationship between ground and surface waters found in the state. Next we survey the evolution of water law in Arizona on the subject. The third section focuses on the 1980 Groundwater Management Act. The fourth section takes a brief look at how other states have coped with this problem. The fifth section looks at federal law, particularly in relation to the water rights attaching to federal lands reserved for Indians and other federal purposes, to explore its implications for resolving the issue in Arizona. Finally, we set out some recommendations for how Arizona might chart a sensible course in this area, exploring, among other things, institutional implications for Arizona water management.

II. The Interaction Between Groundwater and Surface Water: Some Arizona Examples

Because they are influenced by a number of factors, including precipitation, permeability, pressure and equilibrium, surface vegetation, man's

23. Higdon & Thompson, *The 1980 Arizona Groundwater Management Code*, 1980 Ariz. St. L.J. 621, 666. *See also* Goodman, *Current Groundwater Law in Arizona*, 1978 Ariz. St. L.J. 205, 207-08.

24. Collier v. Arizona Dep't of Water Resources, 150 Ariz. 195, 198, 722 P.2d 363, 366 (1986).

25. Currently two water rights adjudications are being conducted in Arizona's superior courts, concerning the waters of the Gila River system and the Little Colorado River system, that will together involve nearly all of the water rights in the state, with the principal exception of those on the main stem of the Colorado River. The goal of these adjudications is to determine who has what rights to "all water appropriable under § 45-141 and all water subject to claims based upon federal law." Ariz. Rev. Stat. Ann. § 45-251(4) (1987). The difficulty of such a massive undertaking is compounded because the courts must determine, as a threshold matter, the extent to which the adjudications will involve groundwater that is hydrologically related to the surface water in these stream systems. That question is now before Judge Goodfarb of the Maricopa County Superior Court, who is trying the Gila River adjudication.

actions, gravity, and the passage of time, interactions between surface water and groundwater can be quite complex.[26] Initially, most precipitation that falls to earth returns directly to the atmosphere via evaporation and transpiration.[27] The remaining water, perhaps a third of what reaches the earth, runs off into the ocean and into streams, rivers, and lakes.[28] A small portion of this, less than 10% of the water precipitating to the earth, percolates into the ground.[29] Some of the water that percolates is captured by soil particles;[30] the balance courses downward through a zone of saturation[31] until it reaches an impermeable level of rock.[32] At this point, subject to the force of gravity, but no longer able to travel further downward, the water saturates the matter around it at a rate dictated by pressure and the physical characteristics of the surrounding matter.[33] The porous, water-bearing formations into which groundwater seeps and is stored are called aquifers.[34] The upper limit of saturated material in an aquifer is called the water table.[35]

To assess the interaction between groundwater stored in an aquifer and surface water, two characteristics of an aquifer must be analyzed: transmissivity and storage coefficient.[36] Transmissivity is the "measure of an aquifer's ability to transmit water from one location to another," that is, how quickly water can pass through the aquifer.[37] The storage coefficient is the "measure of an aquifer's ability to store water within the aquifer material."[38] The transmissivity and storage coefficient of an

---

26. *See generally* R. WARD, PRINCIPLES OF HYDROLOGY (2d ed. 1975); D. GRAY, HANDBOOK ON THE PRINCIPLES OF HYDROLOGY (1970).

27. D. GRAY, *supra* note 26, § 3. It has been estimated that almost 60% of the water that precipitates to the earth either evaporates directly or is returned to the atmosphere via the transpirations of plants, with evaporation accounting for the bulk of this figure. *See* Davis, *Wells and Streams: Relationship at Law*, 37 MO. L. REV. 189, 195 (1972).

28. Davis, *supra* note 27, at 195.

29. *Id.*

30. *Id.* at 196.

31. *Id. See also* ARIZONA DEPARTMENT OF WATER RESOURCES, GILA RIVER SYSTEM: GROUNDWATER - SURFACE WATER INTERACTION STUDY 5-9 (Sept. 1987) [hereinafter DWR INTERACTION STUDY].

32. Davis, *supra* note 27, at 196. *See also* D. Gray, *supra* note 26, § 5.4 (Figure V.3).

33. Davis, *supra* note 27, at 196; DWR INTERACTION STUDY, *supra* note 31, at 5-9. Like water on the surface, groundwater flows in response to a gravitational gradient.

34. DWR INTERACTION STUDY, *supra* note 31, at 5. In a simple sense, aquifers have bottoms and sides where impermeable rock begins, and a top, known as the water table, which is the upper limit of saturated material. Aquifer is defined in Arizona law to mean "a geologic formation that contains sufficient saturated material to be capable of storing water and transmitting water in usable quantities to a well." ARIZ. REV. STAT. ANN. § 45-651(1) (1984).

35. DWR INTERACTION STUDY, *supra* note 31, at 5.

36. *Id.* at 9.

37. *Id.*

38. *Id.* at 13.

aquifer relate directly to the composition of the aquifer.[39] Aquifers composed of sand, gravel, and loose rock readily transmit water and have high storage coefficients.[40] Aquifers composed of silt, clay, or consolidated rock tend to transmit water poorly and have a lower storage coefficient.[41]

Whatever interaction exists between groundwater stored in the aquifers and the waters of surface streams depends not only on the transmissivity and storage coefficient of a given aquifer, but also on the proximity of the water table to the surface. The water table is sometimes so far removed from surface streams that there is virtually no interaction.[42] But if it is close enough to the surface to connect with surface water, withdrawals or additions to either the groundwater or the surface water can cause a measurable effect upon the other.[43]

Surface water streams are generally classified as either perennial, ephemeral, or intermittent.[44] Although intended to describe only surface flow characteristics, each classification suggests a different degree of interaction between groundwater and surface water. The constant surface flow of so-called perennial streams generally consists of precipitation run-off and base flow contributed by a water table that breaks the surface.[45] Such streams are also known as effluent or "gaining" streams; that is, the water table directly supports and feeds the surface stream, resulting in surface flows even when there is no precipitation or run-off.[46]

Ephemeral streams contain water only after precipitation or during snowmelt.[47] Where they exist, the water table is so far removed from the surface that there is no contribution to surface flows.[48] Ephemeral streams are also called influent or "losing" streams, because the water

---

39. *Id.*

40. *Id.*

41. *Id.* However, one should not assume that aquifers always consist of the same material, for they may not. Such variations can result in wide variances in the transmissivity and storage coefficient from one part of an aquifer to another. *Id.*

42. Davis, *supra* note 27, at 196; DWR INTERACTION STUDY, *supra* note 31, at 17.

43. Davis, *supra* note 27, at 197; DWR INTERACTION STUDY, *supra* note 31, at 14, 16. The U.S. Geological Survey has estimated that groundwater is the source of about 40% of the average annual streamflow in the United States, and during droughts can provide nearly all of the base streamflow. *See National Water Summary 1986* (U.S. Geological Survey Water Supply Paper 2325, 1988), as reported in Department of Interior News Release 3 (Oct. 7, 1988) (copy on file with Arizona State Law Journal).

44. DWR INTERACTION STUDY, *supra* note 31, at 14.

45. *Id.*

46. Davis, *supra* note 27, at 197. The DWR term for an effluent stream is a "gaining" stream. DWR INTERACTION STUDY, *supra* note 31, at 14, 16.

47. DWR INTERACTION STUDY, *supra* note 31, at 17.

48. *Id.*

table does not support surface flow. In such cases surface flows infiltrate through the stream bed and recharge the underlying aquifer.[49]

Intermittent streams are a hydrological hybrid, combining characteristics of both perennial (effluent) and ephemeral (influent) streams. They normally flow seasonally, having surface flows for long periods and at other times having no surface flows at all.[50] Such streams may lie over a water table that for parts of the year is transcendent, giving the stream the characteristics of an effluent stream, and at other times falls below the surface, giving the stream the characteristics of an influent stream.[51] This fluctuation in the water table can be attributed to seasonal rainfall, seasonal water demand, phreatophyte consumption, snowmelt, and other factors.[52]

The characteristics of a surface stream—perennial, intermittent, or ephemeral—are thus suggestive of the relationship of the surface stream to the underlying aquifer and to the level of the water table in the aquifer. Perennial streams are indicative of, and generally dependent upon, continuous groundwater discharge into the stream from the supporting aquifer beneath and adjacent to it. Intermittent streams indicate a regular, although not continuous, connection between water in an aquifer and water in the stream. Ephemeral streams have no connection with water in an aquifer other than to recharge the aquifer through infiltration. Consequently, if the water table of an aquifer is lowered, a perennial stream can be converted to an intermittent or ephemeral stream and, likewise, an intermittent stream can be converted to an ephemeral stream.

When water is pumped from an aquifer by means of a well, it creates what is known as a "cone of depression."[53] This is caused by the groundwater in the aquifer moving toward the well. If the material in the aquifer has a high transmissivity value, the cone of depression will be wide and shallow.[54] If, on the other hand, the aquifer does not easily transmit water, the cone of depression will be steep and narrow.[55] If water is pumped continuously from the well, the cone of depression will become larger. If the water table is close enough to the earth's surface to allow this cone to cut into a surface stream, water from the stream

---

49. Davis, *supra* note 27, at 196. The DWR term for an influent stream is a "losing" stream. DWR INTERACTION STUDY, *supra* note 31, at 17.

50. DWR INTERACTION STUDY, *supra* note 31, at 17.

51. *Id.*

52. *Id.*

53. *Id.* at 23.

54. *Id.*

55. *Id.*

would directly infiltrate into the ground, following the slope of the cone of depression until it reached the well.[56] Even if the cone did not intersect the stream directly, it could affect the amount of water in the stream by intercepting water that would otherwise migrate toward the stream.[57] This would cause less water to be available in the stream bed.[58] If water were removed by pumping from a well and none were reintroduced, the water table would decline.[59] If several wells were pumping, there would be a more rapid decline. Any time the rate of water withdrawn from an aquifer exceeds the rate of recharge, the water table will decline.[60]

Arizona watersheds contain all three types of stream flow—perennial, intermittent, and ephemeral—each with unique hydrological characteristics.[61] DWR has analyzed many of these watersheds, locating the water tables, identifying the regional aquifers, and charting the flow of water in the ground and on the surface.[62] Additionally, precipitation patterns in the watersheds are generally known and phreatophyte consumption can be generally estimated.[63] All this information allows the interaction between surface water and groundwater to be predicted with a fair degree of assurance.[64]

The San Pedro, Verde, and lower Gila watersheds furnish samples of each type of stream. DWR studies, as well as those conducted by the federal Bureau of Land Management (BLM) indicate that the San Pedro River watershed contains both perennial and intermittent streams.[65] The San Pedro River watershed exists in a corridor between several sets of mountain ranges. The regional aquifer underlying the river (and also the San Pedro's floodplain aquifer) extends the length of the watershed, from Palominas to Winkelman. It is replenished by precipitation that seeps down the mountains and into the aquifer at the base of the mountains. Base flows and the riparian zone water table in the San Pedro River basin are composed almost entirely of inflow from the

---

56. *Id.* at 23-24.
57. *Id.*
58. *Id.*
59. *See id.*
60. *Id.*
61. *See id.* at 2-3.
62. *See id.* at 29-83.
63. *See, e.g.*, U.S. DEP'T OF THE INTERIOR, BUREAU OF LAND MANAGEMENT, ASSESSMENT OF WATER CONDITIONS AND MANAGEMENT OPPORTUNITIES IN SUPPORT OF RIPARIAN VALUES: SAN PEDRO RIVER, 73-115 (1987) [hereinafter BLM SAN PEDRO STUDY].
64. See DWR INTERACTION STUDY, *supra* note 31, at 85-90.
65. BLM SAN PEDRO STUDY, *supra* note 63; ARIZONA DEP'T OF WATER RESOURCES, WATER RESOURCES OF THE UPPER SAN PEDRO BASIN, ARIZONA 59 (Feb. 1987) [hereinafter DWR SAN PEDRO BASIN STUDY].

regional aquifer.[66] As a result, groundwater pumping in the watershed will draw the water table down and will ultimately affect surface flow in the San Pedro River and its surface tributaries.[67]

The Verde River presents a different situation. A perennial stream, it too flows between several mountain ranges. Unlike the San Pedro, however, the Verde is not underlain by a uniform regional aquifer. Rather, it contains a varied and complex series of aquifers.[68] Consequently, the interaction between surface and groundwater must be determined by thorough testing of each aquifer and its corresponding effect on surface flows.[69] This is not to say that groundwater pumping will not affect surface flows, but only that, because of the multiplicity of underlying aquifers, the interaction is not as predictable as in the San Pedro.

