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# The Chain and Unity of Title Theories for Delineating Riparian Land: Economic Analysis as an Alternative to Case Precedent

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# THE CHAIN AND UNITY OF TITLE THEORIES FOR DELINEATING RIPARIAN LAND: ECONOMIC ANALYSIS AS AN ALTERNATIVE TO CASE PRECEDENT*

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## I. INTRODUCTION

Either the chain or unity of title theories is employed in most states following the riparian rights system (in whole or in part) to determine the boundaries of the area on which riparian water may legally be used. The purpose of this essay is to (1) investigate the nature and scope of these two theories, (2) analyze the economic implications inherent in their application, and (3) suggest a simple model to assist in analyzing the comparative economics of using water from alternative stream and underground sources.

## II. A LEGAL ANALYSIS OF THE CHAIN AND UNITY OF TITLE THEORIES

The riparian system of water rights is in force in most of the eastern states (that is, the 31 states extending easternly from and including the tier states along the west bank of the Mississippi River). These states are usually classified as "humid" for water law purposes and the systems that prevail in them are considered to presuppose a relatively abundant supply.

The riparian rights system also coexists in those states following the California Doctrine of water law. In general, it applies in the "border" states existing between the humid and arid areas of the United States. In its simplest form, the California Doctrine applies prior appropriation rules (first in time, first in right) to public waters and the riparian rights system to private sources.

Riparianism provides that each proprietor of land abutting on a watercourse has a coequal right to the "reasonable use" of its water *on riparian land.* Consequently, the definition of "riparian

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land" is of critical importance in determining where riparian water can be legally used in riparian rights states and, to the extent they follow the riparian rights system, to those following the California Doctrine.

Two major doctrines have emerged defining how much land abutting a stream is to be considered riparian. These are the "chain of title" and "unity of title" theories.

It should be noted that those states cited, *infra,* (Washington, Texas, California) as following the chain (or source) of title theory are all among those generally classified as following the California Doctrine of water law. Thus, given the different uses, supplies, and climates of these states as compared to those applying the riparian rights system to all the riparian sources, it is questionable whether the chain of title test is or will be a part of the riparian doctrine of any eastern state.

On the other hand, cases can be found in both California Doctrine (Oregon)[1] and riparian rights jurisdictions (Pennsylvania)[2] which advocate the unity of title test as being appropriate for delineating the boundaries of riparian land. Both theories will be discussed in turn.

*Chain of Title*

The chain of title[3] theory essentially states that water may be used only on land which has been held as a single tract throughout its historical chain of title. This means that any severed, nonabutting portions of the original tract forever lose their riparian character even though subsequently brought back into common ownership, unless a contrary intention is manifested. This theory was accepted in Washington,[4] Texas,[5] and California.[6] Under this theory, as transfers occur over time, the amount of riparian land is constantly diminishing and the total amount of riparian land cannot be enlarged by the purchase of contiguous back tracts.

1. Jones v. Conn, 39 Ore. 30, 64 P. 855 (1901).
2. Slack v. Marsh, 11 Phila. 543 (Pa. C.P. 1875).
3. Sometimes, perhaps erroneously, this is characterized as being synonomous with the source of title theory.
4. Yearsley v. Cater, 149 Wash. 285, 270 P. 804 (1928).
5. Watkins Land Co. v. Clements, 98 Tex. 578, 86 S.W. 733 (1905).
6. Boehmer v. Big Rock Irrigation Dist., 117 Cal. 19, 48 P. 908 (1897); Lux v. Haggin, 69 Cal. 255, 10 P. 674 (1886).

There is a line of cases which appears to deviate from the chain of title test. It is difficult to determine if they constitute a test which coexists with the chain of title test, is a corollary of it, or exists in lieu of the chain of title test. This test was stated in the case of *Watkins Land Co. v. Clements.*[7]

In that case the defendant irrigated land which was outside the watershed of the stream. Land was also irrigated which was within the watershed but had been acquired by a separate government patent than the watercourse-abutting tract. In determining what lands were riparian, the court said that (1) land acquired in a *single transaction* was riparian and (2) land outside the watershed of a stream is not riparian to it. But the court went on to say that conditions might exist which would permit use of water outside the watershed (for example, if the water supply is abundant and the drainage area small). Thus, irrigation of non-riparian land may be permissible if other riparians are not affected by it. Unlike the *Anaheim* case,[8] in *Watkins*[9] the court did not consider the use of the water on non-riparian land a trespass but only an unreasonable use *in the arid regions* of Texas.

