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Legal Institutions for the Allocation of Water and Their Impact on Coal Conversion Operations in Kentucky

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RESEARCH REPORT NO. 95

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ABSTRACT

The conversion of coal into other types of fuel through gasification and liquefaction has been proposed as a means of coping with America's increasing energy needs. Coal conversion plants require large quantities of water for cooling purposes and for use as a raw material.

There are three types of water allocation presently used in the United States, riparianism, prior appropriation, and administrative permit systems. The common law riparian system is undesirable because under it water rights are insecure and subject to locational use restrictions. Prior appropriation is better, but the permanent water right created under this system results in excessive rigidity. A system of administrative regulation by means of a consumptive use permit system offers the best allocation framework for both coal conversion facilities and other water users as well.

Kentucky presently has such a system of administrative allocation. However, this legislation could be improved by (1) clarifying the planning functions of the Department for Natural Resources and Environmental Protection and the Water Resources Authority; (2) expanding the scope of the consumptive use permit system by removing most of the exempted use categories; (3) adopting beneficial use as the basis upon which consumptive use permits will be granted; (4) imposing a durational limit on water use permits and delineating renewal procedures; (5) adopting a scheme for

both voluntary and involuntary transfers of water rights; and (6) specifying more explicit provision for dealing with temporary water shortages.

Finally, it should be noted that the federal government has an important role with respect to navigation, water resources development, and water pollution control. Federal powers in these areas may impose some constraints on state allocation policies, although major conflicts can be avoided if proper coordination among state and federal officials is maintained.

Descriptors:

Legal Aspects*, Legislation, Water Law*, Water Policy, Water Resources Development

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I. Coal Conversion and Water Resources.

A. Energy Needs and Proposed Solutions

Until recently, the United States was able to supply through domestic sources almost 90 percent of its total energy demands, thus insuring virtual self-sufficiency.[1] Since 1971, however, energy demands have continually exceeded domestic production and the United States has relied on foreign suppliers to make up the difference.[2] In 1973 an oil embargo by the Organization of Petroleum Exporting Countries (OPEC) demonstrated the extent of America's dependence upon foreign energy sources.

Both the availability and cost of energy greatly affect a society's standard of living.[3] The Arab embargo of October 1973 lasted only a short time, but the Federal Energy Administration reported that while "massive unemployment, blackouts and other major disruptions were avoided, the embargo still had an appreciable impact." It is estimated that the GNP dropped by $10 to $20 billion during the embargo, and about 500,000 workers consequently lost their jobs. Moreover, about a third of the 9.8 percent increase in consumer prices that year was due to higher world oil prices.[4]

Realizing the potential economic and social costs of increased dependence on foreign sources of energy, the President established a goal of energy independence for the United States by 1985.[5] "Project Independence 1985" is a long-range response to the Arab action and consists of "a

series of plans and goals set to insure that by the end of this decade Americans will not have to rely on any source of energy beyond our own."[6] A policy of energy independence for America will doubtlessly require the development of new energy sources; but while this may ultimately provide a long-term solution to the energy problem, more efficient use of existing resources such as coal, petroleum, natural gas or nuclear energy is also necessary, particularly in the short run.

Unfortunately, immediate large-scale increases in the use of oil, natural gas, or nuclear energy involve problems of their own. Domestic petroleum and natural gas production cannot meet current or future demand. Even though there are large supplies of petroleum in this country, they are not sufficient to keep pace with the potential demand, and to raise production to higher levels by 1985 would involve prodigious exploration and development costs.[7] These development efforts would not be economically possible unless crude oil prices remain high.

Increased reliance on natural gas would create even greater difficulties. The shortage of natural gas in the United States has become more acute in the last two or three years and now exceeds ten percent of total demands. This is not a result of a shifting of demands to natural gas due to the Arab oil embargo. Rather, it is a continuous and systematic long-term shortage, which probably will not be eased appreciably as long as the Federal Power Commission retains its present regulatory policy.[8] Proven reserves of natural gas have steadily

declined in the last several years, and production at present prices will not be able to cover anticipated demand.[9]

At the present time "nuclear and coal-fired electricity remain the only margins against rising energy demand that are under domestic control."[10] The development of new nuclear energy sources entails high capital costs and long construction lead times, and in any event, nuclear generated electricity cannot always be substituted for gas or oil.[11] Although the rapid, short-term expansion of coal production, may be difficult or costly, coal offers the best possibility under proven, present technology of some measure of energy self-sufficiency.[12]

In the first place, coal in place is relatively abundant. According to the Bureau of Mines, America's coal reserves amount to 1,600 billion tons. If coal use increases steadily to 50 percent by 2000, total consumption in the entire period from 1974 to 2000 would amount to about 70 billion tons, or four and one-half percent of known reserves. Exhaustion of reserves would be roughly 100 years away in 2000, even if the use continued to increase at a steady rate.[13] Moreover, these abundant coal reserves can be used to create synthetic fuels, primarily through gasification and liquefaction processes.[14]

B. Coal Conversion Technology

Most coal conversion processes produce either gaseous or liquid fuels. The former process is known as gasification while the latter is called liquefaction.

1. Gasification

The most promising of the modern processes for converting coal into another form of energy is coal gasification - the act of converting coal into synthetic natural gas (SNG). In the past, true natural gas coming straight out of the ground has been used in preference to SNG. since it was both plentiful and inexpensive. In the years following World War II the amount of natural gas used annually drastically increased, and it has continued to grow even to the present day. However, with increased usage has come a decrease in reserves, even a shortage in some areas, and with that, higher prices. All of this places increased importance on the idea of converting coal into SNG. If the coal produced SNG can replace regular natural gas in most applications, then technology will provide all the advantages of gas produced energy coupled with the material abundance of U.S. coal reserves.

The basic process of coal gasification is to alter the chemical state of the basic mineral in such a manner that gaseous by-products are produced. Coal in its natural state is organic matter composed mainly of carbon, hydrogen, oxygen, sulfur and nitrogen, as well as small amounts of various other minerals.[15] In coal the natural hydrogen content is about 5% as opposed to a 75% carbon content.[16] High-quality pipeline gas, however, contains about 25% hydrogen.[17] Thus, "in order to convert coal to gas or liquid fuels, either carbon must be removed or hydrogen added to the coal molecule; precursors of pollutants, such as sulfur, must be converted to removable compounds, and undesirable inorganic matter

separated."[18] The hydrogen-adding methods are usually used, since the carbon removing processes (such as by pyolysis) are less efficient, and also because hydrogen is required to convert the oxygen, nitrogen, and sulfur found in coal into compounds that allow such substances to be removed from the gas produced.[19]

The beginnings of the modern processes of coal gasification lies in the old-style gasification techniques of the early 1800's. The first coal gas company began operating in London, England, in 1812 and in less than four years a similar company was producing coal gas in the United States.[20] At this time the procedure used to convert coal into gas energy was known as "destructive distillation", and consisted of heating the coal (in the absence of air) to a temperature where it decomposed chemically. The gas produced form such distillation had a heating value of from 475 to 560 BTU. per cubic foot, [21] compared with true natural gas, on the other hand, has a heating value of from 980 to 1035 BTU.[22] Moreover, the distillation process leaves 70% or more of the coal as a solid residue, creating additional problems.[23]

Early gasification procedure took the distillation process a step further and avoided the disadvantages of the former method. As in the case of destructive distillation, the coal was heated and some gas was extracted in this manner. Then, as a second step, the carbon residue of the heated coal was exposed to either air, oxygen or steam (or various combinations of the three) depending upon the type of by-product desired.

The gasses removed in this step were of generally lower heating value than the methane produced by distillation (from 110 to 300 BTU per cubic foot as compared to 475 to 550 BTU per cubic foot. Because of this, and because distilled methane has only about one-half of the heating value of modern pipeline gas (with a heating value of over 1000 BTU. per cubic foot), some addition refinements were needed before coal gasification could become a viable alternative to natural gas at that time.

At this point, modern gasification procedure adds yet another step. At the present time it seems that this third step is likely to take one of two forms. The first of these forms is the process known as methanation, which involves passing the secondary gas over a special nickel catalyst to convert it into almost pure methane. So far, however, the methanation step has not been used on a commercial scale.[24] The second method of increasing the gasses formed during the second state of the gasification process into SNG with the high heating values of natural gas is known as hydrogasification. In this process, more economically promising than methanation, coal or char is reacted directly with hydrogen to form methane by feeding a mixture of hydrogen and steam into the hydrogasifier,[25] as previously stated, hydrogasification may utilize the excess carbon left over from a first stage distillation (the char).[26]

At the present time, seven major processes are used in the United States to convert coal to pipeline quality gas, while five processes are used to convert coal to liquid fuels.[27]

There are also several more conversion processes on the drawing board, but these are completely untested at the present time. Nothing is to be gained by examining each of the seven major processes individually, for all have many factors in common. The typical coal conversion process begins by crushing the coal to a fine size, and usually oxydizing it to destroy any natural coking properties. Coking coal tends to cake when exposed to extreme heat, and if this should happen, gasification would be unable to take place. The coal is then devolatilized (heated in the absense of air so that it decomposed chemically - also known as destructive distillation or pyrolysis) to produce some methane immediately. The char (solid residue) left from this step is then gasified by combining it with steam and oxygen to produce a secondary, or synthesis, gas. This gas then leaves the gasifiers and is treated by means of water scrubbers and centifugal separators to remove tar, dust, ash and carbon impurities.[28] The gas is then passed over a catysyst, which increases the hydrogen to carbon monoxide ratio and speeds up the water shift conversion reaction. The gas is then purified to remove all but the carbon monoxide (CO) and hydrogen (H_2) compounds, which are then methanated to produce pipeline quality gas (the process of gydrogasification still being in development).

Unfortunately, none of the methanation procedures has yet proven commercially feasible.[29] At the present time there are only two commercially available gasification procedures, the Lurgi process and the Koppers-Totzek process.[30] They both work on the principle described above and both result in "producer

gas" (gas too inefficient to be transmitted very far by pipeline but which is often used by industry near the coal conversion site) as a final product. There an additional methanation process would be necessary before this gas would serve as a substitute for natural gas. The first application of this latter step has been proposed for an existing Lurgi facility in the San Juan Basin of New Mexico. In addition to the existing commercial processes, several others are in the developmental states, among these being Bi-gas (Bituminous Coal Research, Inc.) CO_2 Acceptor Process (Consolidation Coal Co.) and the Hygas Process (Institute of Gas Technology). At the present time, Hygas is considered to be the most promising of all the process being currently developed, even though the Lurgi process has seen extensive use.

Coal gasification is not without its problems. Even if technical difficulties in the conversion process itself can be overcome, synthetic gas cannot economically compete at the present time with natural gas. Moreover, some systems involve high maintenance costs while a lack of sufficient sources of electrical power, oxygen and hydrogen may hamper the development of others.[31] Environmental factors are also a source of concern, particularly in the area of water use.