The lower Gila River watershed is today an ephemeral or influent stream because of man's action.[70] Although it once flowed perennially, upstream diversions of the surface water have combined with groundwater pumping along or near the lower Gila to reduce the amount of water in the hydrologic system.[71] Most important, the groundwater table in the lower Gila has been lowered to such an extent that the connection

---

66. BLM SAN PEDRO STUDY, *supra* note 63, at 1, 6.

67. *Id.* at 1. The San Pedro River flows with consistent, year-round flow for 31 miles and intermittently for the remainder of its 140 mile length. Approximately 52 miles of tributary streams also flow perennially, including 20 miles along Aravaipa Creek. Perennial flow is due to two factors. The first is the discharge of groundwater to the stream where the stream intersects the water table, which provides a steady and reliable source of base flow. The second is the presence of geologic restrictions that force groundwater to the surface of the river channel, where it appears as streamflow. This is the hydrogeologic situation at the U.S. Geological Survey (USGS) stream gauge at Charleston, where the river cuts through the Bronco Hills. Much of the San Pedro River exhibits an intermittent flow regime, i.e., a seasonal appearance and disappearance of surface water. This is typically due to the timing of water uses along the stream and to the climatic regime. During seasons of low water use (winter and early spring) the rate of groundwater discharge to the river exceeds the rate of use by phreatophytes and agriculture and the excess of supply over demand appears in the river channel as surface flow. During other seasons the rate of water use by riparian vegetation and by crops near the river exceeds the rate of groundwater discharge to the river and the surface flow disappears, except perhaps immediately after rainfall. DWR SAN PEDRO BASIN STUDY, *supra* note 65, at 56-59.

68. DWR Comments on Evidentiary Hearing for Groundwater-Surface Water Interrelationship (filed April 17, 1987) at 6-7, in the General Adjudication of All Rights to Use Water in the Gila River System and Source, Nos. W-1 through W-4 (Maricopa County Sup. Ct.).

69. "[Because] aquifer conditions are varied and complex in many parts of this watershed, the identification of those groundwater users whose uses affect stream flow within a single season or within several seasons might require an analysis of each well to determine the aquifer from which withdrawals are being made. Withdrawals from some aquifers may have a relatively rapid effect on stream flow, while withdrawals from other aquifers may have little effect over several years time even if the well is located only a short distance from the stream." *Id.*

70. DWR INTERACTION STUDY, *supra* note 31, at 2-3, 86.

71. *Id.*

between ground and surface water has been broken, except for recharge of the aquifer through the stream channel.[72] Where the groundwater table is so low, groundwater pumping does not affect the occasional stream flow.

As these examples indicate, Arizona watersheds display considerable variation in the interaction between ground and surface waters. Yet, given sufficient information, interactions can, where they do occur, be predicted with sufficient precision to allow regulation of ground and surface water uses on a unified basis.[73]

III. THE EVOLUTION OF ARIZONA WATER LAW

A. The Territorial Experience

The first Arizona legislature, meeting in Prescott one year after the Territory of Arizona was organized, enacted a comprehensive code of laws called the Howell Code.[74] Several of its sections addressed water rights and management.[75] A prominent Arizona hydrologist, G.E.P. Smith, observed that water underneath the ground was then "probably considered as of little economic value,"[76] because this was several generations before rural electrification and the development of high speed pumps made extraction of large amounts of groundwater feasible. Thus, the Howell Code concentrated on surface water. It declared all "streams, lakes and ponds of water capable of being used for the purposes of navigation or irrigation" to be "public property" and subject to plenary regulation by the legislature.[77] Other sections of the Code addressed "rivers, creeks and streams of running water," or "spring[s] or stream[s] of running water."[78]

Yet even at this early date, excavations were sometimes made to collect subterranean water, particularly in dry summer months or drought periods.[79] According to Smith, the framer of the Howell Code probably

---

72. *Id.* at 2, 86.

73. *Id.* at 2.

74. *See* C. BASHFORD, PREFACE TO COMPILED LAWS OF THE TERRITORY OF ARIZONA, 1864-71, at iii (1871). For more background on the Howell Code and its author, see Goff, *W.T. Howell and the Howell Code of Arizona*, 11 AM. J. LEGAL HIST. 221 (1967).

75. COMPILED LAWS OF THE TERRITORY OF ARIZONA (1871), at 25 (Territorial Bill of Rights art. XXII), 501-04 (ch. LV, §§ 1-28) [hereinafter COMPILED LAWS].

76. G.E.P. SMITH, *supra* note 13, at 55.

77. COMPILED LAWS 1864-71, at 25.

78. HOWELL CODE, ch. LV, §§ 1, 27; COMPILED LAWS (1864-71), at 501, 504.

79. G.E.P. SMITH, *supra* note 13, at 55. *See also* G.E.P. Smith, *The Cienega Sub-Surface Dam Near Tucson, Arizona*, XXXVI ENGINEERING AND CONTRACTING 110-11 (July 16, 1911) (describing how subsurface dams have been built in Arizona to intercept the "underflow" of streams to raise it to the surface for human use).

regarded these underground sources, collected in man-made excavations, as "streams of running water."[80] Thus, at its inception, Arizona water law applied principles developed primarily for surface water to subterranean water available for human use.

Besides the provisions dealing specifically with water, the Howell Code incorporated the common law of England into Arizona law. It allowed the courts to reject that common law only if they determined it was "repugnant to, or inconsistent with, the constitution and laws of the United States, or the bill of rights or laws of this Territory."[81] In 1885, however, the territorial legislature reversed the presumption that the Arizona courts would ordinarily apply the English common law. Instead, the legislature prodded the courts to assess the wisdom of applying English common law principles in an Arizona setting, and to do so "only as it is consistent with and adapted to the natural and physical condition of this territory, and the necessities of the people thereof . . . ."[82]

The territorial legislature was not, however, content to allow the courts complete freedom to decide the degree to which English common law would influence Arizona water law. Two years later, in 1887, it added a firm prohibition to the Howell Code: "The common law doctrine of riparian water rights, shall not obtain or be of any force or effect in this territory."[83] Twenty-three years after that, an identical provision was included in Arizona's new constitution.[84] Viewed broadly, this admonition ruled out any notion of water rights based simply on land ownership,[85] for that was the basic distinguishing feature of the common law riparian rights water system, followed mostly in the more humid eastern states.[86]

After an early hesitation, the courts of the territory issued decisions that were consistent with these territorial statutes, although none of the cases involved groundwater. In January 1888, in *Hill v. Lenormand*,[87] the territorial supreme court faced a conflict between an 1877 appropriator on the San Pedro River and an 1884 appropriator upstream. The latter claimed a riparian right by virtue of owning land along the river.

---

80. G.E.P. SMITH, *supra* note 13, at 55.

81. HOWELL CODE, ch. LXI, § 7; COMPILED LAWS (1864-71), at 524.

82. 1885 Ariz. Sess. Laws 133, no. 68, codified in ARIZ. REV. STAT. ¶ 2935 (tit. LX, ch. 5, § 8), at 523 (1887). This provision apparently was repealed in 1901 and not reinstated until 1907, although it has continued in force since then. *See* State v. Bonelli Cattle Co., 107 Ariz. 465, 469-70, 489 P.2d 699, 703-04 (1971) (Lockwood, J., dissenting), *rev'd on other grounds sub nom.* Bonelli Cattle Co. v. Arizona, 414 U.S. 313 (1973).

83. ARIZ. REV. STAT. ¶ 3198 (tit. LXIII, ch. 1, § 1), at 558 (1887).

84. ARIZ. CONST. art. XVII, § 1.

85. *See infra* text accompanying notes 285-318.

86. *See, e.g.*, D. GETCHES, *supra* note 2, at 12-19.

87. 2 Ariz. 354, 16 P. 266 (1888).

The court rejected that claim, but not on the ground that riparian rights did not exist in the territory. Instead, it decided that although "[r]iparian rights are the same here as elsewhere, wherever they apply; . . . they do not apply where the rights of prior appropriators have intervened."[88]

A little more than one month later, the crack *Hill* had opened seemed to be firmly closed in *Clough v. Wing*,[89] where the same court flatly stated that, in arid regions dependent "upon artificial irrigation for their food products[, t]he riparian rights of the common law could not exist."[90] It underscored the point: "[T]he common law . . . has never been, and is not now, suited to conditions that exist here, so far as the same applies to the uses of water."[91] Amazingly, neither *Hill* nor *Clough* cited the 1885 territorial statute that limited the incorporation of the English common law, or the 1887 statute that specifically outlawed riparian water rights.

Clough's firm rejection of riparian rights controlled future Arizona decisions. In 1895, for example, in a dispute between two surface appropriators, the territorial supreme court reiterated that the common law "has no application whatever to the use of water with us . . . [and] can furnish no aid in the adjustment of water-rights in this territory."[92] Some years after that, the Supreme Court, speaking through Oliver Wendell Holmes, Jr., reached the same conclusion in affirming a decision of the territorial supreme court. Holmes rejected the argument that the English common law controlled a water rights dispute with a famous quip: "[The Arizona statute adopting the common law] is far from meaning that patentees of a ranch on the San Pedro are to have the same rights as owners of an estate on the Thames."[93]

---

88. *Id.* at 357, 16 P. at 268.

89. 2 Ariz. 371, 17 P. 453 (1888).

90. *Id.* at 381, 17 P. at 456.

91. *Id.* (Citations omitted). These remarks were actually dicta. The action was brought by an earlier appropriator against a later one, but the latter's defense was not that he had a riparian right. Instead, he argued that his appropriation did not injure the earlier one, and he won on that ground.

92. Chandler v. Austin, 4 Ariz. 346, 350, 42 P. 483, 483 (1895).

93. Boquillas Land & Cattle Co. v. Curtis, 213 U.S. 339, 345 (1909). For even more venerable authority for the same general idea, *see* Van Ness v. Pacard, 27 U.S. (2 Pet.) 137, 144 (1829) (Story, J.) ("The common law of England is not to be taken in all respects to be that of America . . . [but] only that portion which was applicable to [our] situation"). In *Boquillas* the territorial supreme court thoroughly rehearsed the applicable law and history and concluded that the territorial statutes were repugnant to the common law doctrine of riparian rights. Boquillas Land & Cattle Co. v. St. David Coop. & Dev. Ass'n, 11 Ariz. 128, 135, 89 P. 504, 506 (1907). A concurring opinion put the matter even more strongly: "[T]he utter incompatibility of the doctrine of riparian rights with the conditions of life in this territory is an all-sufficient reason, under the principles of the common law itself, to hold that that doctrine is not here in force." *Id.* at 141, 89 P. at 508 (Nave, J., concurring). *See also* Fernandez v. Romo, 132 Ariz. 447, 449, 646 P.2d 878, 880 (1982) (abolishing interspousal tort immunity in automobile accident cases).

In 1893, the Howell Code was amended to provide more clearly for the application of the appropriation system of water rights which by that time had been adopted, in one form or another, in practically all the states and territories in the Western United States.[94] It established the right to appropriate "any of the unappropriated waters or the surplus or flood waters" of the territory, and the rule of priority.[95]

The legislature's reference to "unappropriated waters" is broad enough to encompass ground as well as surface waters. Although other parts of this 1893 revision refer to streams,[96] taken as a whole the text does not reflect an intent to restrict its application to surface waters only. Once again, however, no reason existed for the legislature to pause over this question, because so little groundwater was then being used.

1. *Howard v. Perrin*[97]—The First Groundwater Case

The next step was taken by the territorial supreme court. In *Howard*, Abshire had occupied what he thought was federal land in 1889, and had dug a couple of wells and a tunnel to convey the underground water to a nearby arroyo, where it was piped to a watering trough for livestock. Abshire conveyed his interests to the defendant Howard in 1892. Perrin, who had taken title to the land from a railroad in 1897, brought an action to eject Howard. Howard, relying on a federal statute, argued what amounted to adverse possession. He offered his water appropriation both as evidence of adverse possession of the land, and as perfecting a property right in the water good against Perrin even if Perrin was deemed to have good title to the land.

