

AN EVALUATION OF LEGAL THEORIES CURRENTLY  
EMPLOYED TO DETERMINE WHICH LANDS ARE RIPARIAN

Principal Investigator: Donald R. Levi ,

MISSOURI WATER RESOURCES RESEARCH CENTER  
University of Missouri - Columbia

PROJECT NUMBER: A-027-Mo

Agreement Number: 14-31-0001-3025

Dates: July, 1969 - June, 1970

COMPLETION REPORT

June 1, 1971

The work upon which this publication was based was supported by funds provided by the United States Department of the Interior, Office of Water Resources Research, as authorized under the Water Resources Research Act of 1964

## ABSTRACT

Atlases for Howard County, Missouri, for the years 1876, 1897, and 1967 were utilized to prepare a map illustrating the extent of riparian land under the chain and unity of title theories for delineating same for a ten mile strip of land immediately west of the east boundary of said county and lying north of the Missouri River. The cost of irrigating tracts at different locations were calculated. It was concluded that the unity of title theory, classifying all land as riparian which adjoins a riparian source, is contiguous, and within the same watershed, was the superior legal theory because it provided greater flexibility for facilitating water useage on those tracts most productive at the margin. However, it was also concluded that permitting water to be used on land other than that classified as riparian is economically feasible and in some cases the minimum cost method of providing irrigation water.

Keywords: Constraints, Legal Aspects, \*Riparian Rights

## TABLE OF CONTENTS

	PAGE
ABSTRACT	1
LIST OF ILLUSTRATIONS	3
INTRODUCTION & OBJECTIVES	4
A LEGAL ANALYSIS OF THE CHAIN & UNITY OF TITLE THEORIES	5
ECONOMIC ANALYSIS	11
METHOD OF INVESTIGATION	15
RESULTS	19
CONCLUSIONS AND APPLICATIONS	21
PUBLICATIONS	22
TRAINING ACCOMPLISHED	23
REFERENCES	24
APPENDICES	25

LIST OF ILLUSTRATIONS

	Page
Figure 1	17a

## Introduction and Objectives

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 an abundant supply.

The riparian rights system is also partially in effect in those states following the so-called California Doctrine of water law. In it, the prior appropriation and riparian rights systems co-exist. In general, the California Doctrine applies in the "border" states existing between the humid and arid areas of the United States.

Riparianism provides that each proprietor of land abutting on a watercourse has a co-equal right to use its water on riparian land to a reasonable extent. Consequently, the definition of "riparian land" becomes critical.

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. The

purpose of this study was to research and analyze the nature, extent, and social desirability of each theory. The economic criteria used in the analysis was the relative cost of irrigating crops from ground and riparian sources.<sup>1/</sup>

#### A Legal Analysis of the Chain and Unity of Title Theories

The purpose of this subsection is to outline the extent of both the Chain of Title and the Unity of Title theories used to determine which lands are riparian. In doing so, extensive reliance is placed on judicial decisions as both theories are of common law, as opposed to statutory origin.

#### Chain of Title

The chain of title theory 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 non-abutting portions of the original tract which have been severed forever lose their riparian character unless a contrary intention is manifested. This theory was accepted in Yearsley v. Cater, 149 Wash. 285, 270 P. 804 (1928) and Watkins Land Company v. Clements, 98 Tex. 578, 86 S.W. 733 (1905). The California courts have also adopted this theory in Lux v. Haqqin, 69 Cal.

---

<sup>1</sup>Initially it had also been planned to use soil types and their relative marginal responsiveness to irrigation water in evaluating the two legal theories. However, variations in boundary location on four different maps used in the study made this impractical.

255, 10 P. 674 (1886) and Boehmer v. Big Rock Irrigation District, 117 Cal. 19, 48 P. 908 (1897). 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. This rule is apparently the one which has been adopted in most states which have considered the problem.