All of the proposed processes are going to require huge amounts of water. As the Institute for Mining and Minerals Research of the University of Kentucky reported, "[a]ll gasification schemes require large volumes of water for hydrogen production. Large amounts of water are also needed for process

cooling. Therefore, a natural water supply in large amounts must be available at all times.[32] Indeed, the two most important factors in determining the location of the conversion plant are the amounts of local coal reserves and the availability of a sufficient supply of water.[33] The methanation reaction produces enormous amounts of heat (94,200 BTU./lb mole) which must be quickly disipated in order to prevent catalyst deactivation and "run-away" conditions.[34] The most effective way to dissipate this heat may be to use a "fluid-bed" type reactor for the methanation process, which would entail an additional intake of water.[35]

The Lurgi methanation process being built in New Mexico will serve as an example. Projected water requirements for this facility include a primary water intake of 7,000 gallons per minute (gpm) to be gathered from outside sources.[36] This water requirement figure is exclusive of the approximately 765 gpm that will be taken in the form of moisture in the coal and the 630 gpm that will be produced by the methanation reaction.[37] In terms of annual consumption the plant will use approximately 17 million cubic meters of water a year, but this figure is misleading since the New Mexico facility "is engineered so that only 15 percent of gross cooling requirement is met by evaporative cooling. In other areas and under other conditions water consumption might be considerably higher.[38]

There are four factors which determine the amount of water used in the gasification process. First, the amount of water reused must be considered, second, the type of fuel used for firing the boilers is important, third, the means of cooling utilized is a significant factor, and lastly, the type and

composition (especially moisture and sulfur content) of the feed coal must be considered. Thus, for example, where the coal used is low grade lignite, it has been estimated that the "gasification of one ton [of lignite] ... consumes about 3.5 tons of water. A plant built to gasify 8.5 million tons per year of lignite would require 30 million tons per year of water or 22,000 acre-feet."[39] According to one report "... water consumption in coal gasification plants producing pipeline gas of 250 million scf per day (7 million m^3 per day) capacity can be expected to range from about 10,000 acre-ft (12 million m^3) per year where water is at a premium to 45,000 acre-ft (55 million m^3) per year where abundant but poor quality water is used for cooling. The principle difference are in evaporative cooling requirement and relate to the extent to which air cooling is employed and greater waste-water disposal where input water is of low quality."[40] Thus, it must be concluded that coal gasification requires large volumes of water under any set of conditions.

2. Coal Liquefaction

The second major process for converting coal into other more useable forms of energy is the process of liquefaction, which is the conversion of coal into liquid fuel oil. Although the work on coal-to-oil conversion lags behind the coal gasification effort at this time,[41] coal liquefaction could be an extremely important tool in the satisfaction of America's future energy needs. Although the technique of coal liquefaction is not as highly developed as is that of coal gasification - maki

accurate projections risky - it has been estimated that a typical liquefaction plant, consuming about 30,000 tons of coal a day, would be able to produce about 100,000 barrels of synthetic crude per day.[42] Should such a system prove feasible, the economic and environmental advantages would be enormous. In the first place, the low cost, domestically produced fuel could be applied to existing oil-run power plants (which must now rely on a percentage of foreign produced supplies) without the expense of converting the plant to a coal burning one. In addition, "an electric utility is certain to find it much easier to use a low-sulfur fuel produced from coal rather than operating a complicated chemical processing step included in any gas stack cleaning system. This is particularly true of the eastern United States where power demands are high and substantially all of the coal is of the high-sulfur variety."[43]

As was the case with gasification, the technology necessary for the conversion of coal to oil is not a recent discovery. Such knowledge was available in Europe over 30 years ago, but at that time the process was commercially unfeasible.[44] The process of coal liquefaction is in itself relatively simple, and is actually just one step further removed from coal gasification. Stated simply, "[t]he ratio of carbon to hydrogen is much higher in coal then in oil; coal liquification involves producing hydrogen from coal by a gasification process and reacting it with coal so as to increase the hydrogen content of the coal and produce an oil."[45]

At the present time there are two basic plant types which are producing a liquid fuel from coal. These are the COED (Char-Oil-Energy-Development) plant operating in New Jersey since 1962 and the CSF (Consol Synthetic Fuel)plant in West Virginia.[46] Several other processes exist at the present time but it appears that COED and CSF are the most promising for long-term use. In the COED process the coal is broken down into oil . . ."by exposing it to progressively hotter temperatures in several different chambers. The coal is placed in a fluidized bed where the particles of coal are so small that they behave like a fluid when placed in a rapid, upward-moving stream of air. . . . . The process produces a tacklike "oil" (which must be treated with hydrogen to remove the sulfur and make it more liquid."[47] The CSF project, however, works on a very different principle. In this process pulverized coal is first dissolved, and an extract from this chemical reaction is recovered by the use of filters.[48] This solvent is then distilled and further processed (catalytically hydrogenated) in order to produce an even heavier solvent for the production of the synthetic oil.[49]

Although the liquefaction of coal "requires considerably less process water then that required for gasification due to the much lower hydrogen-carbon ratios involved, it is nonetheless clear that large amounts of water will be necessary if this project is to be carried on in large scale.[50] For example, a COED plant will need large supplies of water for boiler feed water, cooling tower make-up water, and emergency steam.[51]

In an independent study the Bureau of Mines estimated a consumption of 17,000 acre-feet per year for each 100,000 bbl/day of fuel produced.[52] It has also been reported that ". . . [t]he National Petroleum Council (1973) adopted a unit consumptive-use value of 0.2 acre-ft ($247m^3$) per year per bpd capacity.[53] Until better data becomes available, this figure translates into 20,000 acre-feet per year for 100,000 barrels per day of oil.[54] This figure of 20,000 AF/yr per 100,000 bbl/day is also the "rule-of-thumb" adopted by the Office of Coal Research.[55] Thus it clearly appears that large amounts of water will be necessary for coal liquefaction, although perhaps not as much as would be involved in the coal gasification process.

C. Water Law and the Needs of the Coal Conversion Industry.

Coal gasification and liquefaction factilities will require large quantities of water both for cooling purposes and for use as a raw material in some of the conversion processes. Therefore, the feasibility of coal conversion as a means of meeting the nation's future energy needs depends, at least in part, on the availability of an adequate and dependable water supply in areas where such facilities will be located. This involves legal as well as technological considerations. Not only must the necessary water be physically available, but coal conversion facilities must be able to obtain a secure enough legal interest in the water to justify the huge capital outlays that such an enterprise requires.

This study will examine three systems of water allocation, in order to determine which of them is most responsive to the needs of the coal conversion industry. The first is the traditional riparian doctrine that prevails in the eastern United

States. The second is prior appropriation, which is found in most of the western states. The third approach, administrative allocation, is a hybrid which contains features of both riparianism and prior appropriation. Since this study is primarily concerned with the feasibility of coal conversion operations in Kentucky, particular attention will be given to this state's law of water rights, which contains elements of both riparianism and administrative allociation.

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II. The Riparian System

A. Surface Water Consumptive Use Rules.

Consumptive rights to contained surface waters are governed by two major allocation systems, riparianism and prior appropriation. The riparian system is found in all of the eastern states except Mississippi,[1] while the prior appropriation system prevails in the West. However, riparian rights also co-exist with appropriative rights in those western states which follow the "California Doctrine,"[2] but are not usually recognized in those prior appropriation states which follow the "Colorado Doctrine."[3]

The riparian system appears to have origninated in America during the early part of the nineteenth century,[4] although some commentators have claimed that it developed from the French Civil Law[5] or the English common law.[6] Under the concept of riparianism, both consumptive and nonconsumptive[7] rights arise from ownership of land[8] which borders on such natural watercourses as lakes[9] or streams.[10] Consequently, as a general rule riparian rights do not attach to artificial waterbodies,[11] or to difused surface waters.[12]

Although commentators have differed about the nature of riparian rights,[13] they generally agree that no rights of ownership attach to the corpus of the water as long as it remains in the stream[14] "because . . . so long as it continues to run there cannot be that possession of it which is essential to ownership."[15] Instead, in most jurisdictions,

a riparian owner has only usufructory right to the water.[16] Moreover, riparian rights are not absolute, but correlative,[17] and each landowner must consider the needs of other riparian proprietors.

1. The Natural Flow Doctrine

There are two doctrines that govern consumptive rights to water under the riparian system, the natural flow doctrine and the reasonable use rule. Under the natural flow doctrine, each riparian proprietor on a watercourse is entitled to have the stream flow through his land in its natural condition, not preceptibly retarded, diminshed or polluted by others.[18] This concept assumes that the law should follow nature and that each proprietor on a stream should be entitled to have the stream continue flowing in its natural state through his land.[19]

Consumptive uses are not entirely prohibited by the rule, but a distinction is made between "natural" and "artificial" wants or uses.[20] Natural wants are those necessary to sustain life and include water for bathing, drinking, household purposes and watering animals.[21] The natural flow doctrine allows a riparian proprietor to use as much water as he needs for his domestic or natural uses even if this drains the entire stream.[22]

Artificial uses increase man's comfort and prosperity[23] and they include irrigation, manufacturing, power generation, mining operations and large-scale stock watering.[24] Riparian landowners may divert water for artificial uses as long as there is no material interference with the natural flow of

the watercourse, but a nondomestic use which noticeably affects the natural condition of the stream is actionable by a downstream owner even though he is not using the stream and suffers no actual damages.[25] The plaintiff is deemed to be injured by the change in the natural flow or condition of the stream and may obtain nominal damages or injunctive relief.[26] In fact, under the natural flow rule, the lower owner is virtually forced to institute an action in order to protect his rights against the acquisition of a prescriptive right by an upper riparian user even though the diversion is reasonable and harmless under the existing circumstances.[27]

In the early days of the Industrial Revolution, when many mills and factories were powered by water, the natural flow doctrine insured that the water passed down from one mill dam to the next.[28] Under modern conditions, however, the natural flow doctrine has little utility. It prohibits many beneficial, non-harmful uses simply because they materially diminish the natural flow of the water. It also permits a riparian proprietor to play "dog in the manger"--not using the water himself, and depriving the upstream owners of its use as well. For these reasons only four or five states still adhere to the natural flow doctrine.[29]

2. The Reasonable Use Rule

The natural flow doctrine and the reasonable use rule reflect widely divergent attitudes about man's relation to a watercourse.[30] While the natural flow doctrine emphasizes the right to flow of the stream and seeks to maintain, as

nearly as possible, the status quo of nature, the reasonable use rule seeks to promote the fullest beneficial use of streams by adjacent riparian owners.