The court, quoting the provision of the Howell Code that made "rivers, creeks, and streams of running water" appropriable,[98] *assumed*, without discussion, that if the water in question could not be so characterized, it belonged to the owner of the overlying land. In making this assumption, the court merely accepted the parties' agreement on the applicable law, because both sides adopted the traditional common law differentiation between "percolating" groundwater and "underground streams."[99] Although courts in many Western states at this time subjected the latter to the same appropriation system applicable to surface waters, many states,

---

94. *See* D. GETCHES, *supra* note 2, at 16-18, 82-86.

95. ARIZ. REV. STAT. ¶ 4169 (tit. LXXIII, ch. 1, § 2) (1901), at 1042-43 (the person "first appropriating water . . . shall always have the better right to the same").

96. *Id.* ¶ 4174 (tit. LXIII, ch. 2, § 7), at 1045.

97. 8 Ariz. 347, 76 P. 460 (1905), *aff'd*, 200 U.S. 71 (1906).

98. 8 Ariz. at 352-53, 76 P. at 462. *See also supra* text accompanying note 78.

99. 8 Ariz. at 354, 76 P. at 463.

including most Western ones, still considered the former governed by the English common law rule, which made percolating groundwater the property of the landowner. But the *Howard* court's statement that the decision of other courts "[t]hroughout the Pacific coast . . . are uniform on the subject"[100] was incorrect. Even at this early date, contrary authority existed, especially where taking percolating waters diminished the flow of surface streams to the detriment of those who had rights to use waters of those streams.[101] Moreover, some courts had, even at this early date, held that subterranean water that was hydrologically related to streams ought to be considered streamwater, not percolating water.[102]

In hindsight, it seems astonishing that Howard's counsel[103] conceded that cases giving a landowner the right to percolating groundwater were controlling. He made this concession without determining whether these cases should be applied in Arizona and, more specifically, whether they were consistent with the legislature's firm rejection of the common law in various water code provisions.[104] By so conceding, Howard agreed that the only question was whether he had tapped an underground stream or percolating groundwater with his crude well and tunnel—if the former, he won, but if the latter, the water belonged to Perrin simply because Perrin owned the land.

The territorial court regarded the case as presenting "solely a question of fact, both parties agreeing as to the law in the premises,"[105] and concluded that the trial court properly found the water was percolating, and belonged to Perrin. Howard appealed to the U.S. Supreme Court, which, after looking briefly at the Howell Code, concluded that because the lower courts had found as a fact that the water in question oozed through the soil in an undefined and unknown channel, it was not a "river, creek or stream of running water" within the meaning of the Arizona statute.[106] Once that conclusion was reached, the Court could

---

100. *Id.* at 353, 76 P. at 462.

101. *See* Annotation, *Subterranean or Percolating Waters*, 55 A.L.R. 1385, 1447-50, 1456-59 (1928).

102. *See, e.g.*, Buckers Irrigation Mill & Improvement Co. v. Farmers' Indep. Ditch Co., 31 Colo. 62, 72 P. 49 (1902).

103. Howard was represented by E.E. Ellinwood, a prominent corporate attorney who figured heavily in the fight for Arizona statehood. He served, for example, as a delegate to the state constitutional convention six years later. Perrin was represented by Edward Doe, who was appointed Associate Justice of the Territorial Supreme Court in 1909, and also served as a delegate at the constitutional convention. *See* Leshy, *The Making of the Arizona Constitution*, 20 ARIZ. ST. L.J. 1, 35, 39 (1988).

104. *See supra* notes 81-83 and accompanying text.

105. 8 Ariz. at 354, 76 P. at 463.

106. Howard v. Perrin, 200 U.S. 71, 75 (1906).

only affirm; like the lower court, it was not asked to decide what law applied to percolating groundwater.

Howard v. Perrin was a most peculiar way for the distinction between ground and surface water to enter Arizona law. First, it was not a dispute between water users—there was no claim that Perrin used water. Instead, it was an action for ejectment, which involved a conflict over title to land. Second, despite the presence of pertinent territorial statutes limiting the common law and broadly rejecting riparian rights, the territorial supreme court addressed the issue as one of common law. Third, the litigants in the case agreed on what the common law was, leaving the court with little to do but accept their view. Fourth, the timing of the case could not have been more unfortunate, for it came just at the threshold of other Western state courts' march toward more unified water management.[107] Finally, the court approached the issue mechanically, refusing to consider whether the division between ground and surface waters was "in the interest of justice or was best suited to physical and economic conditions in the Territory of Arizona."[108] In so doing, the court not only ignored the legislature's admonition against blindly incorporating the common law into Arizona, but also breached its own precedent that the common law had nothing to teach Arizona on water matters.[109]

B. The Early Statehood Experience—1912-1931

Seven years after *Howard v. Perrin*, Arizona became a state. Its new constitution contained but two brief sections on water law. One confirmed existing rights to the use of "any of the waters in the State for all useful or beneficial purposes,"[110] and the other firmly rejected the "common law doctrine of riparian water rights."[111] Although the framers of the Arizona constitution debated various water rights provisions at length,[112] the constitution did not resolve how the law ought to address groundwater.

The next development came in the Arizona Supreme Court, in 1918. The facts were similar to *Howard v. Perrin*. The defendant claimed an appropriation water right in a spring located on plaintiff's mining claim. In a confusing decision, the court held for the defendant, on the ground

107. *See* Annotation, *supra* note 101, at 1418-20.
108. G.E.P. SMITH, *supra* note 13, at 60.
109. *See supra* notes 90-92 and accompanying text.
110. ARIZ. CONST. art. XVII, § 2.
111. *Id.* § 1.
112. *See* Leshy, *supra* note 103, at 53.

that the plaintiff had no valid mining claim and thus had no property interest in the land on which the spring was found. The court nevertheless went on to reject, in *dictum*, defendant's attempted appropriation of the water of the spring, on the ground that the Howell Code referred only to rivers, creeks, and streams of running water, and not springs.[113] The court further obscured matters by citing authorities to the effect that percolating water, "unconfined to a definite channel," belongs to the landowner and is not subject to appropriation, but that a spring that is a "source of a watercourse" is subject to appropriation.[114]

A little more than three months later, the state legislature overhauled the water code. Although it did not make fundamental changes, it adjusted the language of the Howell Code concerning the kind of water to which the Code applied: "The water of all natural streams, or flowing in any canyon, ravine or other natural channel, or in definite underground channel [sic], and of springs and lakes [is subject to appropriation]."[115] Arizona's leading hydrologist, G.E.P. Smith, drafted this language after studying the codes of many other states and western Canada.[116] Smith's intent, as expressed some years later, was to avoid the subject of groundwater because "too little was known" about it, and the most pressing need was for the state water commissioner's office to "concentrate its full attention on the determination of rights in surface waters."[117] It was this "need for caution," based on "much misconception regarding groundwater as evidenced in many engineering reports and in records of court proceedings," that led Smith to reject all reference to groundwater except for the single reference to "water flowing in definite underground channels," which was, he later explained, merely following Arizona precedent.[118]

The 1919 Code was amended in 1921[119] and in 1928[120] to its present form—a disjointed and confusing series of definitional clauses categorizing the water to which it applies:

> The waters of all sources, flowing in streams, canyons, ravines or other natural channels, or in definite underground channels, whether perennial or intermittent, flood, waste or surplus water, and of lakes, ponds and springs on the surface, belong to the public and are subject

113. McKenzie v. Moore, 20 Ariz. 1, 5-6, 176 P. 568, 569 (1918).
114. *Id.* at 5, 176 P. at 569.
115. Act of Mar. 26, 1919, ch. 164, § 1, 1919 Ariz. Sess. Laws 278.
116. G.E.P. SMITH, *supra* note 13, at 49 n.1.
117. *Id.* at 49.
118. *Id.*
119. Act of Mar. 9, 1921, ch. 64, § 1, 1921 Ariz. Sess. Laws 118-19.
120. ARIZ. REV. CODE § 3280 (1928).

to appropriation and beneficial use as provided in this chapter.[121]

This section's awkward syntax admits a number of different interpretations. The first five words suggest a global application to waters of whatever source. The next two clauses, however, seem to limit it to water in channels, including "definite underground" ones. Smith apparently intended this latter phrase to capture the agreement of the litigants in *Howard v. Perrin*, subsequently approved by the court, that the appropriation statute did not apply to waters in "undefined and unknown channels."[122] The two clauses that follow—"whether perennial or intermittent, flood, waste, or surplus water"—again broaden the focus to embrace all kinds of water in these channels. The final definitional clause—"of lakes, ponds, and springs on the surface"—at once broadens the code's reach to include waterbodies that may not have "channels," and narrows its reach to those "unchannelized" springs (and, perhaps, lakes and ponds as well) that are "on the surface."

Of the ambiguities, perhaps the most important is the status of underground water that is not in "definite underground channels." It is not clear whether the legislature contemplated that this water would not "belong to the public" or be subject to an appropriation system. The better view is probably that the legislature avoided the question, and instead left the courts to wrestle with the problem as part of their traditional mission to develop rules of property in case-by-case adjudication.[123] No indicia of legislative intent are available, other than the statement of G.E.P. Smith, who was not a member of the enacting legislature.[124] If his intent is to be honored, the statute ought not to be regarded as displacing the courts' common law power to develop and adjust legal principles applicable to groundwater not in "definite underground channels" to serve the public interest in sound management of limited water supplies.

The question can, however, be approached from a different angle, by focusing on the words "definite underground channels." This might refer only to discrete underground structures that convey water rapidly, without appreciable loss to the surrounding strata, as might be found in a lava tube or a mine tunnel. Or it might have a more conventional meaning, borrowed from our understanding of ordinary surface streams, which have always been understood to flow in legally "definite channels." No one would quarrel with the notion that the Gila or Verde Rivers flow

121. ARIZ. REV. STAT. ANN. § 45-141(A) (1987).
122. *See supra* notes 98-99 and accompanying text.
123. *Cf.* Easterbrook, *Statutes' Domains*, 50 U. CHI. L. REV. 533 (1983).
124. G.E.P. SMITH, *supra* note 13, at 49.

in a definite channel, yet no one could claim that the water in these streams is thereby sealed off from the surrounding geological strata. If this surface analogy is to be employed here, then the remaining question is one of degree—a definite underground channel is one that confines underground water flows to some degree, but not necessarily completely. Because it is a question of degree, the courts would have substantial discretion to resolve what kind of underground water is subject to the water code. This, in turn, would mean that even if the 1919 water code determined that only one category of subterranean waters is subject to appropriation, the courts were left with the important, quasi-common-law responsibility of determining how much underground water falls within that category. The courts of numerous other states did not hesitate to exercise such power when they faced similarly general water codes.[125]

Arizona courts soon took up this task.[126] The first case reached the Arizona Supreme Court in 1926.[127] Proctor had developed a 320 acre farm along the Santa Cruz River in 1913, eventually drilling three wells to irrigate 180 acres. Later, Pima Farms bought up most of the irrigable land in the area for 15 miles along the river, and developed a farm sales program. It drilled some 26 deep wells, installed high capacity pumps, dug a canal system, built a power plant, and subdivided and sold some of its land, along with water, to incoming farmers. Pima Farms' pumping significantly lowered the groundwater table; after Proctor deepened his well once, and faced the prospect of doing it repeatedly, he brought suit, alleging the groundwater was subject to appropriation. Because he had a prior appropriation, Proctor demanded that Pima either reduce its pumping or deliver to him the amount of water he had historically used.

The parties, like their counterparts in *Howard v. Perrin* two decades earlier, agreed on the applicable law. Significantly, however, they took the opposite approach, "assum[ing] or conced[ing] throughout" that the groundwater here was a subterranean stream.[128] The parties so agreed even though, according to G.E.P. Smith, the underground stream did

---

125. *See* Annotation, *supra* note 101, at 1444-98.