There is also a line of cases which appear to deviate from the chain of title test. It is difficult to determine if this is a test which co-exists with the chain of title test, a corollary of it, or a rule which exists instead of the chain of title test. It was stated in the case of Watkins Land Co. v. Clements, 98 Tex. 578, 86 S. W. 733 (1905). 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 riparian tract. In determining what lands were riparian the court said land acquired in a single transaction was riparian and that land outside the watershed of a stream is non-riparian to that stream. But the court goes on to say that conditions might exist which would permit use of water outside the watershed; e.g., if the water supply is abundant

and the drainage area small. The court indicates that irrigation of non-riparian land may be permissible if the other riparians are not affected by the irrigation. Thus, unlike the Anaheim Water Co. Case, this court did not consider the using of the water on non-riparian land a trespass but only an unreasonable use in the arid regions of Texas.

This case refers to the single transaction test but did not elaborate on what was meant by "single transaction" other than saying 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 40 acre plots (the amount initially obtained from the government). Perhaps a clearer statement of this part of the rule was made in Crawford Co. v. Hathaway, 67 Neb. 325, 93 N.W. 781 (1903). In that case the court said riparian land cannot exceed the area acquired by a single government purchase and in view of the fact that the policy of the government is to dispose of 40 acre tracts, then riparian land should not exceed 40 acres.

It has been stated that the rule of the single transaction or source of title test differs from the chain of title test. See 27 Mich. L. Rev. 479 (1929), which cites I Kinney on Irrigation, Sec. 464. No direct mention is made in these cases

on the effect of severance of the 40 acre tracts but the inference might be that these tracts reacquire riparian rights when severed and rejoined.

However, the Crawford case was overruled by Wasserburger v. Coffee, 180 Neb. 149, 141 N. W. 2d 738 (1966). That case accepted the chain of title test. Thus Texas stands alone on the source of title test.

### Unity of Title

The unity of title theory provides that any tract 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. Perhaps this theory is best set forth by the Oregon court in Jones v. Conn, 39 Ore. 30, 39-40, 64 P. 855, 858 (1901):

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 things necessary to entitle him to the rights of a riparian proprietor is to show that the body of land owned by him borders upon a stream.

The unity of title theory has found favor in other jurisdictions. The only eastern states to define riparian land have followed it. Slack v. Marsh, 11 Phil, 543 (Penn. C. P. 1875). Kansas also appears to have adopted this theory in Clark v. Allaman 71 Kan. 206, 80 Pac. 571 (1905) and the unity of title test was adopted by the American Law Institute in 4 Restatement of Torts, section 843, comment C. The problem is that, although the definition of the extent of riparian land is not clear in the eastern states, administrators of diversion permit systems in some of these states have relied on the "source or chain of title" theory. See 1959 Wis. Law Rev. 279, 293.

#### Summary of Legal Analysis

Consequently, it can properly be said that the source or chain of title theory is a constantly contracting theory. As title transfers occur, more and more land loses its riparian classification.

On the other hand, the unity of title theory only requires that the tract abut the watercourse and be contiguous. Consequently, it can be said that the unity of title theory is a constantly expanding theory, given the trend to larger farms.

The purpose of the chain of title and source of title tests has been two fold. It has been used to define specifically

what is one type of unreasonable use, i.e., the use of water on after-acquired non-riparian land. The second use of the tests has been to restrict the use of water to small parcels of land where water is plentiful.

The first reason for the rule is arguably valid. The law should be specific and these tests define clearly what is an unreasonable use so far as irrigation is concerned. However, in many cases the inequity of these rules strictly applied outweigh the benefits of a specific test for what is unreasonable.

The second reason for the rule is only valid where streams and water are abundant. In those places there is no need for a person to use water diverted from a stream on newly acquired land because rainfall is plentiful and other streams may run across the land added to the riparian tract. But the chain of title test does not consider the nature of the land or climate.