This case referred to, but did not elaborate on, the "single transaction test" other than to say that a parcel of land which is regarded as one tract should be regarded as riparian. In normal terms and in common usage this would mean forty acre plots (the amount initially obtained from the government).

Perhaps a clearer statement of this portion of the rule was made in *Crawford Co. v. Hathaway.*[10] There the court said riparian land cannot exceed the area required by a single government purchase, and in view of the fact that the policy of the government is to dispose of forty acre tracts, then riparian land should not exceed forty acres.

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7. 98 Tex. 578, 86 S.W. 733 (1905).

8. Anaheim Union Water Co. v. Fuller, 150 Cal. 32, 88 P. 978 (1907), where an injunction was granted against an upper riparian using water from a river to irrigate in the watershed of a creek, with the land on which such use was occurring having been served and reacquired by the owner of the abutting tract. The court found that the defendants were not riparian owners with respect to the land being irrigated, but rather were trespassers on the plaintiff's property rights.

9. Here, some land being irrigated was outside the watershed while other land was within it, though acquired by a different government patent than the abutting tract.

10. 67 Neb. 325, 93 N.W. 781 (1903).

However, *Crawford* was overruled in a case[11] accepting the chain of title test. Thus, Texas now stands alone on the source of title test, if it in fact is different than the chain of title test.[12]

*Unity of Title*

The unity of title theory provides that any tracts contiguous to the abutting tract are riparian if held in common ownership regardless of when the various tracts were acquired. This implies that a riparian proprietor may increase the amount of his legally classified riparian land by purchasing contiguous back tracts within the watershed. Consequently, given the trend to larger farms and landholdings, the unity of title theory implies a continually expanding quantity of riparian land. Perhaps this theory is best set forth by the Oregon court in *Jones v. Conn*:[13]

> It would seem, therefore, that any person owning land which abuts upon or through which a natural stream of water flows is a riparian proprietor, entitled to the rights of such, without regard to the extent of his land, or from whom or when he acquired his title. The fact that he may have procured the particular tract washed by the stream at one time, and subsequently purchased land adjoining it, will not make him any less a riparian proprietor, nor should it alone be a valid objection to his using the water on the land last acquired. The only thing necessary to entitle him to the right of a riparian proprietor is to show that the body of land owned by him borders upon a stream.[14]

The unity of title theory has found favor in other jurisdictions. The only eastern states to define riparian land have followed it.[15] Kansas also appears to have adopted this theory,[16] and the unity of title test was adopted by the American Law Institute as the restatement view.[17] It should be noted though, that while the definition of the extent of riparian land frequently is not clear in eastern states, administrators of diversion permit systems[18] in some of these states have relied on the "source or chain of title" theory.[19]

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11. Wasserburger v. Coffee, 180 Neb. 149, 141 N.W.2d 738 (1966).
12. *See* 27 MICH. L. REV. 479 (1929), *citing* I KINNEY ON IRRIGATION 464, indicating the two tests are not synonomous.
13. 39 Ore. 30, 64 P. 855 (1901).
14. *Id.* at 39-40, 64 P. at 858.
15. Slack v. Marsh, 11 Phila. 543 (Pa. C.P. 1875).
16. Clark v. Allaman, 71 Kan. 206, 80 P. 571 (1905).
17. 4 RESTATEMENT OF TORTS § 843, comment c.
18. The "administrators" referred to here are the personnel of those state administrative agencies charged with the responsibility of administering the permit systems adopted and patterned somewhat after western state legislation. The State of Iowa is an example.
19. *See* 1959 WIS. L. REV. 279, 293.

## III. Economic Analysis

It can readily be shown that water law should be permissive with respect to providing the opportunity for social welfare maximization.[20] If we assume for the moment that irrigation is the only feasible use which can be made from a given riparian water source, this essentially argues that the theory utilized to delineate where riparian water can be used should permit irrigation water to be allocated to the most marginally responsive land.[21] That is, law should permit successive quantities of water to be allocated to the tract where they will yield the largest possible increase in production.[22]

Neither the chain nor unity of title theories can be expected to encompass the most marginally productive land in all cases. Therefore, regardless of which theory a given state employs, the law is preventing water from being used in its most beneficial use (in the sense of social welfare maximization).