126. The first case decided after enactment of the 1919 code did not consider the code, and merely cited Howard v. Perrin for the proposition that only water in natural channels is subject to appropriation in Arizona. *See* Wattson v. United States, 260 F. 506, 509-10 (9th Cir. 1919) (holding that water in a constructed drainage ditch is not in a natural channel subject to appropriation, and that to the extent water in the ditch derives from percolating groundwater, it is not appropriable for that additional reason).

127. Proctor v. Pima Farms Co., 30 Ariz. 96, 245 P. 369 (1926).

128. *Id.* at 98, 245 P. at 370. Pima Farms was advised to do so by its expert, the ubiquitous G.E.P. Smith. *See* G.E.P. SMITH, *supra* note 13, at 62.

not flow in the conventional sense that surface water flows, but instead coursed through sand and gravel. Moreover, it did not have a conventional bed and banks such as might mark a surface channel, but splayed out over a mile in width.[129]

Speaking through Justice Ross, the court, like its territorial counterpart in *Howard v. Perrin*, accepted the parties' characterization, which included the notion that this was an "independent subterranean stream; that is, . . . independent of the influence of any surface stream . . . ."[130] Conceding that "quite a large body" of underground water was involved,[131] the court nevertheless applied standard appropriation doctrine to it. The only remaining issue in the case was whether the earlier appropriator, with shallow wells, was using reasonable means to retrieve the water. The court held that he was, and therefore required Pima Farms to supply Proctor with the same amount of water he had historically used, upon the same terms Pima Farms was delivering water to its other customers.[132] The court subsequently construed *Pima Farms* to mean that Proctor was to receive water at no greater cost than he would have borne absent defendant's pumping.[133]

Although the court saw *Pima Farms* simply as a case of whether the earlier appropriator was legally protected in his historic means of diversion (from shallow wells), it used an analogy that sheds some light on

---

129. Nevertheless, the court did say it flowed "within well-defined and known channels, the course of which can be distinctly traced." *Pima Farms*, 30 Ariz. at 98, 245 P. at 370. However, G.E.P. Smith later observed that, as applied in that case, the court's description of a subterranean stream "would include most of the ground water supplies" in the state. G.E.P. SMITH, *supra* note 13, at 63. It should be noted that, at least in the Tucson area, the fact that underground water supplies were influenced by conditions along surface streams had been well known for decades. A major flood along the Santa Cruz River in 1890 had greatly widened and deepened its channel. In the words of a contemporary newspaper account, this deepened wash "is drawing off the underflow which previously formed a vast underground reservoir . . . from which the city water wells drew their supply." Arizona Daily Star, June 24, 1905, at 2, col. 2. *See generally* Betancourt & Turner, *Historic Arroyo-Cutting and Subsequent Channel Changes at the Congress Street Crossing, Santa Cruz River, Tucson, Arizona*, in ARID LANDS: TODAY AND TOMORROW 1353, 1361 (1986). This general understanding bolsters the broad interpretation given "underground stream" in *Pima Farms*. Alternatively, it suggests that the general statutory reference to "streams" should be interpreted to embrace the "subflow" or "underflow" that feed them.

130. *Pima Farms*, 30 Ariz. at 98, 245 P. at 370.

131. *Id.* at 102, 245 P. at 371.

132. *Id.* at 113, 245 P. at 375.

133. Maricopa County Mun. Water Conservation Dist. No. One v. Southwest Cotton Co., 39 Ariz. 65, 102, 4 P.2d 369, 382 (1931), *aff'd on reh'g as modified*, 39 Ariz. 367, 7 P.2d 254 (1932). G.E.P Smith applauded the *Pima Farms* decision although, anticipating the modern trend of court decisions, he advocated substituting a "rule of reasonableness . . . for the rigid rule which forbids any lowering of the water plane without severe penalty." G.E.P. SMITH, *supra* note 13, at 64. For a typical modern decision following Smith's advice, *see* Wayman v. Murray City Corp., 23 Utah 2d 97, 458 P.2d 861 (1969).

the problem that we address here. This case, said Justice Ross, ought to be "treated like that of the prior appropriator of the surface water of a stream having a subsurface."[134] In that situation, Justice Ross opined, the senior appropriator is protected against one who pumps from the underflow and thereby depletes the surface stream.[135] Ross did not define "underflow," but plainly regarded it, generally speaking, as subterranean water hydrologically connected to the surface stream.

C. *The Puzzle of Southwest Cotton*[136]

In the same year the Arizona Supreme Court decided *Pima Farms*, litigation was initiated that further clouded the law. In 1916, a subsidiary of the Goodyear Tire and Rubber Company, Southwest Cotton, purchased a large tract of land between the Agua Fria and New Rivers west of Phoenix. Using deep wells, it brought 13,000 acres under cultivation. A dam had been envisioned on the Agua Fria, upstream from Southwest Cotton's land, as early as 1888, and had been promoted for decades by the Beardsley family as a way to store enough water to irrigate thousands of acres of nearby land.[137] In 1925, the plans matured. To secure financing, the family formed the Maricopa County Municipal Water Conservation District and floated bonds sufficient to construct the dam.[138]

Southwest Cotton, fearing that the District's impoundment and diversion of water would interfere with its downstream wells, sued to enjoin construction of the dam.[139] Although the dispute had many of the trappings of a classic groundwater-surface water interconnection case, it had one unusual feature. The groundwater pumper, Southwest Cotton, predated the surface water diversion, and thus would have been advan-

---

134. *Pima Farms*, 30 Ariz. at 107, 245 P. at 373.

135. *Id.* at 107-08, 245 P. at 373. The opinion cited Kinney's treatise on water law, *supra* note 9, § 1163, as authority for this proposition.

136. Maricopa County Mun. Water Conservation Dist. No. One v. Southwest Cotton Co., 39 Ariz. 65, 4 P.2d 369 (1931).

137. The Beardsleys and their successors claimed appropriative rights superior to those of Southwest Cotton as a result of these early promotional efforts, but the court rejected the claim because due diligence had not been shown in perfecting the rights. Almost no work had actually been done on the project between 1895 and 1925. *Southwest Cotton*, 39 Ariz. at 102-04, 4 P.2d at 382-83.

138. It was named the Waddell Dam after one of the partners in the New York investment house that backed the bond issue; the lake formed behind the dam was named after Carl Pleasant, the engineer who designed it. Gindhart, *Waddell Dam Rose After Years of Woe for Dedicated Family*, Ariz. Republic, Apr. 10, 1987, at B1, col. 1.

139. Construction was not halted even though the trial court eventually ruled for the plaintiffs. The dam was completed in 1927. That same year the Beardsleys sold their land to the Los Angeles-based Pacific Development Company, which eventually opened up 39,000 acres for farming. *See id.*

taged by application of the appropriation doctrine. By contrast, because most Western surface streams were fully appropriated before heavy use of groundwater began, the surface user typically had priority, making it easier to obtain relief from subsequently-initiated groundwater pumping, at least where appropriation doctrine applies.

The supreme court, composed of the same three members that decided *Pima Farms*, spoke through Justice Alfred Lockwood. The court regarded the matter as "one of the most important which ha[d] ever come before th[e] court," not only because millions of dollars were at stake, but also because resolving the legal issues involving the relationship between ground and surface water would "in all probability determine and govern to a great extent the course of future agricultural development within the arid regions of Arizona."[140] Befitting this ambitious objective, the opinion covered a lot of legal terrain, but left considerable uncertainty at crucial points.

Justice Lockwood began by addressing whether, assuming Southwest Cotton was pumping percolating water,[141] its pumping was protected by the prior appropriation doctrine. This required an examination of the development of Arizona water law. For Lockwood, the prior appropriation doctrine that had been applied in Arizona for decades was based on the Howell Code of 1864. But because the scope of that code did not address underground water, Justice Lockwood suggested that that water was subject to the English common law, which had been generally adopted in that same code. That, he pointed out, made "percolating subterranean waters . . . the property of the owner of the land."[142]

Further on in his opinion, Lockwood shifted ground. He suggested that the legislature had actually decided in 1864 that prior appropriation should not apply to underground water.[143] That first territorial legislature, he concluded, "made a complete determination of just which waters the doctrine of prior appropriation should be applied to. . . ."[144] Lockwood conceded that there was, in 1864, "little, if any, knowledge in regard to subterranean waters."[145] He maintained, without citing authority, that even in 1864 it "was recognized that there were occasional cases in which [underground] waters might be 'rivers, lakes or ponds,' in the same sense

140. *Southwest Cotton*, 39 Ariz. at 71, 4 P.2d at 372.

141. That is, subterranean water not found in definite underground channels. BLACK'S LAW DICTIONARY 1427 (5th ed. 1979).

142. *Southwest Cotton*, 39 Ariz. at 79, 4 P.2d at 374.

143. *Id.* at 82, 4 P.2d at 375.

144. *Id.* at 83, 4 P.2d at 376.

145. *Id.* at 77, 4 P.2d at 374.

as those of that character above ground; [but generally] speaking . . . they were presumed to be percolating in their nature."[146]

There remained the argument, based on the 1885 territorial statute, that the court ought to modify or reject English common law because it was not "consistent with and adapted to the natural and physical condition of this territory, and the necessities of the people thereof. . . ."[147] Applying this idea tempted Lockwood because at the time of *Southwest Cotton*, many Western states had, as he expressed it, "evolved a new common law from the stern school of necessity, and applied the law of prior appropriation to percolating [ground]waters."[148] Nevertheless, after extolling the genius of the common law's flexibility,[149] he felt bound by judicial restraint because the legislature had already fixed the law in this area, by an "explicit declaration of public policy" that, shifting ground once again, he found in the 1919 code.[150]

The "explicit declaration" was actually implicit because Lockwood could locate it only by applying the hoary interpretive maxim *expressio unius est exclusio alterius* (expressing one excludes others).[151] Lockwood inferred that by making one category of groundwater—that in definite underground channels—subject to appropriation, the legislature had "very carefully excluded" other groundwater from that system.[152] This conclusion was, of course, at odds with the view of the code's author. G.E.P. Smith did not intend to resolve, and considered unsettled, the question of what law applied to percolating groundwater.[153] Not a lawyer, Smith was presumably unfamiliar with statutory interpretation and the maxims that guide it. Furthermore, Smith was a little confused on the issue because he explained that he included the phrase "definite underground channel" in the 1919 code to follow precedent, presumably *Howard v.*

---

146. *Id.* at 78, 4 P.2d at 374.

147. *See supra* note 82 and accompanying text.

148. 39 Ariz. at 81, 4 P.2d at 375.

149. *Id.* at 80-82, 4 P.2d at 375.

150. *Id.* at 82, 4 P.2d at 375.

151. *See* BLACK'S LAW DICTIONARY 521 (5th ed. 1979).

152. 39 Ariz. at 80, 4 P.2d at 375. The *exclusio* canon of construction is, like practically all such canons, not without its opposite number. *See* Llewellyn, *Remarks on the Theory of Appellate Decision and the Rules or Canons About How Statutes Are to Be Construed*, 3 VAND. L. REV. 395, 405 (1950). That is, courts and commentators have also acknowledged that a statute may fairly comprehend many different cases where some only are expressly mentioned by way of example. *See id.* at 405. Moreover, it must be remembered that in *Southwest Cotton* the question was not simply whether the legislature had legislated a doctrine for percolating groundwater, but whether its silence on the subject constituted a decision that the appropriation doctrine should *not* apply, thus foreclosing the courts from reaching a different result through exercise of their common law powers. *See supra* text accompanying note 123.

153. G.E.P. SMITH, *supra* note 13, at 49, 66.

Perrin.[154] This could have allowed the court in *Southwest Cotton* to infer that the 1919 legislature ratified the principle upon which the parties agreed in *Howard*—percolating groundwaters are the property of the overlying landowner.