Under the reasonable use rule, each riparian proprietor has a privilege to use the water for any beneficial purpose, provided that the intended use is reasonable with respect to other proprietors on the stream and does not unreasonably interfere with their legitimate water uses.[31] Of course, the mere fact of benefit to the user does not establish the reasonableness of the use.[32] Moreover, neither priority of use nor the extent of riparian frontage or riparian land are generally considered in determining reasonableness.[33] Although riparian rights are regarded as equal or correlative, each riparian user is not necessarily entitled to a proportionate share of the available water.[34] Indeed, where the water supply cannot satisfy the needs of all riparian users, some uses, otherwise beneficial, may be deemed unreasonable under the circumstances and prohibited.[35] The determination of the reasonableness of a use is a question of fact to be resolved on a case-by-case basis. Various factors may be considered, including rainfall, climate, season of the year, customs and usages, size, velocity and capacity of the watercourse, nature and extent of improvements on the watercourse, amount of water taken, place and method of diversion, place of use, previous uses, the object, the extent and type of use, its necessity and importance to society, and the uses, rights, and reasonable needs of other riparians.[36] The reasonableness of a particular use may also be affected by its location on the stream. The riparian proprietor at

its mouth may capture all he can, while the uppermost riparian must consider the needs of downstream users.[37]

The reasonable use, like the natural flow doctrine, distinguishes between natural and artificial uses, and gives preferential use treatment to the former category.[38] Thus, a natural or domestic use will always be treated as reasonable, while competing artificial uses may be enjoined,[39] but no other preferences are recognized under the reasonable use rule between types or classes of use.

Finally, the reasonableness of a particular use must be determined by present conditions and not by speculation concerning future circumstances.[40] Hence, in the absence of activity by other riparians a single riparian owner may use all of the water in a stream.[41] However, he does not thereby gain any continuing right to the full flow of the stream since upstream owners may commence reasonable uses in the future.[42] In fact, a use which is reasonable under existing circumstances may later become unreasonable when others initiate new uses on the watercourse.[43]

The reasonable use rule, like the natural flow doctrine, also governs water quality: A riparian owner may discharge pollutants into a watercourse, but such conduct will be deemed unreasonable and can be enjoined if it substantially injures another riparian proprietor.[44]

3. Consumptive Use Restrictions.

Under both natural flow and reasonable use theories, water rights are based on ownership of riparian land, a

principle which prevents nonriparian landowners from using watercourses and which has led to other use restrictions as well.

(a) Place of Use Restrictions.

(i) Definitions of Riparian Land

Since surface water may be used only on "riparian" land,[45] the courts have developed several tests to determine whether a particular tract is riparian or not. Perhaps the most restrictive is the "source of title" test, under which riparian rights are limited to the smallest parcel held under one title in a chain of title leading to the present owner.[46] The size of a riparian tract cannot be increased by the purchase of contiguous nonriparian land,[47] and if the back portion of a riparian tract is sold it loses its riparian character.[48] Moreover, the subsequent reuniting of a severed tract with the abutting tract will not re-establish its riparian status.[49] Thus, a riparian tract can be decreased, but never increased in those jurisdictions which follow the source of title rule.[50]

The source of title test, which tends to restrict available surface water supplies to a small group of riparian owners, originated in California and has been largely confined to the western states.[51] The rule supports their policy of limiting riparian rights as much as possible in order to provide more water for appropriators,[52] but this restrictive approach seems inappropriate for eastern states where more available.

The "government survey" test, now confined to Texas,[53] is closely related to the source of title rule.[54] According to this theory, riparian land stops at the outermost edge of the land away from the stream as described by a single original entry of the land in the acquisition of title from the government.[55]

The more inclusive "unity of title" rule provides that any tracts contiguous to the abutting tract are riparian, if held in common ownership, regardless of when they were acquired.[56] This approach permits an increase in the size of a riparian parcel by the purchase of contiguous land even though the added land had been nonriparian ever since its transfer from governmental to private ownership. Given the trend toward larger farms and landholdings, application of the unity of title theory will result in a continually expanding quantity of riparian land. This rule has support in both eastern and western jurisdictions.[57]

The unity of title rule appears superior in an eastern jurisdiction than the source of title test. Often a riparian owner can use water on land added to his riparian tract land without unreasonably curtailing the amount of water available for other riparian owners. However, the failure of the unity of title rule to impose any restriction on the amount of added land which can become riparian when acquired by one riparian owner may adversely affect other riparian proprietors. Accordingly, some courts have declared that the amount of riparian land claimed must be reasonable.[58] Under this reasonable limit rule, the distance of the land from the watercourse is taken into account in deciding the reasonableness

of the particular water use.[59] Arguably, this affords other riparians some protection against monopolization of the water by one riparian owner.

(ii) The Watershed Limitation

The concept of riparian land is further restricted in some states by the watershed limitation, which provides that any part of a tract of land which lies outside watershed of a body of water is not riparian to it even though the tract itself borders on a natural watercourse.[60] This watershed limitation is followed in a number of western states[61] and a few eastern states.[62]

The watershed limitation is based on the assumption that land beyond the watershed is outside the boundaries established by nature for riparian ownership[63] and that water used on land within the watershed will eventually return to the parent body of water.[64] If water is abstracted from one watershed and drained into another, downstream owners along the first watercourse would be damaged by diminution of the stream's flow, while those along the second watercourse might be injured by the effects of an excessive stream flow.[65] The rule allows a riparian owner to use water on his land to the maximum extent while at the same time protecting downstream owners, and protects riparians who are not currently exercising their riparian rights by insuring that water will be available if needed in the future.

Nevertheless, many commentators favor relaxation or abolition of the watershed rule.[66] In the East, this restriction often unduly limits water use and encourages waste of the resource.[67] At the present time a few eastern states have expressly adopted the watershed rule,[68] several have rejected it,[69] and the majority have not yet taken a position.

(iii) Effect of Nonriparian Uses

A nonriparian use is one in which water is diverted onto nonriparian land. Land which lies outside of a stream's watershed is also deemed nonriparian in those states which adhere to the watershed rule. Thus, both diversions by a nonriparian landowners and use of water by a riparian owners on nonriparian land are considered a nonriparian uses.

Nonriparian uses, however, are not always prohibited. According to one view, such uses are wrongful per se and riparian owners may obtain appropriate judicial relief even though they have suffered no actual damage.[70] In states which follow the reasonable use rule, however, a plaintiff must usually prove actual damage before he can enjoin a nonriparian use.[71] A few states permit nonriparian uses even though they cause harm to downstream riparian owners;[72] nonriparian use is simply one factor that is considered in determining whether the use is reasonable in accordance with the requirements of the reasonable use rule.[73]

(iv) Transfer of Water Rights

In most states riparian righs are not transferable

apart from the riparian land to which they are incident,[74] but a few jurisdictions have allowed severance of such rights.[75] In such cases the right of the nonriparian grantee is derivative,[76] and the riparian owner cannot convey a greater right than he has.[77] Moreover, while the right of the nonriparian grantee is effective against his riparian grantor,[78] it is usually inferior to the rights of other riparians.[79]

(b) Use By Municipalities

In theory, a municipality cannot divert water for purposes of public water supply even where it owns riparian property.[80] Actually, courts often refuse to prevent municipal water utilities drawing from watercourses and deny relief on the basis of failure to show damages estoppel or latches, or the existence of prescriptive right on behalf of the municipality.[81] A few states have expressly recognized riparian rights for municipalities.[82] Of course, municipalities normally have the power to acquire water rights by eminent domain, and once water rights are acquired, the municipality may sell water to nonriparians and is not bound by any of the restrictions of the riparian doctrine.[83]

4. Prescriptive Rights

Most riparian jurisdictions allow both riparian and nonriparian owners to acquire prescriptive rights to particular water uses.[84] A prescriptive right constitutes a servitude against the ownership adversely affected,[85] and thus

amounts to an uncompensated transfer of rights from the adversely affected riparians to the adverse user.[86] Prescription, like adverse possession, rests on the theory that aggrieved parties should seek judicial relief within a reasonable time or be forever barred from a remedy.[87]

In order to ripen into a prescriptive right, the use must be adverse, notorious, continuous and uninterrupted, and be made under a claim of right or title. To establish a right by prescription the use must be maintained in a manner hostile to the right of the riparian proprietor against whom it is claimed.[88] An act is hostile when it is inconsistent with the true owner's rights of ownership.[89] Thus, a licensed or permissive use can never give rise to a prescriptive right because such uses are not hostile to the titleholder.[90]

The use must be visible, open and notorious so that the riparian owner either knows, or should know, that his rights have been invaded.[91] It must also be continuous and uninterrupted for the entire prescriptive period.[92] Since some water uses, like irrigation, may be sporatic rather than continuous, this requirement is probably satisfied if the claimant uses the water as his necessities require. Of course, the initation of a suit puts an end to the adverse character of the use as does any other substantial interruption during the prescriptive period.[93] Likewise, the adverse use is interrupted if at any time during the limitation period the adverse claimant concedes or acknowledges title in the true owner.[94] Finally, use of water by one claiming a prescriptive right must be under a claim of right so as to necessarily imply an ouster of the owner's exclusive right of control.[95]

Because of the transient nature of water, prescriptive water rights are difficult to acquire. In those states which follow the natural flow doctrine, there must be an actionable invasion of the right to the stream's natural flow,[96] while reasonable use jurisdictions require an actionable wrong involving actual damages to the servient owner.[97]

The scope of a prescriptive right, once acquired, is measured by the use originally made and actually enjoyed during the prescriptive period.[98] Once a prescriptive right has been perfected, the water use may be changed at any time,[99] as long as the new use does not increase the burden imposed on the servient estate.[100] Finally, prescriptive rights, once acquired, may be lost by abandonment, although mere nonuse is only evidence of an intent to abandon and non conclusive.[101]

B. Ground Water Consumptive Use Rules.

1. Ground Water Hydrology.

Ground water is found in the zone of saturation, where the open spaces between the sand, gravel and rock are saturated with water.[102] Above the zone of saturation, there is a zone of aeration that may range in thickness from a few inches to hundreds of feet.[103] The voids in the rocks in the zone of aeration contain both water and air, and the water is held by capillarity.[104] In particular, soils may hold significant volumes of water against the downward pull of gravity.[105] The zone of saturation will usually yield water

when pumped. Water within the zone of aeration cannot be tapped by wells, but it does provide water to plant life on the surface and protects topsoil against wind erosion.[106]

Ground water may occur under either water table or artesian conditions. Water table conditions exist when the ground water surface is free to rise and fall with the water supply. The top of the saturation zone is called the water table.[107] Artesian conditions occur when water is confined under an impervious watertight bed called an aquiclude. The artesian water is under pressure and will rise above the water-bearing bed if a well is sunk through the aquiclude.[108]

An underground formation that will yield water is called an aquifer.[109] Ground water either percolates through the aquifer or moves in response to hydrostatic pressure and gravity.[110] The amount of recharge depends on the permeability of the soil or mantle rock and on the available water from precipitation or streams or other sources.[111] This movement from recharge areas to areas of natural drainage is normally quite slow, often only a few feet per day or less.[112] This velocity is an important factor determining the sustained yield of wells, for yield is limited to the quantity of water that moves to the well from the places where the water entered the ground. Wells remote from a source of replenishment cannot yield water perennially at rates greater than the rate at which water moves through the acquifer, even though much greater quantities of water may be available at the source.[113]

The hydrology of ground water is complex and dynamic. The amount of water that may be safely extracted from a

ground water basin is not fixed, but varies as manmade or natural conditions affect the supply and from the ground water formation. These activities include artificial recharge, regulation of stream flow by surface storage, vegetative cover charges, extension of sewerage systems, paving of stream channels, and sealing of the ground surface by the spread of urbanization.[114]