The rational water user will seek to minimize his irrigation water acquisition costs. If he can irrigate from a riparian source at a lower cost than would be incurred by tapping underground supplies, if he is not constrained by legal source limitations on use, *ceteris paribus*, he would choose to irrigate from the stream.

Obviously, relative costs of ground and stream irrigation will vary, depending upon method of irrigation, distance from stream, distance to underground acquifer and the type of sub-surface material through which one must drill in order to reach a sufficient supply. However, for any given tract the comparative costs of underground and stream irrigation can be calculated.

Economically speaking it is preferable that water law permit one to select the least cost method of irrigation, *ceteris paribus*.

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20. *See generally, e.g.*, D.R. Levi, *Highest and Best Use: An Economic Goal for Water Law*, 34 Mo. L. Rev. 164 (1969), in which the simple theoretical framework is developed to justify this assertion.

21. In its simplest form, this implies that each successive quantity of water should be allocated to the use in which it is most productive. For example, assume the allocation decision is between farmers A and B, and that the irrigation response characteristics of the soil on their farms are such that, respectively, yield increases expected from an acre-inch of water would be 18 and 7 bushels of corn. Thus, if only one acre-inch is available for irrigation, the basic marginal allocation principle is that it should be allocated to farmer A in order to maximize the productivity from the given quantity of water. *See* Levi, *supra* note 17, for a more complete description of this "marginality" principle.

22. Or, more properly, greatest possible increase in net profit.

This can be computed with the following formula. It is designed to determine the "break-even point" ("break-even distance"), or the point at which the costs from underground and riparian sources are exactly equal:

$$PPU_r + (P_1 \times F_p) = (D_f \times C_f) + C_p + PPU_w + (P_1 \times F_p)$$

where

PPU = cost of pump and power unit
r = riparian
w = well
$P_1$ = cost of pipe, per foot
$F_p$ = total feet of pipe required
$D_f$ = well depth, in feet
$C_f$ = cost of drilling well, per foot
$C_p$ = cost of packing the well and installing a screen.

Though it may at first appear formidable to one not accustomed to working with break-even analysis, in reality the interpretation of the above formula is quite simple. First, the formula assumes that the same water application system (in this case, either gated pipe or a "traveling gun"[23]) will be used regardless of whether a stream or well is selected as the water source. Since the cost of the application system will therefore be the same in any case, it may be omitted in our computation of comparative costs.

The left side of this equation will compute the cost of installing an irrigation system from a stream. Its basic components are (1) a pump and power unit, and (2) the pipe required to carry the water from the pumps to the point at which the application system referred to above is located.

The right side of the equation similarly computes the cost of installing the items necessary to carry water from the underground source to the application system. In addition to the pipe, pump and power unit, it includes all drilling, packing and well preparation costs.

When the two sides of the equation are exactly equal, this says that the cost of installing stream and well irrigation equipment is precisely the same. If one side is smaller, this indicates it represents the least cost manner of supplying irrigation water to this particular point (tract).

23. A self-propelled sprinkling mechanism.

The following examples, illustrative of Missouri River Basin conditions, show how the general formula can be used to compare stream and well investment costs.

> Example 1: A 40 acre field to be irrigated is adjacent to a stream with a water flow adequate to permit irrigation. The alternatives are to use a 100 foot well located in the center of the field or to pump water from the stream to this central distribution point (660 feet from the stream). An adequate well can be drilled for $15 per foot; packing the well will cost an additional $200. The same size pump and power unit, costing $3,700 will be required regardless of whether we pump from the well or the stream. Pipe costs $1.40 per foot. Using the formula, the computations would be as follows:
> $[PPU_r + (P_i \times F_p)] = [(D_f \times C_f) + C_p + PPU_w + (P_i \times F_p)]$
> $[3700 + (1.40 \times 1320)] = [(100 \times 15) + 200 + 3700 + (1.40 \times 660)]$ $5548 < $6324

In this example, the delivery system that uses the stream as the water source is less expensive than the well. The stream has a net investment advantage of $776 ($6,324—$5,548). A riparian landowner would prefer the stream over the well under the stated conditions.