Finally, once again muddling common law with statutory application, Justice Lockwood rejected the argument that the principle announced in *Howard v. Perrin* ought not to be followed because it was *dictum*.[155] Even if it were, he wrote, "it has been accepted as the law of this jurisdiction for so long, and so many rights have been based upon it, that only the clearest showing that the rule declared was error would justify us in departing from it."[156] In any event, the legislature confirmed the principle by enacting it in 1919. Therefore, he concluded, percolating groundwaters are not subject to prior appropriation in Arizona.[157]

In the end, however, and despite language suggesting that percolating groundwater is the property of the overlying landowner,[158] Lockwood carefully avoided any conclusive statement on the subject. He contrasted the "old English common law in its strictest form"[159] with the "American modification known as the rule of correlative rights,"[160] and declined to choose between them, preferring instead to wait until "the matter [was] properly before [the court]."[161]

Other Western state courts confronted the question addressed by Justice Lockwood at about the same time, with far different results. For example, in a case decided seven months before *Southwest Cotton*, the Idaho

---

154. *Id.* at 49 n.1 ("The single reference to groundwater followed the previous court decisions in Arizona").

155. *Southwest Cotton*, 39 Ariz. at 82-83, 4 P.2d at 376.

156. *Id.*

157. *Id.* at 84, 4 P.2d at 376.

158. *Id.* at 82, 4 P.2d at 375.

159. Presumably, the absolute ownership rule. *See* D. GETCHES, *supra* note 2, at 232-34.

160. *Southwest Cotton*, 39 Ariz. at 83, 4 P.2d at 376. Lockwood cited Katz v. Walkinshaw, 141 Cal. 116, 74 P. 766 (1902), for this doctrine. The "American modification" eventually evolved two separate variations: correlative rights, which gave all overlying landowners rights to a reasonable share of water in a common source of groundwater; and the reasonable use or American doctrine, which did not require sharing among overlying landowners who were pumping from a common supply for use on their own land. Both variations prohibited the use of groundwater off the land from which it was pumped, if injury to other users resulted. But the correlative rights doctrine went further, and limited each user of water on land overlying a common aquifer to a "fair and just proportion" of the common supply. The reasonable use doctrine, in contrast, allowed each pumper to use water on the overlying land without restriction, even if other like pumpers were injured. The latter retained, in other words, the "tragedy-of-the-commons" vice of the English rule in this context. *See generally* 2 C. KINNEY, *supra* note 9, § 1192, at 2161-62; Annotation, *Subterranean or Percolating Waters*, 55 A.L.R. 1400-08 (1928); Annotation, *Subterranean or Percolating Waters*, 109 A.L.R. 399-403 (1937).

161. *Southwest Cotton*, 39 Ariz. at 84, 4 P.2d at 376.

Supreme Court held that percolating subterranean waters were subject to appropriation, even if they did not flow in a well-defined stream.[162] Because all subterranean waters move through the earth, the court concluded, the question whether such waters move in a well-defined channel is solely a question of degree, which would pose difficult problems for courts if the law were to erect different legal systems upon that difference.[163]

New Mexico had similarly decided, two years before *Southwest Cotton*, that all groundwater was subject to appropriation, regardless of whether it flowed in underground streams.[164] In 1915, New Mexico's legislature made "[a]ll natural water flowing in streams and water courses" subject to appropriation, but, like the Arizona Legislature, was silent on the legal doctrine to be applied to other kinds of water.[165] Twelve years later, the New Mexico legislature broadened the appropriation doctrine to include nearly all kinds of subterranean water.[166] Landowners argued that the legislature had, by this 1927 enactment, unconstitutionally taken their property rights in the groundwater underneath their land, rights that both existed at common law and were, in their view, implicitly confirmed in the 1915 statute. These were both arguments that Justice Lockwood would accept two years later in *Southwest Cotton*, but they were both rejected by the New Mexico Supreme Court. First, the English common law ought not to be borrowed wholesale, unthinkingly, but rather only so much of it "as is applicable to our condition and circumstances."[167] Second, the legislature did not exclude application of the appropriation doctrine to percolating groundwater by limiting the prior appropriation system in 1915 to streams and watercourses.[168]

---

162. Hinton v. Little, 50 Idaho 371, 296 P. 582, 583 (1931).

163. *Id.* at 376, 296 P. at 583. Dissenting, Judge Budge took the tack Justice Lockwood followed in Arizona. Budge argued that the legislature resolved this issue by statute when it applied the appropriation doctrine only to "the waters of any natural stream, spring or seepage waters, or lakes, or other public waters." He interpreted this language to exclude that groundwater to which the owner of land had a private right. *Id.* at 386, 296 P. at 587.

164. Yeo v. Tweedy, 34 N.M. 611, 286 P. 970 (1929).

165. N.M. STAT. ANN. § 5654 (1915); *see also Tweedy*, 34 N.M. at 614, 286 P. at 972.

166. Act of Mar. 16, 1927, ch. 182, 1945 N.M. Sess. Laws 450; *see also Tweedy*, 34 N.M. at 613, 286 P. at 971 (applying to "[a]ll waters in this state found in underground streams, channels, artesian basins, reservoirs, or lakes, the boundaries of which may be reasonably ascertained by scientific investigations or surface indications").

167. *Tweedy*, 34 N.M. at 615, 286 P. at 972.

168. *Id.* at 616, 286 P. at 972. Four years after *Southwest Cotton*, the Utah Supreme Court confronted the same problem. The court criticized the idea that percolating groundwater belonged to the owner of the soil. The defect of that approach, it concluded, was that groundwater "is evasive and constantly changing." Justesen v. Olsen, 86 Utah 158, 165, 40 P.2d 802, 805 (1935). Thus, there "can be no more ownership of water moving through the soil than there can be of

Justice Lockwood did not deal with cases from other jurisdictions in *Southwest Cotton*.[169] Instead, having decided that prior appropriation did not apply to percolating groundwater, he proceeded to address a difficult question—what kind of water was Southwest Cotton actually pumping? The trial court, following the expansive view applied by the Supreme Court five years earlier in *Pima Farms*, concluded that it was water in a definite underground channel and therefore subject to appropriation.[170]

Lockwood announced a legal presumption that underground waters are percolating and held that the presumption could be rebutted only by clear and convincing evidence.[171] For this proposition he cited *Howard v. Perrin*, which did not address that point, and *Ryan v. Quinlan*,[172] a Montana case, that similarly failed to lend much support for it.[173] Here again, contrary authority existed that went unmentioned in *Southwest Cotton*. Sixteen years earlier, the Utah Supreme Court held that one who takes percolating groundwater must show that the water taken is not tributary to a surface stream which had previously been fully appropriated.[174] The U.S. Supreme Court, applying Utah law, had reached a similar result in 1923.[175]

Justice Lockwood followed what he termed the "great weight of authority" in requiring a channel to have "a well-defined bed and banks, and a current of water."[176] Although these criteria were developed in surface water cases, he opined that "definite underground channels . . . must have substantially like characteristics" without pausing to ask

---

ownership of water moving across the surface." *Id.* at 164-65, 40 P.2d at 805. Instead, the same rule, prior appropriation, ought to be applied to both. *Id. See also* Wrathall v. Johnson, 86 Utah 50, 40 P.2d 755 (1935), discussed in note 300 *infra*.

169. His opinion did allow that some cases had been "read and carefully considered." *Southwest Cotton*, 39 Ariz. at 83, 4 P.2d at 376.

170. *Id.* at 87-88, 4 P.2d at 377.

171. *Id.* at 85, 87, 4 P.2d at 376, 377.

172. 45 Mont. 521, 124 P. 512 (1912).

173. *Ryan* did not articulate a "clear and convincing evidence" standard. Rather, in remanding for a new trial on other grounds, the court said, in *dicta*, that there was no presumption that groundwater was "tributary" to any stream. The burden, it suggested, ought to be on the one arguing for the connection; it may be met by circumstantial evidence so long as that evidence had "so much of substance and probative value as will reasonably exclude the contrary hypothesis." *Id.* at 534, 124 P. at 516 (citation omitted).

174. Mountain Lake Mining Co. v. Midway Irrigation Co., 47 Utah 346, 360, 149 P. 929, 934 (1915).

175. Snake Creek Mining & Tunnel Co. v. Midway Irrigation Co., 260 U.S. 596, 606 (1923). *See also* Silver King Consol. Mining Co. v. Sutton, 85 Utah 297, 306, 39 P.2d 682, 686 (1934).

176. Maricopa County Mun. Water Conservation Dist. No. One v. Southwest Cotton Co., 39 Ariz. 65, 85, 4 P.2d 369, 376 (1931).

whether it made sense to apply these component features underground.[177] Turning to the evidence in the case, Justice Lockwood noted that the Agua Fria River flows only intermittently on the surface between its source in the mountains and its confluence with the Gila. He conceded that an "immense quantity" of underground water existed in the general area, all apparently moving slowly and steadily southwest toward the Gila. He stated, however, that no indications on the land surface suggested the existence of "definite underground channels" except those directly beneath the river bed.[178] Given that evidence, he refused to find the water of "any wells not in or immediately adjacent to the surface channel of the Agua Fria" to be water in "definite underground channels" and, by that fact, subject to prior appropriation.[179]

Lockwood next considered whether the water pumped by Southwest Cotton was appropriable because it was, as he expressed it, part of the "underflow, subflow or undercurrent, as it is variously called," of the Agua Fria.[180] Lockwood assumed, without extended consideration, that such subflow was appropriable the same as the body of the stream itself. This concept, sometimes described as underflow "dependent" on a surface stream,[181] was well-known at the time. Indeed, the Arizona Supreme Court said as much in *Pima Farms*, when it characterized the underground stream at issue as "independent."[182]

It was not clear, however, whether Justice Lockwood intended that the strong presumption he had just created, that groundwater was percolating, would apply to determining whether underground water was the subflow of a stream. On one hand, the subflow might be regarded as subterranean, and thus, his presumption that "subsurface" waters are percolating ought to apply. But Justice Lockwood was careful to say that the subflow is "part of the surface stream."[183] This suggests the presumption against it being appropriable ought not apply. As Kinney had pointed out more than two decades earlier, case law supported the idea that water found below a stream is presumed to be the subflow and subject to appropriation, and the burden is on the one seeking to prove the contrary.[184]

---

177. *Id.* at 86, 4 P.2d at 377.
178. *Id.* at 89-90, 4 P.2d at 378.
179. *Id.* at 95, 4 P.2d at 380.
180. *Id.* at 96, 4 P.2d at 380.
181. *See, e.g.*, 2 C. KINNEY, *supra* note 9, § 1163, at 2113.
182. *Pima Farms*, 30 Ariz. at 98, 245 P. at 370.
183. *Southwest Cotton*, 39 Ariz. at 96, 4 P.2d at 380 (citing 2 C. KINNEY, *supra* note 9, § 1161, at 2106-10).
184. 2 C. KINNEY, *supra* note 9, § 1165, at 2118.