Interference between wells, overdraft of the water-bearing bed or aquifer, and contamination are all serious ground water problems.[115] Interference occurs when wells are not properly spaced. When a well is pumped the water level surface in the area around the well is lowered as a result of the withdrawal of the water. The water-table surface forms a depression in the shape of an inverted cone, and interference occurs between wells when the cones of depression overlap.[116] Overdraft occurs when the rate of withdrawal of water from an aquifer exceeds the rate of recharge.[117] If this continues the water table will be permantly lowered and the aquifer is said to be mined.[118] Contamination includes pollution and salt-water intrusion.[119]

2. Underground Streams

Subsurface waters are classified as either underground streams or percolating waters, and different consumptive use rules apply to each category.[120] Underground or subsurface streams flow in well-defined channels below the earth's surface, generally have ascertainable banks and courses,[121] and are subject to the same consumptive use rules that

govern surface watercourses.[122] Underground streams are relatively uncommon and one who alleges the existence of an underground stream usually has the burden of proof on that issue.[123] Furthermore, existence and location of the underground stream must be reasonably ascertainable from the surface without excavation.[124]

3. Percolating Ground Water

Percolating waters "ooze, seep or filter through the soil beneath the surface, without a defined channel."[125] However, the term is commonly used by courts to represent a variety of hydrologic conditions and serves mainly to distinguish them from underground streams. Ground water is presumed to be percolating unless it can be shown that the water is flowing in an underground stream. This is because visible surface indications and scientific information available are usually inadequate to allow an accurate determination of the source and movement of underground water. Some states have even abandoned the underground stream classification, and hold all ground waters to be percolating.[126] This convergence of physical facts, legal presumptions and standards of proof no doubt explains why courts have in the vast majority of cases classified ground water as percolating.[127]

Although consumptive use rules with respect to percolating ground water are hopelessly fragmented and confused, four major approaches can be discerned: (1) the absolute ownership doctrine, (2) the American rule, (3) the correlative rights doctrine, and (4) the prior appropriation system.

(a) The Absolute Ownership Doctrine

According to the English or absolute ownership rule, a landowner may extract an unlimited amount of percolating ground water from his land and use it on either overlying or distant lands, regardless of injury to adjacent landowners.[128] The rule imposes liability only for waste or for malicious injury to another.[129]

The absolute ownership rule originated in Acton V Blundell,[130] an English case decided in 1842. The plaintiff in that case was a manufacturer whose well was affected by nearby mining operations. As the defendant pumped water out of the shaft of his coal mine, he drew the percolating water from under the plaintiff's well. The plaintiff sought damages in an action on the case. Although the defendant's conduct might have been actionable if a surface watercourse had been involved, the court refused to apply the law of surface waters because ". . . no man can tell what changes these underground sources have undergone in the process of time . . . . [T]here can be no ground for implying any mutual consent or agreement for ages past . . . which is one of the foundations on which the as to running streams is supposed to be built."[131]

Instead the court in Acton held that the defendant was entitled to use the water as he saw fit, even if he injured the plaintiff. This result was justified on the basis that the defendant as owner of the overlying land had an exclusive right to any percolating ground water beneath his tract.[132]

The absolute ownership doctrine recognizes a vested property in the overlying landowner to percolating ground water beneath his property whether or not he actually puts the water to use.[133] It has been said that "the percolating water belongs to the owner of the land, as much as the land itself, or the rocks and stones in it."[134] However, since a landowner has no rights against an adjoining landowner who withdraws all the water under his land and dries up his wells, it is somewhat misleading to say that he owns "absolutely" the percolating water under the land.[135] Instead it would seem that the landowner does not really own the water until he has reduced it to actual possession.[136] The property right involved is the landowner's exclusive right of access to the ground water through his land, rather than ownership of the underground water itself.[137]

Followed by many American jurisdictions in the nineteenth centry,[138] the absolute ownership rule is still recognized in a number of states.[139] The absolute ownership doctrine, however, now is often criticized because it fails to take into account the nature of ground water and because it favors municipalities and other large users who are able to drill deep wells.[140]

(b) The American Rule

The American or reasonable use rule,[141] allows a landowner may use as much percolating ground water as he needs, regardless of any adverse effect on other landowners, as long as the water use is reasonably related to natural use of his overlying land.[142] The use must be beneficial; malicious or wasteful

use is considered unreasonable per se[143] and may be enjoined even though the plaintiff has suffered no actual damage.[144] As a general rule, however, the use of water on overlying land for agricultural, domestic, mining or manufacturing purposes is deemed to be reasonable.[145]

The absolute ownership doctrine and the American rule are virtually the same with respect to the landowner's right to use percolating ground water on overlying land, but differ significantly in their approach to the extraction and transportation of ground water for use in distant areas. The absolute ownership doctrine permits ground water to be transported and used on non-overlying land without liability even though neighboring landowners are injured. According to the American rule, however, the sale or use of water on distant lands is unreasonable and actionable if it impairs the ground water supply of another landowner, even though the defendant's use is beneficial.[146]

The leading case on the American rule is Forbell v. City of New York.[147] The plaintiff in Forbell used ground water in connection with farming operations on his land. The City of New York, which owned an adjoining two-acre tract sank a number of wells in order to obtain water for sale to the City of Brooklyn. When the defendant's wells interferred with his farming operations, the plaintiff sought injunctive relief. Although the court conceded that there would be no liability under the absolute ownership doctrine, it nevertheless enjoined the defendant's extraction of ground water for transportation and sale to distant users.

The American rule has displaced the older absolute ownership doctrine in many jurisdictions, and is now probably the majority position.[148] Although the American rule differs from the absolute ownership theory where the use of ground water on nonoverlying land is concerned, the two rules are quite similar conceptually and the American rule may be regarded as a modification of the absolute ownership doctrine.[149] Both rules agree that ownership of percolating waters is in overlying landowners,[150] but the American rule places reasonable limitations upon the exercise of ownership rights on much the same basis as the law of private nuisance. Like the absolute ownership doctrine, the American rule fails to offer any meaningful protection to this property interest, but favors large users at the expense of farmers and domestic users who tend to have shallow wells and less powerful pumps.[152]

(c) The Correlative Rights Doctrine

The correlative rights doctrine provides that each owner over a common ground water pool has an equal and correlative right to make a beneficial use of the water on his overlying land. The correlative rights doctrine is sometimes known as the "California rule" because it was introduced by the California Supreme Court in Katz v. Walkinshaw.[153] The plaintiff in the Katz case was using ground water for domestic and irrigation purposes on land overlying an artesian basin. He brought suit when the defendant began pumping the water for sale and use outside the basin. The court stated that use of ground water on nonoverlying land

would not be allowed if it caused injury to an overlying user, but went on to declare that landowners above a common underground basin have such coequal rights in the underlying waters as to require that it be prorated among them when the available supply was not sufficient to meet the needs of all.[154]

In addition, the court applied the principles of prior appropriation to transfers of water beyond overlying land. Thus, as between outside users the first taker had priority over subsequent users.[155] The Katz case, therefore, represented an effort to unify the state's groundwater law with its law of surface water streams, which recognized both riparian and prior appropriation rights.[156]

Only California strictly follows the Katz case.[157] In other states the correlative rights doctrine does not attempt to determine priority among outside users. Outside of California the doctrine merely provides that ground water must be equitably apportioned among overlying owners in times of shortage, with each owner entitled to no more than his fair and just proportion.[158] This is sometimes known as the eastern correlative rights doctrine. In some instances, particularly in the case of irrigators, the correlative rights rule limits the user to his proportionate share, according to his surface area as compared with the whole area overlying the water supply.[159]

Some writers view the correlative rights doctrine as an attempt to analogize the law of percolating ground water to the law of surface streams.[160] The approach of these two doctrines, with their emphasis on common rights to water, is

similar. Using either a surface water reasonable use or a correlative rights rationale a number of eastern states appear to have abandoned the American rule.[161]

Other commentators regard the correlative rights doctrine as an extension of modification of the American rule.[162] However, these two doctrines seem to rest upon different conceptions of water ownership.[163] Under the correlative rights rule, overlying owners have only usufructory rights and not, as under the absolute ownership and American rules, proprietary rights in the corpus of the water itself. It is this perception of water as usufructory right that justifies the requirement that overlying owners share the available water supply in periods of shortage.[165] The surface water reasonable use rule rests on a similar basis.

As far as equitable considerations are concerned, the correlative rights doctrine is superior to either the absolute ownership doctrine or the American rule since small users are better protected and because the effects of a water shortage must be borne proportionately by all users. On the other hand, the correlative rights doctrine is subject to many of the same criticisms as the surface water reasonable use rule. The correlative rights rule is so indefinite that it is exceedingly difficult to apply to varying conditions.[166] Moreover, it offers no security to earlier developers by protecting the supply of the amount of water on which they have relied, nor does it permit landowners to acquire a more secure right to an adequate supply of water by purchase or contract.[167]

(d) The Prior Appropriation System

Prior appropriation, the prevailing system of surface water allocation in the West, is discussed at greater length in Chapter III. In most of those states underground streams are subject to appropriation in the same manner as surface waters.[168] Increasingly, these states have moved toward public control and management in the distribution of their percolating ground water as well.[169] Colorado, Idaho, Montana, Nevada, New Mexico, Oklahoma, Oregon, Washington and Wyoming now have separate ground water codes based on the prior appropriation model,[170] and five other states, Kansas, North Dakota, South Dakota and Alaska, have made their general appropriation statutes applicable to percolating ground water.[171] The remaining western states follow one of the common law rules and do not apply prior appropriation principles to ground water. California, of course, follows the correlative rights doctrine, Arizona and Nebraska follow the American rule,[172] while Texas continues to adhere to the absolute ownership doctrine.[173]

Under the appropriation theory, overlying landowners have no proprietary interest in percolating ground water beneath their land as they do under the absolute ownership and American rules. Instead, ground water is owned by the state or by the public and individual rights in it, which are usufructory in nature, can only be acquired by beneficial use.[174] As with surface waters, during periods of water shortage the rights of later appropriators of an underground basin must yield to those of earlier appropriators.

Despite its greater suitability to stream water, the prior appropriation system has been successfully applied to ground water in arid states. It encourages early development and use of water resources, provides users with a relatively secure water right, and encourages continued use by providing for loss of rights by non-use.[175] But while prior appropriation achieves some degree of certainty as to rights and order of distribution, there are disadvantages to its inherent rigidity. Just as it encourages the early land developers in an area, it also discourages subsequent development of valuable land once the available water supply has been appropriated.[176]

4. Ground Water Pollution

Contamination of ground water has become a serious problem in some areas of the country. Although federal and state legislation now deal with ground water pollution,[177] private law remedies are also available. In the case of pollution of an underground stream, the surface water reasonable use rule prevails and pollution which unreasonably interferes with the uses of other overlying landowners is not allowed.[178] Where percolating ground waters are affected, however, neither the absolute ownership rule nor the American rule provide much protection to injured landowners.[179] Such cases seldom involve a proprietary beneficial use of the water in question, but rather a proprietary use of the land whereby the percolating waters are incidentally affected.[180] Perhaps for this reason, the allocation rules are usually ignored and liability is imposed on the basis of private nuisance,[181] negligence,[182] or strict liability[183] principles.

