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MANN, Dean E. **The Politics of Water in Arizona.** Tucson, Arizona, The University of Arizona Press, 1963. 318+xviii pages, 5 maps.

Dr. Dean E. Mann, author of *The Politics of Water in Arizona*, is a political scientist who has managed to write this book with only two references to geographic works, one from 1939, the other an American Association for the Advancement of Science publication edited by Gilbert White. In spite of whatever handicap this may have been, and I think the book could have been improved in several spots by additional references to geographical literature, he does manage to present a very clear picture of the interplay of political and other forces and pressures which have guided water policy in Arizona over the years.

Dr. Mann makes clear that the doctrine of prior appropriation found widely in the arid West of North America, a doctrine which basically holds that the first beneficial user has first right to the water, works reasonably well in distributing surface water to various users, although it is a conservative system that adjusts slowly to changes in technology or population. Almost all the surface water of Arizona is in the Colorado River system. Especially important inside Arizona is the flow of the Gila River, a tributary of the Colorado that stretches across the state, and of its principal tributary, the Salt River which supplies water to the Salt River Reclamation Project around Phoenix. Most of the surface water goes to agricultural irrigation, an economically unproductive but voracious consumer of water. Dr. Mann's description of the adoption and modification of the doctrine of prior appropriation is the substance of his third chapter. Essentially, all surface water in the state has been appropriated.

With surface water only the current year's supply, plus any excess from previous years held in storage, can be used. It is not possible to draw on next year's supply. But in using ground water there is no such limitation. As Dr. Mann correctly points out, the major water problem in Arizona is the pumping each year of a quantity of ground water which is far in excess of the annual recharge. Additional exploitation of ground water in valleys not previously fully developed (as in the Sulphur Springs Valley) still is going on.

In other cases wells drilled near the edge of an alluvial basin have run out of water as the water table dropped; but the farmers in these cases were unable to drill deeper, as their colleagues near the basin center have done to get to deeper supplies, because their wells reached nonproductive bed rock before reaching more water. This situation has forced some farmers to abandon fields which had been irrigated by these now dry wells. It is rather interesting, I think, that radio carbon dating shows that much ground water now being used in Arizona fell as rain before the time of Christ.

Dr. Mann describes the largely unsuccessful attempts to legislate control of ground water exploitation, particularly in areas where the water table is dropping. In fact, although there are some rather weak laws on the books, the actual situation approaches anarchy, in part because the doctrine of prior appropriation specifically has been rejected for underground water. The area around Casa Grande, Coolidge, and Eloy about half way between Tucson and Phoenix is one example of numerous valleys which have had severe overpumping of ground water. In some cases this has resulted in settling of the land surface to a degree sufficient to cause major breaks in the surface of highways crossing the transition zone from pediment to alluvium-filled basin.

It is to rescue farmers in areas such as this, areas which have been overdeveloped in terms of the ground water supply, that the Central Arizona Project to bring in water from the Colorado River is proposed. This grandiose scheme would subsidize the water to the farmers by building two more power producing dams on the Colorado with the hope that a profitable market for the electricity can be found. Even then, there is doubt by some that the farmers who need the water can afford it even at the subsidized price proposed.

The history of Arizona's struggle to get the right to withdraw from the Colorado River the water its leaders feel it needs, and of the various other state, Federal and even private schemes to build the power dams is presented clearly by Dr. Mann. The favorable decision in the U.S. Supreme Court on Arizona's claim to more water occurred as the book was being finished. An interesting sidelight is that the Supreme Court went counter to the doctrine of prior appropriation

— to the surprise of many — when it gave the Secretary of the Interior the power to ration water to the states in times of shortage.

In other chapters Dr. Mann presents the history of the battle between private and public power interests in Arizona, and he also covers the problems of management of water and allied natural resources from many viewpoints. Of interest is the inclusion of four chapters devoted to a summary of research on various water problems of Arizona as it was being carried on by both Federal and state agencies.

Since the book went to press, additional research has shown that the return to the economy from using water for irrigation is extremely low per unit of water consumed compared to other uses of water such as in industry and other urban uses and in recreation. In fact, it is asserted that there is no real shortage of water in Arizona at present, only a shortage of cheap water for agriculture. If irrigation of low-yielding food and feed grains and forage crops were eliminated, the more than three million acre-feet a year overdraft on the under-ground water resources could be wiped out without affecting other agriculture.¹ How to do this, and how to distribute higher yielding crops and other uses to areas where the water is available is one of the problem addressed in a related context by Dr. Mann. He suggests on page 257 that :

« The law of the market place unquestionably has its virtues in regard to many economic questions. But when the question involves the fundamental basis of the economy, as the question of water does in Arizona, it would appear necessary to take the long view, to place the short-run economic interests in the context of the future economy of the state, and to provide the leadership in gaining acceptance of the policies which will bring more efficient utilization of the existing water supply and whatever adjustments might be required to meet changing economic conditions. »

As Dr. Mann clearly shows, overall planning of water use and development in Arizona is badly needed. Perhaps this is the most important point of a generally well written and interesting book.

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SAUER, Carl Ortwin. **The Early Spanish Main.** Berkeley, University of California Press, 1966. 306 pages.

For many years, Carl Sauer has helped to unravel the complexities of Middle American cultural and historical geography in a series of articles which bring together the various relevant threads of human and physical geography. His latest book, *The Early Spanish Main*, is an important work which is concerned with what are probably the most significant years in the post-Columbian cultural development of the Hispanic New World — those which cover the initial clashes of two broadly-different culture groups (Spanish and Amerindian), from the first discoveries of Columbus to the major transference of colonial interest from the West Indies to Tierra Firme, which followed Cortez' expedition to Mexico in 1519. Without a full appreciation of this influential period in Middle American history, many of the later trends of this area's cultural development cannot be understood, and this study by Sauer forms a deeper analysis of the events of those years than anything written hitherto.

The main thesis is that this period gave rise not only to a major culture clash, resulting from Spanish expansion into a then « New » World, but also to new precedences for political and economic control of the conquered territories. Both were to have far-reaching and often disastrous consequences in their later development.

The « New » World which Columbus reached during his search for a western sea-route to the Orient proved in the main to be hospitable and well-populated, with established, stable cultures, organised around leading caziques, and supported by traditional conuco agriculture, which provided an abundance of food. No matter what the tribal differences in the circum-Caribbean

¹ MARTIN, William E., and BOWER, Leonard G., « Patterns of Water Use in the Arizona Economy », *Arizona Review*, XV : 12, December, 1966, pp. 1-6.