Kinney, whose treatise Justice Lockwood cited repeatedly, made clear his view that the subflow concept was broad. In the very section Justice Lockwood cited for the proposition that the subflow is appropriable, Kinney described the typical subflow as "broad and deep . . . probably much greater in volume in some cases than the water upon the surface, and [which is] as far as rights of appropriation . . . are concerned, but a valuable portion of the well-defined surface stream."[185] The U.S. Supreme Court had taken substantially the same position in 1907.[186] Kansas had brought suit to contest Colorado's use of the waters of the Arkansas River, which flowed from Colorado into Kansas. The latter claimed that the subflow of the river actually formed a second, subterranean river independent of the surface stream, and was thus subject to a separate claim by Kansas. The Court rejected the argument, pointing out that the underflow or subsurface water "percolates on either side as well as moves along the course of the river, and the more abundant the subsurface water the further it will reach in its percolating on either side . . . ."[187] Thus, the underflow, no matter how broad, "is not properly denominated a second and subsurface stream."[188]

Other judicial opinions suggested, however, that it was not necessary to apply an expansive concept of subflow to resolve groundwater/surface water disputes. Regardless of whether groundwater is considered subflow of a surface stream, its use might still be limited to protect prior appropriators of surface waters. Kinney pointed out, in a section of his treatise not cited by Justice Lockwood, that pumpers of groundwater are subject to limitation if their pumping injures prior appropriators on streams whose waters are fed by the groundwater being pumped, even if the groundwater is legally characterized as percolating.[189] In other words, Kinney interpreted the cases decided up to 1912 as creating two separate classes of percolating groundwater: (1) water that is truly independent of surface streams or their subflow; and (2) percolating groundwater that is "tributary" to surface waterbodies. Waters in this second class are not "subflow," according to Kinney, because they "have not yet reached the channels of the water courses to which they are tributary."[190]

Numerous investigations have demonstrated, Kinney wrote, that percolating groundwaters are often the "sources of supply . . . of

185. *Id.* § 1161, at 2107 (footnote omitted).
186. Kansas v. Colorado, 206 U.S. 46 (1907).
187. *Id.* at 115.
188. *Id.* at 114.
189. 2 C. KINNEY, *supra* note 9, § 1193, at 2162.
190. *Id.*

surface streams and other surface bodies of water."[191] Armed with the emerging knowledge that "these percolating waters physically are directly tributary to these streams, the law has kept pace [so that] in law they should be, and in many jurisdictions are, dealt with and treated as tributary waters."[192] Thus, in a state applying prior appropriation doctrine to surface waters, a landowner may not intercept and use tributary groundwaters if this would interfere with prior appropriations on the stream the percolating waters augment, "upon the same principle as though this water was a part of the stream itself, as, for example, its underflow."[193] Kinney traced this principle[194] to the California cases of *Katz v. Walkinshaw*[195] and *McClintock v. Hudson*,[196] both of which Justice Lockwood cited favorably in *Southwest Cotton*.[197]

Samuel Wiel, also writing about twenty years before *Southwest Cotton*, reached the same conclusion. He considered percolating groundwater feeding a stream as "percolations tributary to a watercourse instead of resting beneath it [as with 'subflow,' and thus] tributary percolations form a component [of the stream] though they have not yet reached the actual channel."[198] Wiel cited substantially the same cases for this proposition as Kinney.[199] In the end, said Wiel, the question whether percolating groundwater ought to be "treated as a component part of the watercourse, and follow rights on the watercourse . . . and not regarded as underground rights separate therefrom" is a "question of fact, not of law."[200]

As for courts like Arizona's that had not yet addressed these issues, Kinney wrote in 1912 that it was "only a question of time" before

---

191. *Id.* § 1194, at 2164.

192. *Id.*

193. *Id.* (footnote omitted).

194. *Id.*

195. 141 Cal. 116, 70 P. 663 (1902).

196. 141 Cal. 275, 74 P. 849 (1903).

197. *Southwest Cotton*, 39 Ariz. at 97, 4 P.2d 381. Kinney also cited for this proposition cases from Colorado, Idaho, Montana, Texas and Utah. *See* 2 C. KINNEY, *supra* note 9, § 1194, at 2164-65 n.5.

198. S. WIEL, *supra* note 9, at 1022-25.

199. *Id.*

200. *Id.* at 1023. The U.S. Supreme Court had also endorsed this conclusion. In Snake Creek Mining & Tunnel Co. v. Midway Irrigation Co., 260 U.S. 596 (1923), the Court applied Utah law to hold that a mining company could not intercept percolating groundwater, even outside a "defined channel," that fed a stream previously fully appropriated by farmers. *Snake Creek*, 260 U.S. at 606. The Court conceded that the Utah decisions had not been entirely consistent, but read them as supporting the farmers' argument that their appropriation of the surface stream "reach[ed] and includ[ed] its underground sources of supply . . . " *Id.* at 598-99. *See also* 2 C. KINNEY, *supra* note 9, § 1161, at 2108.

they followed the same course: In a region "where the greater portion of the water supply percolates through a common stratum which underlies the lands of all, the common law rules [of ownership of groundwater by the landowner] are wholly inapplicable."[201]

It is not clear whether *Southwest Cotton* accepted this view of tributary percolating waters as a component part of the stream. Justice Lockwood cited Kinney, and many of the cases upon which Kinney relied, but he also described the "so-called subflow" as, in "almost all cases . . . found within, or immediately adjacent to, the bed of the surface stream itself."[202] Furthermore, his opinion had already stated the presumption that underground water is percolating, and had concluded that Southwest Cotton could not claim a "right by reason of *appropriation*" to water pumped from wells "not in or immediately adjacent to the bed" of the stream.[203]

Significantly, however, Justice Lockwood specifically refrained from deciding what Southwest Cotton's rights were "under the law applying to percolating waters of the classes we have mentioned in this opinion."[204] This reference to plural "classes" of percolating water suggests that he embraced the courts' and commentators' division of percolating waters between those tributary to streams and those that are not; otherwise, only one "class" of percolating groundwater exists.

Southwest Cotton's test for determining whether subterranean waters relate to a stream in a manner that subjects them to the same law that governs the stream was a physical one: "Does drawing off the subsurface water tend to diminish appreciably and directly the flow of the surface stream?"[205] This test echoed the idea expressed by Wiel, that the problem was one of fact, not law.[206] The crucial question was, in other words, not how to pigeonhole subterranean waters into artificial legal categories like "percolating" or "subflow" or "underground streams." Instead, it was simply whether groundwater was so hydrologically related to streamflow to warrant legally considering it part of the stream system.

Justice Lockwood did not address the difficulty of applying this "appreciable and direct diminution" test to a stream like the Agua

---

201. 2 C. KINNEY, *supra* note 9, § 1194, at 2166.
202. *Southwest Cotton*, 39 Ariz. at 97, 4 P.2d at 381.
203. *Id.* at 101, 4 P.2d at 382 (emphasis in original).
204. *Id.*
205. *Id.* at 97, 4 P.2d at 381 (emphasis deleted).
206. *See supra* note 200 and accompanying text.

Fria, which flowed only intermittently.[207] Moreover, his test asked whether groundwater pumping affected surface flows, whereas *Southwest Cotton* itself involved the interruption of surface flows that allegedly affected groundwater pumping. That is, Southwest Cotton was concerned that diverting the Agua Fria's flow upstream would dry up its wells. This was unlike the more typical situation, at which Justice Lockwood's test appears aimed, where a senior surface appropriator claims injury from subsequently-initiated groundwater pumping. Justice Lockwood indicated, without elaboration, that it was irrelevant whether interrupting the surface flow dried up nearby wells. Without discussing the evidence, he concluded that the water beneath Southwest Cotton's lands "does not constitute the subflow of the Agua Fria River, for there is not the slightest evidence that their pumping diminishes directly or appreciably the surface flow, no matter how true may be the converse."[208]

On this point, too, the law was rapidly developing in the Western states. California courts had long held that a pumper of groundwater could not diminish the stream to the detriment of surface water users.[209] Four years after *Southwest Cotton*, the California Supreme Court decided that a groundwater pumper whose pumping operations interfered with senior appropriations from a surface stream could be enjoined.[210] The Colorado Supreme Court reached the same conclusion in a series of cases. Two years before *Southwest Cotton*, for example, the Colorado court decided that percolating groundwater that would eventually reach a surface stream "belongs to the river," and is subject to the river's priority of appropriations.[211]

Finally, Justice Lockwood addressed whether the groundwater was appropriable because it was an underground lake. He appeared to

---

207. G.E.P. Smith later suggested that Lockwood's test is "entirely impracticable" on ephemeral streams, of which there are many in Arizona. G.E.P. SMITH, *supra* note 13, at 69.

208. *Southwest Cotton*, 39 Ariz. at 99, 4 P.2d at 381.

209. *See, e.g.*, McClintock v. Hudson, 141 Cal. 275, 74 P. 849 (1903). The California cases must be appraised in the context of California's recognition of riparian water rights. The cases reason that when an owner of riparian land pumps percolating groundwater that feeds the surface stream to which the landowner/pumper is riparian, she is deemed to be riparian to that groundwater (just as she is to the surface stream). Therefore, she has a right only of reasonable use of the water, relative to the rights of other riparians. *Id. See also* Hudson v. Dailey, 156 Cal. 617, 105 P. 748 (1909).

210. Tulare Irrigation Dist. v. Lindsay-Strathmore Irrigation Dist., 3 Cal. 2d 498, 45 P.2d 972 (1935).

211. Nevius v. Smith, 86 Colo. 178, 181, 279 P. 44, 45 (1929). This approach was amplified and followed in Faden v. Hubbell, 93 Colo. 358, 28 P.2d 247 (1933); Dalpez v. Nix, 96 Colo. 540, 45 P.2d 176 (1935).

assume that if it were a true lake, it would be appropriable. Indeed, the code at that time made water in "springs and lakes" as well as in "definite underground channel[s]" appropriable.[212] The conjunction of the two could be read to exclude *underground* springs or lakes, so that the only subterranean water appropriable would be that in a definite channel. On the other hand, this language could be understood to make underground springs and lakes appropriable; Justice Lockwood apparently read it that way.[213] He distinguished a California Supreme Court decision finding the underground water in the San Fernando Valley a huge appropriable lake,[214] however, on the dubious ground that the surface of the underground lake in *Southwest Cotton* is not "perpendicular to a radius of the earth, as is invariably the case with a surface lake, [but instead] has a decided slope or dip to the south and west."[215]

Southwest Cotton's ultimate message is confusing. On one hand, it stands for the proposition that ordinary percolating groundwater is not appropriable.[216] Exactly how much underground water actually fits within that category is, however, left unclear. The case suggests, for example, that such a thing as an appropriable underground lake can exist.[217] It acknowledges that the concept of appropriable stream includes groundwater that can be characterized as influencing surface streams. It leaves ambiguous, however, whether the inquiry into influence should be broad or narrow.

In effect, *Southwest Cotton* introduced two new categories of groundwater into the law, alongside water in "definite underground channel[s]" (the 1919 Code) and ordinary percolating groundwater: underground lakes and groundwater that influences surface streams. Moreover, Lockwood's test of "appreciable diminution" of the stream by pumping acknowledges the possibility that much groundwater is in that fourth category, and subject to regulation to protect rights in

---

212. ARIZ. REV. STAT. § 3280 (1928).

213. Four years later, Justice Lockwood described *Southwest Cotton* as holding that a "subterranean lake" may be appropriable. Campbell v. Willard, 45 Ariz. 221, 224, 42 P.2d 403, 404 (1935). The code itself, then and now, makes the water of "lakes, ponds, and springs on the surface" subject to appropriation. ARIZ. REV. STAT. ANN. § 45-141(A) (1987). The question is whether "on the surface" modifies springs only, or lakes and ponds as well. In still another case, Justice Lockwood implied that "on the surface" modifies springs only. *See* Fourzan v. Curtis, 43 Ariz. 140, 142-45, 29 P.2d 722, 723-24 (1934).

214. Los Angeles v. Hunter, 156 Cal. 603, 105 P. 755 (1909).

215. *Southwest Cotton*, 39 Ariz. at 100, 4 P.2d at 382.

216. That idea has been undermined, if not completely destroyed, by later developments. *See infra* text accompanying notes 270-79.

217. This assumes one can be found whose surface is "perpendicular to the radius of the earth." *See* 39 Ariz. at 100, 4 P.2d at 382.

surface streams. Justice Lockwood remarked that in "almost all cases" this fourth kind of groundwater would be found "within, or immediately adjacent to, the bed of the surface stream itself."[218] The qualifier "almost" is best construed as reflecting the court's assumption concerning the state of hydrological knowledge at that time, an assumption that improvements in that knowledge have seriously undermined.

Thus, even though Justice Lockwood astonishingly did not discuss the five-year-old *Pima Farms* decision, which took an expansive view of what is an appropriable underground stream, *Southwest Cotton* may have effectively reached a similar result, by formulating an expansive concept of subflow of, or underground water tributary to, a stream.[219]

Part of the difficulty in deciphering *Southwest Cotton* stems from the fact that it was not a typical groundwater/surface water dispute. The groundwater pumper sought to stop a later surface diversion. Yet the court's test, borrowed from the more typical, opposite situation, focused on the impact of pumping on the stream, and suggested the impact of surface diversions on wells was irrelevant.