C. The Law of Water Allocation in Kentucky

1. Water Resources in Kentucky.

Kentucky's climate and topography insure that water generally will be available. The average annual rainfall ranges from 36 to 42 inches in the northern counties, 42 to 47 inches in the central portion of the state, and 47 to 50 inches in the southern area. This produces 45-inch average annual rainfall.[184] Although there are seasonal variations, rainfall is generally adequate throughout the year.

Kentucky has 544 square miles of streams, rivers, lakes and reservoirs.[186] The flowing surface waters of the state comprise a network of rivers and streams ranging from the Ohio River and its main tributaries to the small creeks which drain into the Ohio's lesser tributary streams. The Ohio forms the northern boundary of Kentucky for a distance of 664 miles and drains a total area of 204,000 square miles from portions of fourteen states.[187] (See Figure 1.) About 97 percent of Kentucky's 40,000 square mile area drains into the Ohio River, mainly through seven major river basins: Big Sandy, Licking, Kentucky, Salt, Green, Cumberland and Tennessee rivers. (See Figure 2.) The remaining area, located in extreme western Kentucky, drains directly into the Mississippi River.[188] There are no natural lakes of any size in the state, but a number of large artificial lakes or reservoirs, such as Lake Cumberland, Kentucky Lake and Lake Barkley, have been created by river impoundment. In addition throughout the state impoundments on small tributary or headwater streams have created a number of small lakes and ponds for farm use, municipal water supply or recreational


N.Y.
PA.
OHIO
IND.
ILL.
MD.
W. VA.
VA.
KENTUCKY
MO.
TENN.
N. CAR.
S. CAR.
MISS.
ALA.
GA.
OHIO RIVER
DRAINAGE BASIN

Figure 1.

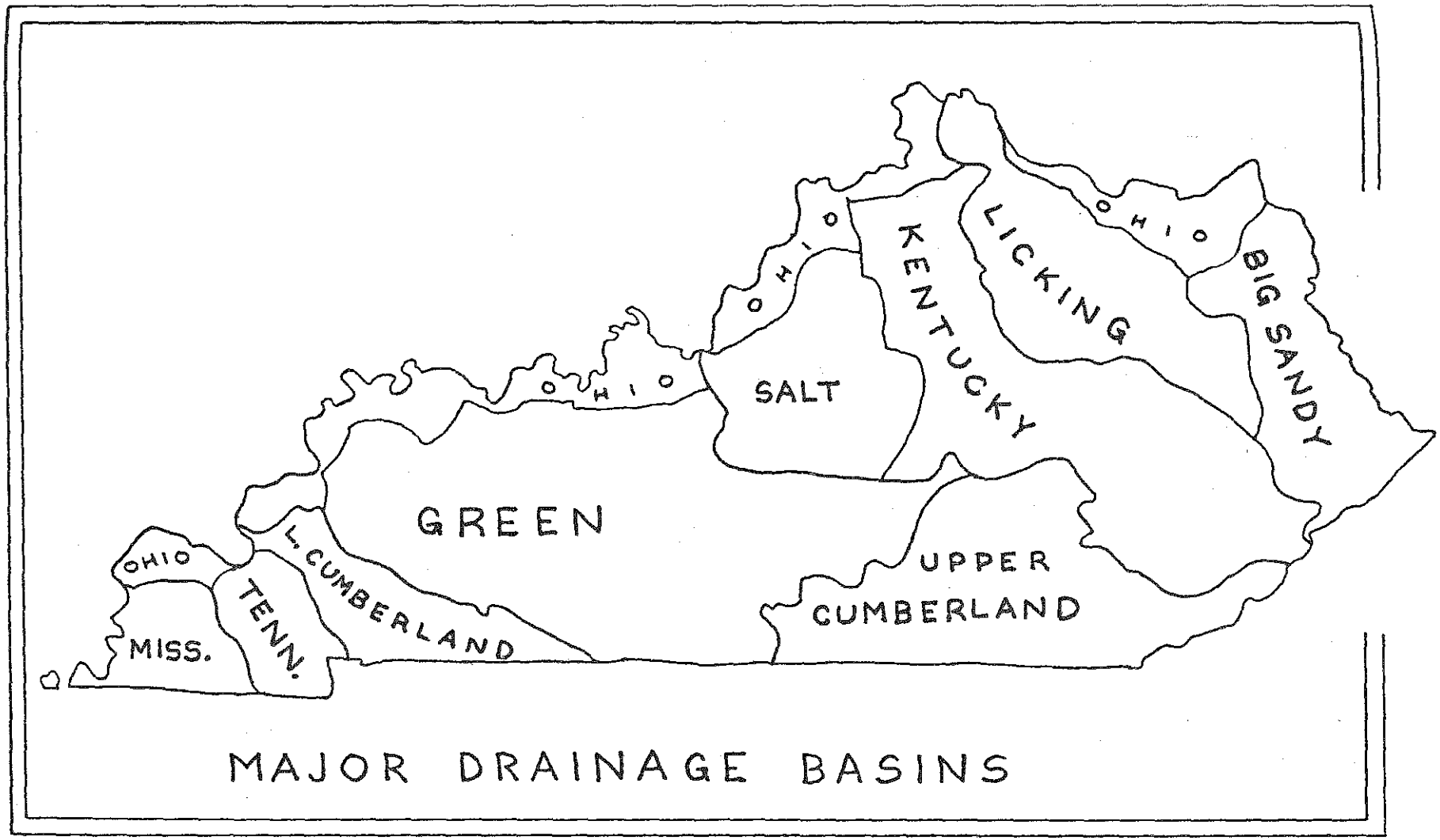
OHIO
OHIO
KENTUCKY
LICKING
OHIO
BIG SANDY
OHIO
SALT
GREEN
L. CUMBERLAND
OHIO
TENN.
MISS.
UPPER
CUMBERLAND
MAJOR DRAINAGE BASINS

Figure 2.

purposes.[189] Finally, there are many large springs, some flowing several hundred gallons per minute in Kentucky.[190]

Ground water is also plentiful in many parts of the state. There are five major ground water provinces in Kentucky, the Eastern Coal Field Region, the Blue Grass Region, the Mississippian Plateau Region, the Western Coal Field Region and the Jackson Purchase Region.[191] (See Figure 3.) The Jackson Purchase Region and the alluvial fill areas along the Ohio River are the richest sources of ground water in Kentucky, but good to moderate supplies are also available from the Mississippian Plateau and Western Kentucky Coal Field regions.[192]

2. Surface Water Allocation Rules.

Although Kentucky is a riparian state, it was unclear until recently whether it followed the natural flow doctrine or the reasonable use rule since the Court of Appeals sometimes used the two doctrines interchangably. Anderson v. Cincinnati Southern Railway,[193] an early case, is illustrative. The plaintiff in Anderson owned a grist mill on a small creek. Two miles above the mill the defendant railroad company constructed a small dam to supply a reservoir of water for its trains. The dam, however, interferred with the plaintiff's mill and he brought suit.

The court declared that "[t]he right of every riparian owner to the enjoyment of a stream of running water in its natural state in flow, quantity, and quality is now well established,"[194] language which implied that the court was adopting the natural flow theory. Later portions of the opinion, however, were suggestive of the reasonable use

[195]

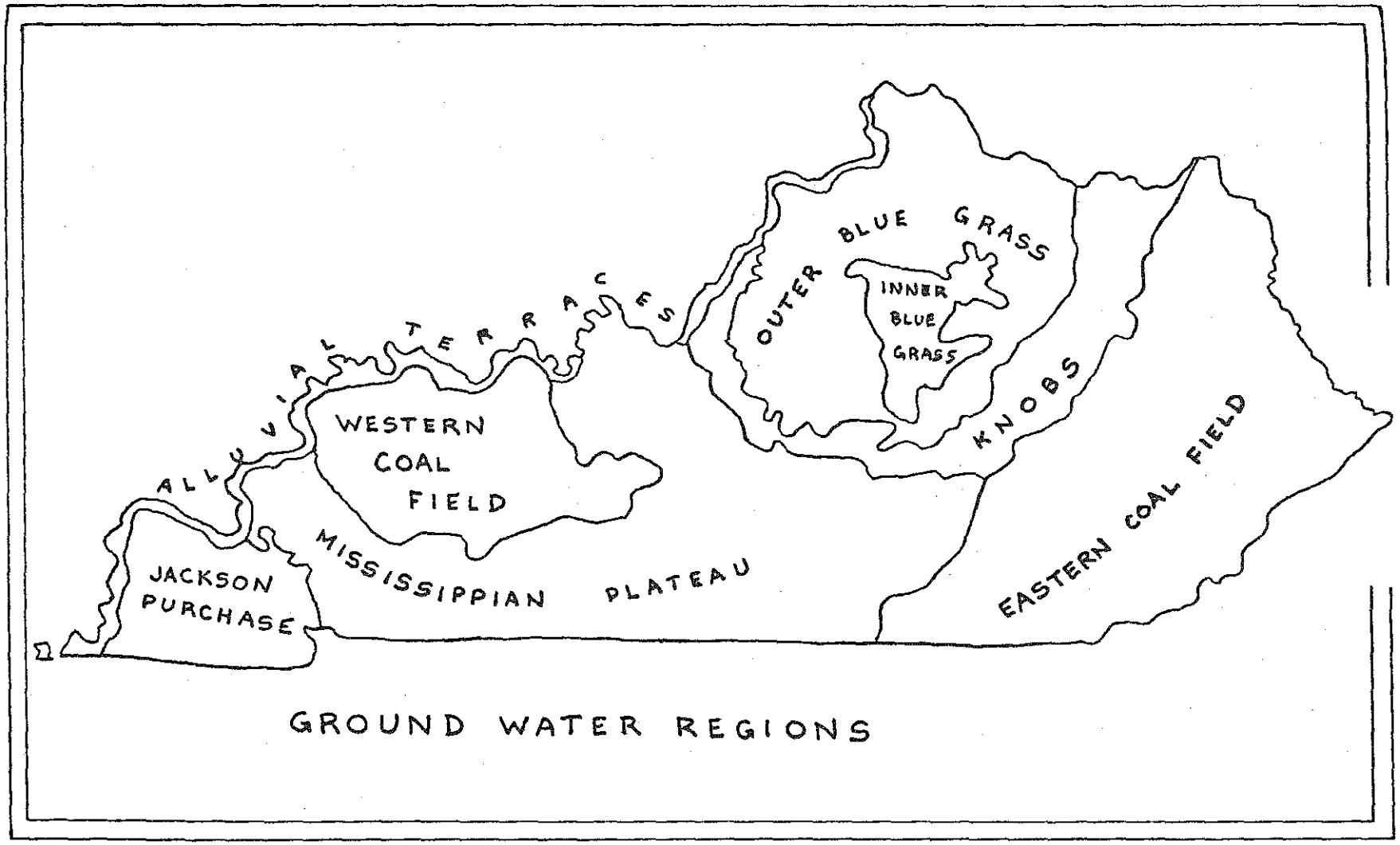
OUTER BLUE GRASS
INNER BLUE GRASS
ALLUVIAL TERRACES
WESTERN COAL FIELD
KNOBS
EASTERN COAL FIELD
JACKSON PURCHASE
MISSISSIPPIAN PLATEAU
GROUND WATER REGIONS

Figure 3.