> Example 2: An 80 acre field to be irrigated is located one-half mile from the stream. A well can be drilled at the edge of the field closest to the river. Well depth is 200 feet and drilling costs are $15 per foot. Well packing costs are $200. A slightly larger pump ($4,100 vs. $3,700) is required to pump the water from the stream. Pipe costs $1.40 per foot. Using the formula, we can again compare the two alternatives:
> $[4100 + (1.40 \times 2640)] = [(200 \times 15) + 200 + 3700 + (1.40 \times 1320)]$ $[4100 + 3696] = [3000 + 200 + 3700 + 1848]$
> $7796 < $8748

In this example, the stream has a net investment cost advantage of $952 ($8,748—$7,796). However, an irrigator could not acquire the right to use riparian water under the chain of title theory where his point of use is one-half mile from the stream, because of this theory's previously noted forty acre (one-fourth mile) maximum. And, of course, a non-riparian would likewise

be denied the right to irrigate this tract from the stream even under the more liberal definition of riparian land associated with the unity of title theory.

Any time the irrigation point of distribution is between the river and the "break-even distance" (that is, the distance from the stream at which irrigation investment costs for well and stream are precisely equal), arguably such point should be within the area legally classified as riparian if economically optimal results are to occur. Admittedly, the *ceteris paribus* (other things equal) assumption being employed is of critical importance to this assertion, and the relaxation of same may yield some circumstances under which such assertion appears somewhat specious.

To illustrate, it may be argued that many streams do not contain sufficient flow to permit diversion for irrigation, once a particular community's[24] higher valued uses such as household and municipal, stock watering, recreation and fish and wildlife uses are satisfied. While this may well be true, it is of little consolation to irrigators and other water users legally classified as non-riparians for whom a nearby stream carrying water not needed for higher valued uses is the least cost source.

Under some circumstances where the least cost source is a stream, the point of distribution under consideration may lie outside the watershed. Again, from the standpoint of economics, this fact alone is not logically sufficient to conclude that all such uses should be prohibited.

However, the logic of permitting riparian sources to be tapped for use on non-riparian land can be criticized when the proposed location is such that, to the extent a use is non-consumptive, geological features prevent the *same* riparian source from being recharged. That is, downstream users may be partially dependent on this recharge, and the value of same to them may be capitalized into the value of their land. Consequently, one can argue that restrictions on the location of riparian water use should not be eliminated unless downstream riparians are compensated for the capitalized value of recharge.

One further observation is offered with respect to the economic "illogic" associated with the current rule of limiting

24. Here the term community is used in a broad sense to include that sector of society residing in or with direct interest in the enumerated uses throughout the watershed.

riparian water use to riparian land. It is not unusual to find areas near our larger streams in which a nearby well is recharged almost solely from the stream. Thus, even a non-riparian may be able to legally affect the stream flow level by drilling a well. If this be so, it seems rather ironic that this same user would be denied the right to take water directly from the stream.

## IV. Concluding Comments

Laws should not be so structured as to prevent that allocation of water from which society receives the greatest possible benefit. While case precedent developing the chain and unity of title theories has served to give warnings of limitations on use, and thereby permit planning to avoid potential legal disputes, it probably has not facilitated economically optimal results in all cases.

These two theories constitute arbitrary allocation mechanisms which do not recognize the economic realities of water use and investment decisions, and give no assurance that society will have the opportunity to realize maximum benefit from its water resources. In order to facilitate economically optimal results, it is submitted that these legal constraints should be eliminated,[25] and that users be permitted to transport water to any location which rational economic use dictates.

The potential usefulness of the simple break-even analysis presented in this discussion lies in helping delineate the areas of rational economic use from alternative sources.[26] Obviously, any legal scheme to establish the permissible locations of use of riparian water will possess a degree of arbitrariness. Certainly, the magnitude of the area of economically rational (least cost) riparian water use may vary significantly, depending on a variety of hydrological and geological factors.

Recognition of this variation could be incorporated into water law by allowing the area of permissible riparian water use to vary among watersheds. While still imperfect, the use of simple analyses (such as that described in this essay) to establish boundaries for these areas makes more economic sense than the precedent-based theories in current use.

25. Compensating those beneficiaries of recharge who have capitalized same into their land values.

26. While presented in the context of irrigation, the basic analytical framework can be altered to apply to other kinds of uses (*e.g.*, recreational, industrial, etc.).