It is submitted that "riparian land" should have no set boundaries. What land the water is used upon should only be a factor considered in determining whether or not a use is unreasonable. The hard, fast inflexible test used in California and elsewhere has no basis in public policy or economic utility. No area in the U.S. always has abundant water and no area is always dry.

A more flexible rule which takes into account all the circumstances, such as abundancy or lack of water in the area, the size of the tract, irrigated as compared to the amount of water which flows in the stream and a comparison of hardships of the irrigating riparian and the complaining riparian. Whether a use is reasonable is the ultimate question and reasonableness depends upon not one, but many factors including injury to others on the stream, the size of the stream, the custom of the country, and the necessities of the irrigator. See 2 Farnum Sec. 466. As Farnum put in his treatise,

"The purpose of the law of reasonable use of waters is to secure equality in the use of water by riparian owners as near as may be . . . This purpose is not subserved by any arbitrary classifications . . ." of what is a reasonable use. 2 Farnum Sec. 466, p. 1579 (1904).

In accord with this view see certain dicta in Watkins Land Co. v. Clements, supra., and 27 Mich. L. Rev. 479, supra.

Not within the scope of this paper but deserving of discussion is the "within the same watershed" test which was expressly not adopted in Jones v. Conn, supra, for the same reasons the chain of title test was not adopted, i.e., need for a flexible rule.

#### Economic Analysis

In addition to using water directly from a stream a riparian landowner can generally obtain water by drilling a

well in the river bottom. The choice between a stream and a well (or wells) as a water source<sup>is</sup> influenced by both technical and economic factors. A prospective water user will want to seek the assistance of an experienced professional in evaluating the technical aspects of feasible alternatives.

Suppose a landowner with rights to water from a stream with adequate water has decided to irrigate. A profit oriented landowner will wish to minimize his cost of water as long as it does not prevent profit maximization. This does not mean he should minimize investment costs since variable costs are also important. The following comparison of a stream versus a well as a water source assumes the same variable costs regardless of the water source. The assumption is reasonable for situations that prevail in river bottom areas.

The economic aspects of water source selection can be evaluated with a general comparative expression of the form given in equation (1).

$$(1) N = \overline{\angle PPU_r + (P_i \times F_p)} - \overline{\angle (D_f \times C_f) + C_p + PPU_w + (P_i \times F_p)}$$

Where N = the net difference between the investment in the delivery system for a stream vs. the delivery system for a well

PPU = cost of pump and power unit; r = stream, w = well

$P_i$  = cost of pipe per ft.

$F_p$  = total feet of pipe required

$D_f$  = well depth, in feet

$C_f$  = cost of sinking a well, per foot

$C_p$  = cost of packing the well and installing a screen

If  $N$  is negative the river installation is least expensive.

This general expression assumes the same water outlet component of the system (i.e. gated pipe, sprinkler, central pivot) will be used regardless of the water source. In such a case the outlet system cost would be a constant to either delivery system and can be ignored.

The following examples for Missouri River conditions show how the general purpose equation can be used to compare costs of irrigating from alternative water sources.

Example 1: Assumes a 40 acre field to be irrigated is adjacent to a stream with adequate water flow. The comparison is with a 100 foot well in the center of the field. An adequate well can be drilled for \$15.00 per foot - packing cost \$200. The pump and power unit will cost \$3,700 whether pumping from the well or stream. Pipe costs \$1.40 per foot.

$$\begin{aligned} N &= \overline{PPU}_r + (P_i \times F_p) - \overline{(D_f \times C_f)} + C_p + PPU_w + (P_i \times F_p) \\ &= \overline{3700} + (1.40 \times 1320) - \overline{(100 \times 15)} + 200 + 3700 + \\ &\quad (1.40 \times 660) = 5548 - 6324 = \$-1776 \end{aligned}$$

The delivery system that uses the stream as the water source is less expensive and has a net investment advantage over

the well of \$1,776.