In the more typical case, Justice Lockwood's answer would seem clear: groundwater that, when pumped, "appreciably deplete[s] the waters of the surface stream" is subject to limitation to the extent that it impairs existing appropriations from that stream. Moreover, it is also unprotected against new appropriations of stream water that interfere with it. This last interpretation is bolstered by a long passage that concluded the opinion, in which Justice Lockwood extolled the virtues of protecting surface waters. He did so not on the modern ground of protecting environmental and recreational uses of free-flowing streams, but rather on the justice and wisdom of protecting investments in projects to utilize those surface waters for traditional irrigation uses.[220] He contrasted the fairness of protecting these investments, even when they occur *after* pumping of hydrologically related subterranean water has commenced, with what he regarded as the less compelling case for protecting investments in projects that depend upon groundwater. The latter category of water was, in his words, too "uncertain" and "speculative" to justify investors staking their funds, and farmers their future, in reliance on them:[221]

---

218. *Southwest Cotton*, 39 Ariz. at 97, 4 P.2d at 381.

219. G.E.P. Smith later observed that the physical conditions in the Santa Cruz (*Pima Farms*) and Agua Fria (*Southwest Cotton*) valleys "are for all practical purposes the same," G.E.P. Smith, *supra* note 13, at 69, even though the court in *Pima Farms* characterized the Santa Cruz Valley subterranean water as an underground stream independent of surface flows.

220. *Southwest Cotton*, 39 Ariz. at 105, 4 P.2d at 383.

221. *Id.*

> It may be said that this [case] means an end to all future large [groundwater] pumping projects. If these projects are based on the depletion of surface waters [because of the hydrologic connection between ground and surface waters], it is far more economical both in money and water, and thus better for the state as a whole, that those surface waters be utilized through surface developments . . . . [If the effect] will be to lessen somewhat the number and size of future irrigation projects depending upon pumped water, in our opinion it is more than compensated by the establishment of certainty and security for the vastly more important surface projects now existing, and which will doubtless exist in the future.[222]

This preference for surface over groundwater in situations where the uses conflict was dramatically illustrated in the result—Southwest Cotton's investment in its groundwater project was made precarious by the court's willingness to protect the investor in the surface impoundment. This was so, remarkably, even though the latter was later in time.[223] This closing passage strongly suggests that *Southwest Cotton* leaves unprotected groundwater users whose pumping negatively influences surface waters. By refusing to apply the concept of prior appropriation to pumpers of groundwater hydrologically connected to surface water, the court avoided protecting groundwater users against new appropriators in the connected surface streams.

In short, Justice Lockwood strained to protect surface water users against groundwater pumpers regardless of priority in time. Applying the appropriation doctrine to "tributary" (hydrologically-connected) groundwater would, in the more typical case where surface appropriations precede groundwater pumping, accomplish that result. However, *Southwest Cotton* was not that typical case. On its facts, Justice Lockwood could not fully apply the appropriation doctrine to tributary groundwater without favoring the earlier groundwater user. The test he adopted, however, functioned the same way when the surface appropriation came first. When groundwater pumping "diminishes directly or appreciably the surface flow"[224] it is subject to the surface stream appropriation system.

When the "converse" is true—when the surface flow "directly or appreciably" affects the supply of groundwater to nearby wells—Justice Lockwood said that groundwater is not subject to the appropriation

---

222. *Id.* at 105-06, 4 P.2d at 383-84.

223. The court remanded the case for further proceedings, after modifying its opinion in certain respects immaterial to this article. *Southwest Cotton*, 39 Ariz. 367, 7 P.2d 254 (1932). No further opinions were published.

224. *Id.* at 99, 4 P.2d at 381.

doctrine. Justice Lockwood's one-way test ("no matter how true the converse"[225]) allowed him to protect surface users against nearly all groundwater pumpers. If the surface users are first, pumpers of tributary groundwater are junior and subject to the senior appropriations. If the groundwater pumpers are first, as in *Southwest Cotton*, they are protected only to the extent their wells are "within, or immediately adjacent to, the bed of the surface stream itself."[226]

Southwest Cotton's concluding passage effectively warned all Arizona water users that the law would protect surface water users against groundwater pumping that "directly or appreciably" diminished surface flows. Lockwood's admonition has important implications today in evaluating the fairness of managing surface and tributary groundwaters on a unitary basis. In effect, it has meant that no landowner in the state could have a legitimate, legally protected expectation of a right to pump groundwater regardless of its effect on surface streams.

D. From Southwest Cotton to the 1980 Groundwater Management Act

Southwest Cotton was quickly followed by two Arizona Supreme Court decisions of little moment; in each, the court found that the water in dispute was not appropriable, but rather was percolating groundwater.[227] Some action also took place in federal court, in the context of a general stream adjudication that the United States initiated to establish rights to the Gila River sufficient to construct and operate the San Carlos reclamation project. That case was settled in 1935 by a consent decree.[228] Although the decree dealt only with appropriative water rights, the Kennecott Copper Corporation had been pumping some 6000 acre-feet of groundwater in the basin. The facts were, thus, similar to *Southwest Cotton*—the groundwater pumper was threatened by a later upstream impoundment of surface water. Article IX of the decree set out a complex scheme for protecting Kennecott's pumping, explicitly acknowledging that it was pumping "from the underground waters of the Gila River."[229]

---

225. *Id.*

226. *Id.* at 97, 4 P.2d at 381.

227. Fourzan v. Curtis, 43 Ariz. 140, 145, 29 P.2d 722, 724 (1934) (water obtained by excavating a swampy spot on the surface was not a spring subject to appropriation because it did not flow naturally); Campbell v. Willard, 45 Ariz. 221, 224, 42 P.2d 403, 404 (1935) (plaintiff did not meet burden of showing that water flowing from an artesian well was not percolating groundwater).

228. United States v. Gila Valley Irrigation Dist., Globe Equity No. 59 (D. Ariz.) (popularly known as the Globe Equity decree).

229. *Id.*, art. IX, slip decree at 26-29.

During the 1930's, groundwater pumping began to increase rapidly, as a result of increased pump efficiency, lower electricity costs, rural electrification, and higher cotton prices.[230] Pumping exceeded one million acre-feet (MAF) state-wide for the first time in 1934.[231] It exceeded two MAF in 1945, three MAF in 1948, four MAF in 1953, and five MAF in 1961.[232]

In 1945, the legislature passed a bill taking the first faltering steps to control groundwater pumping in the state by means of administrative regulation. The Ground Water Act of 1945[233] merely required owners of existing wells to supply some information to the state land commissioner, and those who intended to drill new wells to file a notice of intention with the commissioner.[234] The Act defined ground water broadly as "water under the surface of the earth, regardless of the geologic structure in which it is standing or moving."[235] This definition appeared to obliterate, at least for the modest regulatory purposes contained in the Act, all previous legal distinctions among types of groundwater.

This definition lasted until 1948, when the legislature, after numerous special sessions called by Governor Sidney Osborn,[236] enacted a bill providing limited controls over new wells used for agricultural irrigation in certain critical groundwater areas.[237] This statute exempted one category of groundwater from the regulatory scheme: water "flowing in underground streams with ascertainable beds and banks."[238] It did not significantly alter the law applicable to groundwater outside the critical groundwater areas, or to groundwater obtained from existing wells inside such areas.[239] One might construe its definition of groundwater, however, as narrowing the kind of subterranean water subject

---

230. *See* G.E.P. Smith, The Groundwater Supply of the Eloy District in Pinal County, Arizona (Ariz. Agric. Exp. Station Tech. Bull. No. 87, June 1, 1940); Mann, *supra* note 10, at 247.

231. ARIZONA WATER COMM'N, SUMMARY INVENTORY OF RESOURCE AND USES Table 4 (July, 1975) (source of data: U.S. Geological Survey).

232. *Id.*

233. Act of Oct. 3, 1945, ch. 12, 1945 Ariz. Sess. Laws (1st S.S.) 508 (codified at ARIZ. REV. STAT. §§ 75-2101 to -2109 (since repealed)). *See also* D. MANN, THE POLITICS OF WATER IN ARIZONA 49-50 (1963).

234. Act of Oct. 3, 1945, ch. 12, §§ 5-6, 1945 Ariz. Sess. Laws (1st S.S.) 509-10.

235. Act of Oct. 3, 1945, ch. 12, § 2, 1945 Ariz. Sess. Laws (1st S.S.) 508.

236. *See* D. MANN, *supra* note 233, at 51.

237. Act of Apr. 1, 1948, ch. 5, 1948 Ariz. Sess. Laws 601-08 (codified at ARIZ. REV. STAT. §§ 45-301 to -324 (repealed by 1980 Ariz. Sess. Laws ch. 231, § 79, and 1980 Ariz. Sess. Laws (4th S.S.) ch. 1, §73)).

238. Act of Apr. 1, 1948, ch. 5, § 2, cl. 1, 1948 Ariz. Sess. Laws 601.

239. It did contain a general prohibition on waste of groundwater anywhere in the state. Act of Apr. 1, 1948, ch. 5, § 12 1948, Ariz. Sess. Laws 607.

to appropriation, to those situations where water flowed in a channel with ascertainable beds and banks.

Whether this 1948 statute altered *Southwest Cotton*'s concept of the subflow of a surface stream is not clear. Justice Lockwood seemed to consider this water as hydrologically of a piece with water in the stream itself—as surface water even though it was subterranean. The new statutory definition, on the other hand, defined groundwater as water "under the surface of the earth" except for underground streams.[240] Thus, it might be construed as redefining subflow water as groundwater. Considered in context, however, such a construction requires drawing the unwarranted inference that the legislature understood and rejected the concept of subflow endorsed by *Southwest Cotton*, and chose instead to sever, legally, all hydrologic connections between ground and surface water.[241] Overall, then, the effect of the 1945 and 1948 statutes on ground/surface water interconnections is at best murky.

In 1952, the Arizona Supreme Court issued its first decision in *Bristor v. Cheatham*.[242] The court, by a 3-2 vote, held that percolating groundwater was public property and subject to appropriation, but did not define percolating groundwater. Instead it merely cited *Southwest Cotton* for the proposition that water is presumed percolating until proved otherwise by clear and convincing evidence.[243] Although the two dissenters vigorously protested what they thought was the majority's unwarranted rewriting of the law, neither addressed groundwater hydrologically related to surface water.[244]

While the case was pending, and apparently without notifying the parties, the Supreme Court asked then-retired Justice Lockwood for his views on the issues raised, and he filed an "opinion" on the subject shortly before his death on October 29, 1951.[245] In it, Justice Lockwood

---

240. Act of Apr. 1, 1948, ch. 5, § 2, cl. 1, 1948 Ariz. Sess. Laws 601.

241. In the same vein, the *Southwest Cotton* court acknowledged that some large bodies of groundwater might be considered underground lakes subject to appropriation. *See supra* text accompanying notes 212-15. Because the 1948 statutory definition did not explicitly recognize this, it might be seen as rejecting the idea. Yet neither the 1945 nor the 1948 groundwater codes altered the pre-existing statutory definition of surface water subject to appropriation, which included water in "lakes." ARIZ. REV. STAT. § 45-101 (1952).

242. 73 Ariz. 228, 240 P.2d 185 (1952) (*Bristor I*).

243. *Id.* at 232, 240 P.2d at 187.

244. *Id.* at 240-60, 240 P.2d at 193-207 (LaPrade, J., concurring and dissenting, and DeConcini, J., concurring and dissenting).

245. Despite a diligent search, we have failed to uncover Lockwood's "opinion." It does not appear in the official records of the case—it was apparently not served on the parties or filed as an *amicus curiae* brief. *See* Bristor v. Cheatham, Docket #5334 (Ariz. S. Ct., 1952) (microfilm #36.1.503). The only record of it we have found is in a front-page newspaper account, which broke the story of its existence and quoted extensively from it. Avery, *High Court Water Edict Approved by Lockwood*, Ariz. Republic, Jan. 24, 1952, at 1, col. 2.

confessed error for previously regarding percolating groundwater as not subject to appropriation.[246] He now opined that the legislature had not foreclosed the question when it made only surface water subject to appropriation, because there was no indication that the legislature intended to prevent the courts from adopting as common law that groundwater was subject to appropriation. Moreover, the courts should not have applied the English common law principle of groundwater ownership by landowners because that principle was, in his words, "clearly inapplicable to the local conditions and necessities of the people of Arizona."[247] Justice Lockwood's new views were clearly influential, being closely tracked by the majority in *Bristor I*.