> The owner is entitled to the reasonable use of the water for natural and domestic purposes; but when he undertakes to divert the course of the stream, or detain the water by means of a dam, so as to prevent the previous supply to other riparian owners, he became a wrongdoer. . . . The use and detention of the water on a large stream by means of a dam, for purposes of the railroad, might not be an unreasonable use, as ordinarily there would be ample water left for all the purposes of the riparian owners below; yet, where the stream is small, or even large, if the dam so obstructs the water as to diminish the flow and lessen the capacity of the water power below, it is an injury to the proprietor for which damages may be awarded.

In the end the court reversed the trial court's decision for the plaintiff and ordered a new trial. The court stated that the plaintiff should not recover unless he suffered material injury from the defendant's use of the water.

In Fackler v. Cincinnati N.O. & T.R.C. Co.,[196] the defendant railroad placed a dam across a small creek, impounding the water and preventing it from flowing into the plaintiff's land. The court declared that a "proprietor is entitled to have the water of a stream flow to his land in its natural course undiminished in quantity and unimpaired in quality."[197] However, relief was denied because the plaintiff could not show any damage.

In City of Louisville v. Tway,[198] the defendant also dammed a stream, thereby reducing the velocity of its flow. This created a pollution problem for the plaintiff. The court stated that:[199]

> It is true, as suggested by counsel for appellant, that our court is committed to the "natural flow rule" though as we read the two rules (reasonable use) . . . the distinction is rather close, and even under what may be

> termed the more restricted theory (natural) flow), . . . each riparian owner is recognized as having a privilege to use the water to supply his natural wants, and extraordinary or artifical uses, so that such does not sensibly or materially affect the quantity of the water and such uses by the lower riparian owner.

The court held that the plaintiffs had failed to show that the defendants had made "unreasonable use of the water from the stream." It also declared, however, that the defendants' dam "did not appreciably affect the flow of water" in the stream. Thereupon, the court upheld the lower court's refusal to grant injunctive relief since the defendant's actions had not caused any demonstrated harm to the plaintiff's property.

The continuing uncertainty between the natural flow and reasonable use theories led in 1954 to a legislative adoption of the reasonable use rule:[200]

> The owner of land continguous to public water shall have the right to such reasonable use of this water for other than domestic purposes or impair existing uses of other owners heretofor established, or unreasonably interfere with a beneficial use by other owners.

Although this provision was repealed in 1966, the reasonable use rule appears to be securely established in this state. Daugherty v. City of Lexington[201] is the most recent case on point. In this case the City of Lexington denied a building permit to the plaintiff, who had plans to build a restaurant, because he failed to show that his septic tank system would not endanger the purity of city water in a nearby reservoir. The plaintiff argued that his proposed restaurant would be a reasonable use of his land. The court quoted from a Michigan case, People v. Hulbert,[202] which set forth a reasonable use formula for water

> . . . in determining whether a use is reasonable we must consider what the use is for, its extent, duration, necessity, and its application; the nature and size of the stream, and the several uses to which it is put; the extent of the injury to the one proprietor and of the benefit to the other; and all other facts which may bear upon the reasonableness of the use.

According to the court, the determination of reasonable use is a question of fact to which a balancing test must be applied. The necessity of the use of water must be considered and balanced against the harm which would ensue from the use.

Many of Kentucky cases have involved impairment of water quality rather than consumptive uses. In Kraver v. Smith,[204] a distillery caused a pollution problem by discharging its waste into a nearby stream. The court granted an injunction to a lower riparian on the theory that the riparian was " . . . entitled to the natural flow of water, unimpaired in quality, except as may be occasioned by reasonable use of the stream by other proprietors."[205]

Kentucky, like almost all eastern jurisdictions, limits the use of surface water to riparian land. In Bank of Hopkinsville v. Western Kentucky Asylum for the Insane,[206] the defendant purchased a small tract of land on a stream. constructed a pumping station, and transported the water for use on nonriparian land located about three-quarters of a mile away. This diversion interferred with the operation of the plaintiff's grist mill and he brought suit to enjoin the defendant from continuing its nonriparian use. The court agreed that the Hospital could not transport the water to a nonriparian tract if this caused injury to a riparian owner.

Kentucky apparently recognizes prescriptive rights. In W.G. Duncan Coal Co. v. Jones,[207] a coal company obtained the right to pollute a stream because the lower riparian owner allowed the defendant's use to continue throughout the statutory prescriptive period.

3. Ground Water Allocation Rules.

Like most states Kentucky recognizes the legal distinction between underground streams and percolating ground water. In Nourse v. Andrews,[208] a plaintiff owning land on the Muddy River in Logan County tried to stop the City of Russellville from using two springs for its water supply since this caused the river to be depleted. The plaintiff argued that the springs were part of the source of the river but lost when he was unable to prove this allegation. The court stated that one who alleges the existence of an underground stream has the burden of proof and added that:[209]

> Subterranean streams, as distinguished from subterranean percolations, are governed by the same rules, and give rise to the same rights and obligations as flowing surface streams. . . . The owner of the land under which a stream flows can, therefore, maintain an action for the diversion of it, if such diversion took place under the same circumstances as would have enabled him to recover, if the stream had been wholly above ground.

Therefore, according to the Nourse case, a landowner may assert riparian rights to underground water only if he can prove the existence of an underground stream. In Commonwealth v. Sebastian,[210] such proof was established by pointing to a line of green grass which flourished in spite of dry weather. The court in Sebastian also stated that

"there is an initial presumption that subterranean waters are percolating, but once a subterranean stream is shown to exist, there arises a presumption that it has a fixed and definite course and channel."[211]

In the case of percolating ground water, Kentucky originally followed the absolute ownership rule. In Kinnard v. Standard Oil Co.[212] the court stated that percolating waters "belong to the soil, constitute part of it, and may be used, controlled, or removed by the owner in the same manner that he could the soil through which the water percolates or runs."[213] In Long v. Louisville & Nashville Railway Co.[214] the court declared that "The rule is universal that the owner may dig on his own land such wells as he needs, although in doing so he may dig up his neighbor's well."[215] The doctrine was reaffirmed in Nourse v. Andrews:[216]

> Percolating waters are part of the earth itself, as much as the soil and stones, with the same absolute right of use and appropriation by the owner of the land . . . . The law seems to be well settled that water percolating through the soil is not, and cannot be, distinguished from the soil itself. The owner of the soil is entitled to the waters percolating through it, and such water is not subject to the appropriation.

The absolute ownership rule, however, was replaced by the American rule of reasonable use in Sycamore Coal v. Stanley.[217] In this action, the plaintiff brought suit when the defendant coal company's core hole, used to test for coal, caused the water in his well to disappear. The defendant plugged the hole, but the water rose only 14 inches, as compared to the previous 54-inch level. The

court found no evidence to establish the existence of an underground stream, and, therefore, assumed the waters to be percolating.

The court limited the landowner over subterranean percolating waters to a "reasonable and beneficial use of the waters . . . and he had no right to waste them, whether through malice or indifference, if, by such waste, he injures a neighboring landowner."[218] Since the landowner's use was "properly connected with the use, enjoyment and development of the land itself," the court held that he was entitled to all he could use, regardless of the depletion of his neighbor's supply.

Cases of ground water pollution have also arisen in Kentucky. For instance, Kinnard v. Standard Oil Co.[219] allowed a spring owner to recover damages from the defendant because defendant's coal oil storage tanks leaked and polluted plaintiff's spring, which was fed by percolating waters. In accord is Rogers v. Bond Brothers,[220] where the court quoted from Cooley on Torts:[221]

> It is said in an early case that where one has filthy deposits on his premises, he whose dirt it is must keep it that it may not trespass. Therefore, if filthy matter from a privy or other place of deposit percolates through the soil of the adjacent premises, or breaks through into the neighbor's cellar, or finds its way into his well, this is a nuisance.

However, in United Fuel Gas Co. v. Sawyers,[222] a gas company defendant was not held liable when a newly-drilled

gas well contaminated the plaintiff's home water source. The court declared that "the owner of land when putting it to a legitimate and not unreasonable use is not liable to the owner of adjoining land for injuries to well or springs fed by hidden underground waters."[223]

D. The Riparian System and Coal Conversion

1. Surface Water Consumptive Use Rules

The riparian system is not particularly responsive to the needs of the coal conversion industry. This is especially true of the reasonable use rule, which prevails in most eastern jurisdictions, including Kentucky. Ideally, water rights should be both definite and secure: the water right should be clearly defined with respect to quantity and in terms of its relation to the rights of other users. The reasonable use rule, however, is vague and uncertain.[224] Because of the nature of the reasonable use concept, one cannot know with any precision who may use the available water, how much he can use, or for what purpose he can use it.[225] This is because any use must be reasonable with respect to the uses of other riparian owners, and these uses are constantly changing.[226] As long as these uncertainties exist, private investment in water-based enterprises such as coal conversion facilities will be discouraged.

The uncertain nature of the user's water right under the riparian system is further aggravated because mechanisms

for resolving controversies among water users are severely limited. Not only is litigation time-consuming, expensive and uncertain in its outcome, but the results even of successful litigation are narrow and limited in scope. First of all, the judgment relates only to the parties before the court and not other water users. Since the courts will usually not apportion a stream between competing users, the judgment will be an "all or nothing" finding for one party or another. Moreover, the judgment pertains only to the facts as they exist at a given time and new developments which change the relative positions of the parties cannot adequately be dealt with without further litigation.[227]

Another criticism is that the riparian system tends to foster locational inefficiencies.[228] In most states it excessively restricts the use of the water for the benefit of non-riparian land.[229] Since many beneficial uses consume water some distance from the point of diversion, these locational restrictions probably result in less efficient water use.[230] This could present serious problems if some aspects of the coal conversion took place on non-riparian land.

Thus while the riparian system possesses the advantage of flexibility, insecurity of water right and locational restrictions do not promote efficient water use.

2. Ground Water Consumptive Use Rules

Both hydrologists and legal commentators have criticized the existing law of water rights for its failure to recognize the relationship between surface and ground water.[231] This

interrelation between percolating ground water and surface water supports a uniform allocation rule for all forms of water.[232] Only the correlative rights doctrine sufficiently resembles the surface water reasonable use rule, both in terms of allocative standard and in terms of underlying theory of property interest in the water, to allow the courts to fashion a rational and integrated law of water allocation.[233]

Unfortunately, the correlative rights doctrine is subject to the same deficiencies as its surface water counterpart, the riparian reasonable use rule. There are no such uncertainties, however, under either the American rule or the absolute ownership doctrine. From the perspective of the coal conversion industry, the American rule would be superior to the correlative rights doctrine because industrial users, who could construct the deepest wells, would be able to secure as much water as they needed for use on overlying land without having to concern themselves with the requirements of smaller-scale users such as irrigators. The English or absolute ownership rule is even more suitable to the water needs of the coal conversion industry. Coal conversion facilities, like other industrial users, not only may obtain a secure water right (as they can under the American rule), but the water obtained can be transported beyond the owner's overlying land. Thus, under the absolute ownership doctrine, there are no locational

restrictions, and additional ground water can always be transported from distant well fields if water supplies in the immediate area become inadequate.