Example 2: Assumes an 80 acre field to be irrigated is removed one-half mile from the stream. A well can be drilled at the edge of the field closest to the river. Well depth is 100 feet and drilling costs are \$15 per foot. Well packing costs \$200. A slightly larger pump (\$4100 vs. \$3700) is required to pump the water from the stream. Pipe costs \$1.40 per foot.

The comparison is:

$$\begin{aligned}
 N &= \overline{\$4100} + \overline{(1.40 \times 2640)} - \overline{[(100 \times 15) + 200 + 3700 +} \\
 &\quad \overline{(1.40 \times 1320)]} = \overline{\$4100} + \overline{3696} - \overline{[1500 + 200 + 3700 +} \\
 &\quad \overline{1848]} = 7796 - 7248 = \$548.
 \end{aligned}$$

Drilling a well is the least cost water source for example 2. The well alternative would have a net investment advantage of \$548. However, when the \$548 investment difference is amortized over a seven to ten years the difference in cost between the two water sources is not great for this situation.

### Method of Investigation

Land located in Howard County, Missouri, abutting the north bank of the Missouri River was selected as a case study area. The area selected began at the eastern boundary of Howard County and extended west for a distance of 10 miles.

Atlases prepared for Howard County in the years 1876, 1897, and 1967 were used to construct a composite map showing the extent of riparian land under the chain and unity of title theories for determining same.

Using cost minimization as the relevant economic criteria, the model employed was designed to estimate costs of irrigating riparian land from alternative riparian and ground water sources at various depths and distances from the river. Assuming the water to be of the same quality from these two sources (which is likely, since any groundwater sources would be in the alluvial plain) irrigating at minimum costs would also be expected to yield the maximum net social benefit (assuming irrigation as the only feasible alternative use of water). That is, once the distance from the stream is determined at which the cost of irrigating from each source is exactly equal, the rational investor would use the ground water source on greater than the calculated distances from the stream, and riparian sources for distances which are less than the calculated equal cost distance.

Ideally, water law should be structured so as to permit this economically rational course of action.

### Results

Figure 1 illustrates the amount of land which would be classified as riparian under

- 1) the source or chain of title theory and
- 2) the unity of title theory.

It can readily be seen that, for the most part, the unity of title theory provides the larger amount of irrigable land. This is particularly true at the extreme eastern edge of the study area. Here, only about 60 acres would be classified as riparian under the chain of title theory (and much of this is marshy woodland). However, under the unity of title theory approximately 1,018 acres would be susceptible of irrigation.

In the tract located at the eastern most edge of the study area, two other facts bear noting. First, the land classified as riparian under the unity of title theory crosses a public highway (a "farm to market" road). Since land ownership must be contiguous, if the state or county government holds fee simple absolute title to the roadway, the use of riparian water beyond this point will not be permitted in some jurisdictions. However, if the state or county government has only taken an easement, and fee simple absolute ownership has been

reserved to the landowner, then riparian water can legally be transported across the road and used on land located there.

A railroad also runs through this eastern most tract of the study area. The aforementioned discussion of easement versus fee simple absolute title would also apply to characterize land located across the tracts as either riparian or non-riparian in nature.

Approximately 3,601 acres are encompassed by the chain or source of title test, while 5,066 acres are included as riparian land under the unity of title test. Consequently, it can be said that 40.7 percent more land is classified as riparian under the unity of title theory in the area being examined.

The fact that the Missouri River had gradually but significantly changed course over the last 125 years resulted in the gradual eroding away of some riparian tracts of land until they had completely disappeared. It is interesting to note that the island shown in Figure 1 had seen its eastern most edge move east approximately 1 mile during the preceding 125 year period. The northern edge of this land had also moved south by approximately one-half mile. This made it more difficult to precisely measure the extent of riparian land under the chain of title theory.

A comparable study in this area was conducted by F. Osterhoudt in Northwestern Wisconsin.<sup>2/</sup> He found that the difference in the amount of land available for riparian water use under the two rules can be considerable and that 64% more land would be encompassed by using the unity of title test in his case study area.