Despite Lockwood's imprimatur, *Bristor I* met with substantial public opposition, chiefly because of the prospect of sorting out priorities among existing groundwater pumpers under the new system of prior appropriation.[248] Scarcely six weeks later, the court granted a rehearing. Thirteen months later, the court reversed itself by an identical margin of 3-2.[249] The opinions in the new decision were the mirror image of those in the first. Once again, the discussion focused only on whether percolating groundwater not shown to have a connection to surface streams was subject to appropriation. The court did not address what result should obtain where such a connection existed.[250]

---

246. Avery, *High Court Water Edict Approved by Lockwood*, Ariz. Republic, Jan. 24, 1952, at 1, col. 2.

247. *Id.*

248. *See* D. MANN, *supra* note 233, at 57-58. The court had already faced a substantially similar question, however, in *Pima Farms*. *See supra* notes 132-33 and accompanying text.

249. Bristor v. Cheatham, 75 Ariz. 227, 255 P.2d 173 (1953) (*Bristor II*). The turnabout occurred because Justice Stanford switched his vote, without explanation. Justice DeConcini, who had dissented in *Bristor I*, had retired and was replaced by Justice Windes, who wrote the majority opinion in *Bristor II*.

250. The majority opinion in *Bristor II* quoted from a Pennsylvania decision, Rothnauff v. Sinking Spring Water Co., 339 Pa. 129, 134, 14 A.2d 87, 90 (1940), to the effect that a landowner's use of groundwater off his land may be enjoined "if the springs or wells of another landowner are thereby damaged or impaired." 75 Ariz. at 236, 255 P.2d at 178. This reference to "springs" might be construed as an acknowledgement of an interconnection between ground and surface waters, because in Arizona, springs were made subject to appropriation in 1919. *See supra* text accompanying notes 113, 118-21. And later in the opinion the court quoted approvingly from an Oklahoma case, Canada v. City of Shawnee, 179 Okla. 53, 55, 64 P.2d 694, 697 (1937), which says that a landowner may not use groundwater pumped from beneath his land off the land if a neighboring landowner's "wells, springs, or streams are thereby materially diminished in flow . . . ." *See* 75 Ariz. at 238, 255 P.2d at 180. (In fact, the Oklahoma court was, in the passage quoted by the Arizona Supreme Court, itself quoting from a New Jersey court opinion, Meeker v. East Orange, 77 N.J.L. 623, 639, 74 A. 379, 385 (1909)). This might be construed as reversing, in a backhanded way, *Southwest Cotton's* preference for surface uses. That is, the quotation from *Canada* (*Meeker*) implied that a pumper of percolating groundwater may pump

In the years that followed, the court issued decisions upholding the constitutionality of, and construing, the 1948 groundwater code,[251] and addressing the common law that applied to percolating groundwater. But only one case, *England v. Ally Ong Hing*,[252] addressed the problems of defining groundwater subject to the groundwater code, and the status of groundwater hydrologically related to surface streams. In *England*, plaintiffs claimed that defendant's nearby housing project unlawfully interfered with their appropriation rights to a spring by disrupting the subsurface source of the spring. Although neither lower court decision in this case is a paragon of clarity, the second opinion rested on the ground that the plaintiffs had not lawfully appropriated the waters in the spring, and thus could not complain. On rehearing, however, the court carefully cautioned that it was not saying that a landowner "has the right to destroy a spring in violation of the rights of a prior appropriator . . . ."[253] On review, the supreme court vacated the lower court opinions, and sidestepped the key legal issue: it upheld the trial court's finding that the defendant's project had not affected the flow of water in the spring.[254]

In 1974 the legislature enacted a statute requiring the registration of rights to use the "public waters of the state."[255] It defined these "public

---

and use that water *on* his own land without liability, even if a neighbor's stream or spring is materially injured. Yet it is difficult to construe *Bristor II* as endorsing the proposition. The plaintiff in *Bristor*, like the defendant, was pumping groundwater. No issue of hydrologic interconnection with surface water existed. *Southwest Cotton's* preference for the surface user in such a conflict was not examined by the *Bristor II* court. The *Bristor II* majority quoted *Canada (Meeker)* plainly not for whatever it said about groundwater/surface water interconnections, but rather because it made a distinction between pumping for use *on* and *off* the land. In these circumstances, the court's quotation from these cases from other jurisdictions will not easily bear the heavy freight of reversing *Southwest Cotton's* preference for surface water users.

251. Southwest Eng'g Co. v. Ernst, 79 Ariz. 403, 291 P.2d 764 (1955); State v. Anway, 87 Ariz. 206, 349 P.2d 774 (1960); Jarvis v. State Land Dep't, 104 Ariz. 527, 456 P.2d 385 (1969) (*Jarvis I*); Jarvis v. State Land Dep't, 106 Ariz. 506, 479 P.2d 169 (1970) (*Jarvis II*); Jarvis v. State Land Dep't, 113 Ariz. 230, 550 P.2d 227 (1976) (*Jarvis III*).

252. 8 Ariz. App. 374, 446 P.2d 480, *explained and rehearing denied*, 8 Ariz. App. 558, 448 P.2d 128 (1968), *vacated*, 105 Ariz. 65, 459 P.2d 498 (1969).

253. *England*, 8 Ariz. App. at 559, 448 P.2d at 129. The Court of Appeals in *England* therefore indicated that it understood *Bristor II* as not reversing the protection to be accorded surface water users from groundwater pumping. The court's first opinion cited *Bristor II* for the proposition that a landowner can pump percolating groundwater "without limitation or liability to a [neighboring] user of the percolating water . . ." but that if the neighbor has a prior right in a spring fed by that water, the neighbor prevails. *See* 8 Ariz. App. at 379, 446 P.2d at 485; *see also* 8 Ariz. App. at 559-60, 448 P.2d at 129.

254. *England*, 105 Ariz. at 69, 459 P.2d at 502-03 (1969).

255. ARIZ. REV. STAT. ANN. §§ 45-180 to -193 (1987). Rights established since adoption of the 1919 code had required a permit from the state, and the new registration statute was aimed at pre-1919 appropriations, to enable the state to have a record of these early water rights.

waters" in a way practically identical to that in the 1919 Code.[256] There is no indication that the legislature intended this definition to change prior law; therefore, it is best read as incorporating prior judicial decisions, including *Southwest Cotton*.

Two years later, the Arizona Supreme Court issued a major decision in *Farmer's Investment Co. v. Bettwy*,[257] which jeopardized all pumping of groundwater by cities for their residents' use.[258] This decision, like *Bristor II*, did not deal with the ground/surface water interface. In an interesting twist, however, the *FICO* court implicitly suggested that *Bristor II* ought not be read broadly as preferring groundwater users in conflicts with surface users.[259] Following this decision, the legislature enacted a temporary curative act[260] that substantially overturned *FICO* and set in motion a train of events that culminated in the enactment, in 1980, of a comprehensive scheme regulating the extraction and use of groundwater. The 1977 Act did not change the definition of groundwater set out in the 1948 act, which included all water under the earth's surface except for that "flowing in underground streams with ascertainable beds and banks."[261]

---

256. "'Public waters' or 'water' means waters of all sources flowing in streams, canyons, ravines or other natural channels or in definite underground channels, whether perennial or intermittent, flood, waste or surplus water, and of lakes, ponds and springs on the surface." ARIZ. REV. STAT. ANN. § 45-181(3) (1987).

257. 113 Ariz. 520, 558 P.2d 14 (1976) [hereinafter *FICO*].

258. The court held that percolating groundwater could not be transported off the land from which it was pumped if it injured any other pumpers from the same source. Furthermore, the court adopted a narrow definition of "land from which it was pumped," the net effect of which prohibited a city from pumping from city-owned land and delivering the water anywhere off the parcel of land containing the well. *FICO*, 113 Ariz. at 525-30, 558 P.2d at 19-24.

259. *Bristor II*'s quotation from the Oklahoma decision in the *Canada* case could be construed as suggesting a preference for groundwater users against neighboring surface water users. *See supra* note 250. *FICO* quoted the same passage but, in a suggestive twist, excised that portion of the *Canada* quote that referred to the neighbor's use of surface water. *Compare* 113 Ariz. at 525-26, 558 P.2d at 19-20 *with* 75 Ariz. at 238, 255 P.2d at 180. The net effect was to use *Canada* only for the proposition that landowners pumping groundwater for use on their own land are protected against other landowners doing the same thing, and not to suggest a similar result where ground and surface waters were interconnected.

It is also worth noting that although Oklahoma followed the reasonable use common law groundwater doctrine at the time of *Bristor II*, the Oklahoma legislature subsequently modified it. OKLA. STAT. tit. 82, §§ 1020.1-1020.22 (1973). The Oklahoma Water Resources Board's implementation strictly limiting groundwater pumping by landowners in a particular geographic area of the state survived constitutional attack in Kline v. State, 759 P.2d 210 (Okla. 1988), the Oklahoma Supreme Court finding that landowners' "use and enjoyment of . . . subterranean water . . . [may be restricted] to protect [the waters] from waste and to prevent the infringement of the rights of others." 759 P.2d at 212.

260. Act of May 2, 1977, ch. 29, §§ 1-10, 1977 Ariz. Sess. Laws 67.

261. Now codified in ARIZ. REV. STAT. ANN. § 45-101(4) (1987).

E. The 1980 Groundwater Management Act to the Present

By enacting the 1980 Code,[262] the Arizona legislature continued its traditional pattern of defining groundwater for purposes of groundwater regulation (1945, 1948, 1977) and separately defining surface and groundwater for purposes of the appropriation doctrine (1919, 1921, 1928, 1974).[263] It carried forward both the definition of groundwater contained in the 1948 Act and the definition of public water subject to appropriation contained in the 1919 surface water code.[264] The drafters of the code apparently thought they were not affecting prior law on the subject.[265] When read with other provisions of the Code, however, the definitions cause problems. Even when read against each other, careful analysis reveals that the two definitions do not neatly mesh, because some subterranean water may fit within neither, or both, the definitions of appropriable subterranean water[266] and of groundwater.[267]

The next important piece in the puzzle is the Supreme Court's decision in *Chino Valley v. City of Prescott*.[268] At issue was the constitutionality of the 1980 Groundwater Management Act, which the town of Chino Valley had challenged because it legitimated the city's pumping and transportation of groundwater. The city's actions allegedly injured the town, which was pumping from the same underground basin as the city.[269] Thus, the main contest was between two pumpers of groundwater which the parties and the court treated as ordinary percolating groundwater. Surface water and hydrologic connections between groundwater and surface water were not, therefore, directly implicated in the decision.

Nevertheless, the court revisited the common law of percolating groundwater in Arizona. It conceded that cases like *Howard v. Perrin*

---

262. Act of June 12, 1980, ch. 1, 1980 Ariz. Sess. Laws (4th S.S.) 1339 (codified in ARIZ. REV. STAT. ANN. §§ 45-401 to -637 (1987), and scattered other sections).

263. *See supra* text accompanying notes 115-21, 233-41, 255-56, 260-61.

264. *See* ARIZ. REV. STAT. ANN. §§ 45-101(4), (6) (1987); *see supra* notes 115, 236-41 and accompanying text.

265. *See, e.g.*, Higdon & Thompson, *supra* note 23, at 645.

266. "[F]lowing . . . in definite underground channels . . ." *see* ARIZ. REV. STAT. ANN. § 45-101(6) (1980), and possibly including underground lakes. *See supra* notes 212-214 and accompanying text.

267. Defined to exclude water in underground "streams with ascertainable beds and banks." ARIZ. REV. STAT. ANN. § 45-101(4) (1987). *See* Higdon & Thompson, *supra* note 23, at 645 n.196.

268. 131 Ariz. 78, 638 P.2d 1324 (1981), *appeal dismissed*, 457 U.S. 1101 (1982). This is popularly known as *Chino Valley II*, because the first decision upheld the major provisions of the stopgap 1977 legislation. 119 Ariz. 243, 580 P.2d 704 (1978).

269. *Chino Valley II*, 131 Ariz. at 79-80, 638 P.2d at 1325-26. Although other landowners in the vicinity of the city's wells joined the town as plaintiffs, the decision does not indicate whether they were also pumping groundwater.