It should be pointed out, however, that the absolute ownership doctrine and the American rule, while well suited to the needs of the coal conversion industry, are probably not responsive to those of other water users in the state.

1. Formerly a riparian state, Mississippi enacted a prior appropriation statute in 1956. Miss. Code Ann. §51-3-7 (1973). Champion, Prior Appropriation in Mississippi: A Statutory Analysis, 39 Miss.L.J. 1 (1967).

2. 1 W. Hutchins, Water Rights Laws in the Nineteen Western States 193 (1971). The coordination of appropriative and riparian rights in these states is often difficult. Trelease, Coordination of Riparian and Appropriative Rights to the Use of Water, 33 Tex.L. Rev. 24 (1954).

3. F. Trelease, Cases and Materials on Water Law 11 (2d. ed. 1974).

4. Tyler v. Wilkinson, 4 Mason 397, 24 Fed. Cas. 472, Fed. Case No. 14,312 (C.C.D.R.I. 1827). J. Kent, Commentaries 353, 355 (1828).

5. Weil, Origin and Comparative Development of the Law of Water Courses in the Common and in the Civil Law, 6 Calif.L. Rev. 245, 342 (1918); Weil, Waters: American Law and French Authority, 33 Harv.L.Rev. 133 (1919); Busby, American Water Rights Law: A Brief Synopsis of Its Origins and Some of Its Trends, With Special Reference to the Beneficial Use of Water Resources, 5 S.C.L.Q. 106, 113-14 (1952).

6. Maass & Zobel, Anglo-American Water Law: Who Appropriated the Riparian Doctrine?, 10 Public Policy 109 (1960). See also Murphy, English Water Law Doctrine Before 1400, 1 Am. J. Geg. Hist. 103 (1957); Lauer, The Common Law Background of the Riparian Doctrine, 28 Mo. L. Rev. 60 (1963).

7. Riparian landowners possess a right of access to adjacent navigable waters. McCarthy v. Coss Head Timber Co., 208 Ore. 371, 302 P.2d 238, 246 (1956); Hollan v. State, 308 S.W.2d 122, 125 (Tex. Civ. App. 1958); Board of Trustees v. Madeira Beach Nominee, Inc., 272 So.2d 209, 214 (Fla. App. 1973). They also share with other members of the public the right to navigate, fish, swim or bathe in such waters. Harris v. Brooks, 225 Ark. 436, 283 S.W.2d 129, 134 (1955); Harrison County v. Guice, 224 Miss. 95, 140 So.2d 838, 842 (1962). Riparian property is also subject to the doctrines of accretion, reliction, avulsion and erosion. See generally, 56 Am. Jur., Watters §§476-98 (1947); 65 C.J.S., Navigable Waters §§983-86 (1973); 5A G. Thompson, Commentaries on the Modern Law of Real Property §§2560-65 (J. Grimes, ed. 1957).

8. Restatement of Torts §843, Comment e (1939); Jones v. Conn, 39 Ore. 30, 64 P. 855, 65 P. 1068 (1901. The term "riparian" is derived from "ripa", the Latin word for river bank. The beds of navigable watercourses normally are not subject to private ownership, but are held in trust by the state for the common use and benefit of its citizens. Note, The Public Trust in Public Waterways, 7 Urban L. Ann. 219 (1974); Maloney & Ausness, The Use and Legal Significance of the Mean High Water Line in Coastal Boundary Mapping, 53 N. Car. L. Rev. 185 (1974); Note, Conveyances of Sovereign Lands Under the Public Trust Doctrine; When are They in The Public Interest?, 24 U. Fla. L. Rev. 285 (1972); Effective Judicial Intervention, 68 Mich. L. Rev. 471 (1970).

9. 1 Waters and Water Rights §52.1(D) (R. Clark, ed. 1967); Davis, Water Rights in Iowa, 41 Iowa L. Rev. 216, 229 (1956); Maloney & Plager, Florida's Lakes: Problems in a Water Paradise, 13 U. Fla. L. Rev. 1, 52-54 (1960); Humphreys Mexia Co. v. Arseneaux, 116 Tex. 603, 297 S.W. 225 (1927); Doemel V. Jantz, 180 Wis. 225, 193 N.W. 393 (1923). These rights are also known as "littoral" rights where a natural lake or pond is involved. 56 Am. Jur., Waters §282 (1947).

10. A stream flows in a particular direction, possesses a definite channel, bed, banks or sides, and discharges into some other body of water. Piper v. Hawley, 179 Cal. 10, 175 P. 417 (1918); Yaskill v. Thibault, 273 Mass. 266, 173 N.E. 504 (1930); McGill v. Card-Adams Co., 154 Neb. 332, 47 N.W.2d 912 (1951): Note, Acquisition of the Right to Use Water, 29 Tulane L. Rev. 554, 555 (1955). Kentucky law is substantially in accord with this definition. KRS 151.100(4) (1974); Morgan v. Morgan, 205 Ky. 545, 266 S.W. 35 (1924); Winters v. Berea College, 349 S.W.2d 357 (Ky. 1961).

11. 3 H. Farnham, Water and Water Rights §§827b, 838 (1904); but see Evans, Riparian Rights in Artificial Lakes and Streams, 16 Mo. L. Rev. 93 (1951).

12. Maloney & Plager, Diffused Surface Water: Scourge of Bounty?, 8 Nat. Res. J. 72, 108 (1968). KRS 151.100(5) (1975) defines diffused surface water as "water shich comes from falling rain or melting snow or ice, and which is diffused over the surface of the ground, or which temporarily flows vagrantly upon or over the surface of the ground as the natural elevations and depressions of the surface of the earth may guide it, until such water reaches a stream or watercourse".

13. F. Maloney, S. Plager & F. Baldwin, Water Law and Administration--The Florida Experience §21.2 (1968).

14. 1 W. Hutchins, Water Rights Laws in the Nineteen Western States 137 (1971); Maricopa County M.W.C. Dist. v. Southwest Cotton Co., 39 Ariz. 65, 73, 4 P.2d 369 (1931).

15. Plamer v. Railroad Comm'n, 167 Cal. 163, 168, 138 P. 997 (1914),

16. Harris v. Norfolk & Western R., 153 N.C. 542, 69 S.E. 623 (1910); City of Syracuse v. Stacy, 169 N.Y. 231, 62 N.E. 354 (1901); Carpenter v. Gold, 88 Va. 551, 14 S.E. 329 (1892).

17. Lawrie v. Silsby, 76 Vt. 240, 56 A. 1106 (1904).

18. Hanks, The Law of Water in New Jersey, 22 Rutgers L. Rev. 621, 628-29 (1968).

19. Kinyon, What Can a Riparian Proprietor Do?, 21 Minn. L. Rev. 512, 527 (1937).

20. Evans v. Merriweather, 4 Ill. 492 (1842).

21. Meng v. Coffee, 67 Neb. 500, 93 N.W. 713 (1903); Crawford Co. v. Hathaway, 67 Neb. 325, 93 N.W. 781 (1903); Hough v. Porter, 51 Ore. 318, 98 P. 1083 (1909); Salem Mills Co. v. Lord, 42 Ore. 82, 69 P. 1033, 70 P. 832 (1902); Martin v. Burr, 111 Tex. 57, 228 S.W. 543 (1921).

22. 6A American Law of Property §28.57 (Casner, ed. 1952); Buescher, Appropriation Water Law Elements in Riparian Doctrine States, 10 Buffalo L. Rev. 448, 452 (1961); Canton v. Shock, 66 Ohio St. 19, 63 N.E. 600 (1902); Spence v. McDonough, 77 Iowa 460, 42 N.W. 371 (1889); Rilbert v. Dechert, 22 Pa. Super, 362 (1903).

23. Harnsberger, Prescriptive Water Rights in Wisconsin, 1961 Wis. L. Rev. 47, 51.

24. Prentice v. Geiger, 74 N.Y. 341 (1878); Neilson v. poner 46 Wash. 14, 89 P. 155 (1907); Pennsylvania R.R. v. Miller, 112 Pa. St. 34, 3 A. 780 (1886); Watkins Land Co. v. Clements, 98 Tex. 578, 86 S.W. 733 (1905); Lone Tree Ditch Co. v. Cyclone Ditch Co., 26 S.D. 307, 128 N.W. 596 (1910).

25. Harvey Realty Co. v. Wallingford, 111 Conn. 352, 150 A. 60 (1930); Robertson v. Arnold, 182 Ga. 664, 186 S.E. 806 (1936); Roberts v. Martin, 72 W. Va. 92, 77 S.E. 535 (1913); Note, Development of Riparian Law in Alabama, 12 Ala. L. Rev. 155, 158 (1959).

26. Guynn v. Wabash Water & Light Co., 181 Ind. 486, 104 N.E. 849 (1914); Note, Water Rights in Indiana, 32 Ind. L. J. 39, 42 (1956).

27. Teass, Water and Water Courses, 18 Va. L. Rev. 223, 236 (1932).

28. Restatement of Torts (2d) §850A, scope note, Tenative Draft No. 17 (1971).

29. Only Georgia, New Jersey, Pennsylvania and West Virginia expressly adhere to the natural flow doctrine, Robertson v. Arnold, 186 S.E. 806 (Ga. 1936); McCord v. Big Brothere Movement, Inc., 120 N.J. Eq. 446, 185 A. 480 (1936); Plamer Water Co. v. Lehighton Water Supply Co., 280 Pa. 492, 124 A. 747 (1924); McCausland v. Jarrell, 136 W. Va. 569, 68 S.E. 29 729 (1951).

30. In spite of this, the natural flow and reasonable use rules often tend to become blended or confused in practice, Davis, Water Rights in Iowa, 41 Iowa L. Rev. 216, 218, n. 8 (1956).

31. 5 R. Powell, The Law of Property, para. 713 (1973); Restatement of Torts (2d) §853, comments c, d, & e, Tentative Draft No. 17 (1971).

32. Trelease, The Concept of Reasonable Beneficial Use in The Law of Surface Streams, 12 Wyo. L. J. 1, 16 (1957).

33. 6A American Law of Property, supra note 22, at §28, 55.

34. Haar & Gordon, Riparian Water Rights vs. a Prior Appropriation System: A Comparison, 38 B.U.L. Rev. 207, 240 (1958).

35. Restatement of Torts (2d) §850A, Comment d, Tentative draft No. 17 (1971).

36. Harnsberger, supra note 23, at 55.

37. Restatement of Torts (2d) §850A, comment d, Tentative Draft No. 17 (1971).

38. Note, supra note 10, at 556.

39. Although many courts have abandoned the nomenclature of the old classifications of natural and artificial use, all have recognized the existence of a preference for domestic uses.