It can readily be shown that water law should be permissive with respect to maximizing social benefit.<sup>3/</sup> In the context of irrigation as the only feasible use, this essentially argues that the theory utilized to delineate where riparian water can be used should permit irrigation water to be allocated to the land most responsive to same at the margin.

One can further argue that neither the chain nor unity of title theories can be expected to encompass the most marginally productive land in all cases, that law should not prevent the most beneficial use of water, and, therefore, it is economically preferable for the law to permit riparian water to be used anywhere. But this logic can be criticized when the proposed location of use is such that, to the extent it is not a consumptive use, hydrological features prevent the same riparian source from being recharged. That is, downstream owners may be partially dependent on this recharge, and the value of same may be capitalized into their land. Consequently, one can argue that restrictions

---

<sup>2</sup>F. H. Osterhoudt., An Economic Analysis of Wisconsin's Diversion Permit System for Agricultural Irrigation, unpublished Ph.D. dissertation, U. of Wisconsin, 1967.

<sup>3</sup>E.g., see generally D. R. Levi, "Highest and Best Use: An Economic Goal for Water Law," 34 Mo. Law Rev. 165 (Spring, 1969).

on the location of use of water should not be removed unless downstream riparians are compensated for the capitalized value of recharge.<sup>4/</sup>

In any event, it is relevant to seek to minimize costs of securing irrigation water, as outlined, supra. Obviously, relative costs of ground and stream irrigation will vary, depending on method of irrigation, distance from stream, distance to underground aquifer and the type sub-surface material through which one must drill in order to reach a sufficient supply, but for any given tract the comparative costs of underground and stream irrigation can be calculated.

Ideally, it is preferable that water law permit use of the least cost method of irrigation. The formula set out, supra, under "Economic Analysis" can be modified to determine the "break-even point" ("break-even distance"), or the point at which the costs from underground and riparian sources are exactly equal, as follows:

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

where: PPU = cost of pipe per foot

$F_p$  = total feet of pipe required

$D_f$  = well depth, in feet

$C_f$  = cost of packing the well and installing a  
screen

---

<sup>4</sup> Compensation for capitalization can be logically argued as necessary, regardless of whether such capitalization occurred by reason of the legal system or by patterns of water usage.

Any site between the "break-even point" and the stream can be most economically irrigated from the stream, and those, arguably, should be within an area legally classified as riparian if economically optimal results are to occur.

It is submitted that this general method of delineating where riparian water may be used is generally more economically rational than historically based case precedent.

## Conclusions and Applications

Given the results of this study, the following conclusions can be drawn:

1. Generally more land will be classified as riparian under the unity of title than the chain of title theory and in no event will the latter encompass the greater area. Approximately 40 percent more land was classified as riparian under the unity of title theory in the present study.
2. Given the potential for larger areas to be classified riparian, the unity of title theory is more likely to encompass those areas yielding the greatest marginal increase in production from a given quantity of water.
3. On the basis of flexibility to achieve the greatest total benefit from a given source, it is economically preferable that there be no legal constraints governing the location of riparian water utilization.
4. As an alternative to case precedent, it is submitted that an application of economic theory is more likely to provide a legal structure yielding maximum social benefit.

PUBLICATIONS, REPORTS, PAPERS, TALKS PRESENTED

A manuscript is being prepared for submission to a Law Review.

## TRAINING ACCOMPLISHED

One law student was hired in a part time capacity to assist in the legal research. Training over and above that available through his law school course work was thus achieved.

One undergraduate agricultural economics major assisted in a portion of the economic analysis. This provided him with the opportunity to make a practical application of previously studied theoretical concepts.

## REFERENCES

F. H. Osterhoudt., An Economic Analysis of Wisconsin's Diversion Permit System for Agricultural Irrigation, unpublished Ph.D. dissertation, U. of Wisconsin, 1967.