40. Prather v. Hoberg, 24 Cal.2d 549, 150 P.2d 405 (1944).

41. Rancho Santa Margarita v. Vail, 11 Cal.2d 501, 81 P.2d 533, 560 (1938).

42. Harnsberger, supra note 23, at 60.

43. Lauer, Reflections on Riparianism, 35 Mo. L. Rev. 1, 10 (1970).

44. F. Maloney, S. Plager & F. Baldwin, Water Law and Administration -- The Florida Experience §112.1 (1968). The natural flow doctrine and the reasonable use rule relate only to private rights and duties among riparian owners. The private right to impair water quality is subject to water quality is subject to water quality control legislation at the federal state and local level.

45. Farnham, Permissible Extent of Riparian Land, 7 Land & Water L. Rev. 31 (1972).

46. 1 Kinney, The Law of Irrigation and Water Rights 789 (2d ed. 1912); Rancho Santa Margarita v. Vail, 11 Cal.2d 501, 81 P.2d 533 (1935); Levi & Schneeberger, Chain and Unity of Title Theories for Delineating Riparian Lands: Economic Analysis as an Alternative to Case Precedent, 21 Buffalo L. Rev. 439 (1972).

47. Title Ins. & Trust Co. v. Miller & Lux, 183 Cal. 71, 190 P. 433 (1920); 5 R. Powell, supra note 31, at para. 714.

48. Anaheim Union Water Co. v. Fuller, 150 Cal. 327, 88 P. 978 (1907).

49. Watkins Land Co. v. Clements, 98 Tex. 578, 585, 86 S.W. 733, 735 (1905); Yearsley v. Carter, 149 Wash. 285, 270 P. 804 (1928).

50. Waite, Beneficial Use of Water in a Riparian Jurisdiction, 1969 Wis. L. Rev. 864, 872.

51. Boehmer v. Big Rock Irrigation District, 117 Cal. 19, 48 P. 980 (1897); Yearsley v. Carter, 149 Wash. 285, 270 P. 804 (1928).

52. Davis, supra note 49, at 680, n.203.

53. Watkins Land Co. v. Clements, 98 Tex. 578, 86 S.W. 733 (1905).

54. Weil and Kinney treat the government survey rule as a separate test. 1 S. Wiel, Water Rights in the Western United States §§770-71 (2d ed. 1911); 1 Kinney, supra note 46, at §464. Farnham states that, except in a most unusual case, the same result would occur under either test. Farnham, supra note 45, at 53, 75. Levi and Schneeberger distinguish between the two tests, but refer to the government survey test as the source of title test and refer to the source of title test as the chain of title test. Levi & Schneeberger, supra note 46, at 441-42.

55. Farnham, supra note 45, at 43-44.

56. Levi & Schneeberger, supra note 46, at 442.

57. Slack v. Marsh, 11 Phila. 543 (C.P. Pa. 1875); Clark v. Allaman, 71 Kan. 206, 80 P. 571 (1905); Jones v. Conn., 39 Ore. 30, 64 P. 855 (1901); Restatement of Torts §843, Comment c (1939).

58. Sparks Mfg. Co. v. Town of Newton, 57 N.J. Eq. 367, 41 A. 385 (1898); rev'd on other grounds, 60 N.J. Eq. 399, 45 A. 596 (E & A 1900); see also 1 Kinney, supra note 46, at 789; 6 A American Law of Property, supra note 22, at §28.55.

59. Farnham supra note 45, at 57.

60. Comment, 20 Mich. L. Rev. 123 (1921); Johnson & Knippa, Transbasin Diversion of Water, 43 Tex. L. Rev. 1035, 1036 (1965). According to Professor Waite the source of title and one version of the unity of title tests are not concerned with the watershed limitation. The other version adds to the unity of title test the requirement that the land lie within the watershed of the watercourse to which it is riparian. Waite, supra note 50, at 873; Sayles v. City of Mitchell, 60 S.D. 592, 245 N.W. 390 (1932). Professor Clark declares this to be the general rule. 1 Waters and Water Rights, supra note 9, at §53.5 (c). On the other hand, Professor Casner contends that the unity of title definition without the watershed limitation is the general rule. 6 A American Law of Property, supra note 22, §28.55.

61. Hudson v. West, 47 Cal.2d 823, 306 P.2d 807 (1957); Clark v. Allaman, 71 Kan. 206, 80 P. 571 (1905); Sayles v. City of Mitchell, 60 S.D. 592, 245 N.W. 390 (1932); Watkins Land Co. v. Clements, 98 Tex. 578, 86 S.W. 733 (1905); Miller v. Baker, 68 Wash. 19, 20, 23, 122 P. 604-05 (1912).

62. McCarter v. Hudson County Water Co., 70 N.J. Eq. 695, 65 A. 489, 494-95 (E & A 1906); Stratton v. Mt. Hermon Boy's School, 216 Mass 83, 103 N.E. 87 (1913); Town of Gordonsville v. Zinn., 129 Va. 542, 106 S.E. 508, 511 (1921); Virginia Hot Springs Co. v. Hoover, 143 Va. 460, 130 S.E 408 (1925); Harrell v. City of Conway, 271 S.W.2d 924, 927 (Ark. 1954); Sturtevant v. Ford, 280 Mass. 303, 182 N.E. 560 (1932); Comment, 34 N. Car. L. Rev. 247, 247-48 (1959).

63. 2 H. Farnham, The Law of Waters and Water Rights 1571 (1904).

64. Note, Limitation on Diversions form the Watershed: Riparian Roadblock to Beneficial Use, 23 S.Car. L. Rev. 43 (1971); Anaheim Union Water Co. v. Fuller, 150 Cal. 327, 88 P. 978 (1907). Most industrial and municipal uses return up to 90 percent of the water diverted; some water used for irrigation is also returned. Johnson & Knippa, supra note 60, at 1057.

65. Murphy, A Short Course on Water Law for the Eastern United States, 1961 Wash. U.L.Q. 93, 94-95.

66. Farnham, Improvement and Modernization of New York Water Law Within the Framework of the Riparian System, 3 Land and Water L. Rev. 377, 413 (1968); Comment, 62 W. Va. L. Rev. 1, 11 (1959); Comment, 47 Iowa L. Rev. 549, 557 (1962); Note, The Riparian Rights Doctrine in South Carolina, 21 S. Car. L. Rev. 757, 769 (1969).

67. Marquis, Freeman & Heath, Movement for New Water Rights Laws, 23 Tenn. L. Rev. 797, 832 (1955).

68. New Jersey, Massachusette, Virginia, and Arkansas. See cases cited at note 62.

69. Gillis v. Chase, 67 N.H. 161, 31 A. 18 (1891); Lawrie v. Silsby, 82 Vt. 505, 74 A. 94 (1909).

70. 6A American Law of Property, supra note 22, §28.56; Waite, supra note 50, at 875.

71. 5 R. Powell, supra note 31, at para. 712; Metropolitan Util Dist. v. Merritt Beach Co., 179 Neb. 783, 140 N.W.2d 626 (1966); Jones v. Conn., 39 Ore. 30, 64 P. 855 (1901); Texas Co. v. Burkett, 117 Tex. 16, 296 S.W. 273 (1927).

72. Lawry v. Sillsby, 82 Vt. 505, 74A. 94 (1909); Poire v. Serra, 106 A.2d 39 (N.H. 1954); Smith v. Stanoling Oil & Gas Co., 197 Okla. 499, 172 P.2d 1002 (1946); Farnham, supra note 66, at 413.

73. Note, 34 N. Car. L. Rev. 247, 251 (1956).

74. Trelease, Coordination of Riparian and Appropriative Rights, 33 Tex. L. Rev. 24, 56-57 (1954); 3 H. Farnham, supra note 11, at 2190.

75. Winchell v. Clark, 68 Mich. 64, 73, 35 N.W. 907, 913 (1888); Texas Co. v. Burkett, 117 Tex. 16, 25, 296 S.W. 273, 276 (1927); Hite v. Town of Luray, 175 Va. 218, 224, 8 S.E.2d 369, 371 (1940).

76. Davis, supra note 49, at 683.

77. Young v. City of Asheville, 241 N. C. 618, 86 S.E.2d 408 (1955); 5 R. Powell, supra note 31, at para. 719.

78. Duckworth v. Watsonville Water & Light Co., 158 Cal. 206, 110 P. 927 (1910); Texas Company v. Burkett, 117 Tex. 16, 296 S.W. 273 (1927); Note, supra note 73, at 25

79. Stoner v. Patten, 132 Ga. 178, 63 S.E. 897 (1909); Roberts v. Martin, 72 W. Va. 92, 77 S.E. 535 (1913); Heilbron v. Fowler Switch Canal Co., 75 Cal. 426, 432, 17 P. 535, 538 (1888); Kennebunk v. Maine Turnpike Authority, 147 Me. 149, 84 A.2d 433 (1951); Contra Gillis v. Chase, 67 N.H. 161, 31 A.18 (1891); Lawrie v. Silsby, 82 Vt. 505, 74 A.94 (1909); Note, Are Water Rights Marketable in Wisconsin? 1966 Wis. L. Rev. 942, 946, n. 18.

80. Pernell v. Henderson, 220 N.C. 79, 16 S.E.2d 449 (1941); Town of Purcellville v. Potts, 179 Va. 514, 19 S.E.2d 700 (1942); Webster v. Harris, III Tenn. 668,69 S.W. 782 (1902); Ziegler, Acquisition and Protection of Water Supplies by Municipalities, 57 Mich. L. Rev. 349, 357 (1954); Marquis, Freeman & Heath, supra note 67, at 813.

81. Buescher, Appropriation Water Law Element in Riparian Doctrine States, 10 Buffalo L. Rev. 448, 445 (1961).

82. Canton v. Shock, 66 Ohio St. 19, 63 N.E. 600 (1902); St. Anthony Falls Water Power Co. v. St. Paul Water Commissioners, 56 Minn. 485, 58 N.W. 33 (1894); Grogan v. Brownwood, 214 S.W. 522 (Tex. 1919); Trelease, The Concept of Reasonable Beneficial Use in the Law of Surface Streams, 12 Wyo. L. J. 1, 4 (1965).

83. Davis, supra note 49, at 684.

84. Waite, supra note 50, at 875; Sibbett v. Babcock, 124 Cal. App. 567, 269 P.2d 42 (1954); S.O. & C. Co. v. Ansonia Water Co., 83 Conn. 611, 78 A. 432 (1910); Manier v. Myers & Johns, 43 Ky. 514 (1844); Harmon v. Carter 59 S.W. 656 (Tenn. 1900); Martin v. Burr, III Tex. 57, 228 S.W. 543 (1921); Kirk v. Hoge, 122 Va. 519, 97 S.E. 116 (1918); Town of Gordonsville v. Zinn, 129 Ba. 542, 106 S.E. 508 (1921).

85. Northern California Power Co. v. Flood, 186 Cal. 301, 199 P. 315 (1921); 5 R. Powell, supra note 31, at para. 720.

86. Buescher, supra note 81, at 452.

87. Harnsberger, supra note 23, at 48-49.

88. Shellow v. Hagen, 9 Wis.2d 506, 101 N.W.2d 694 (1960).

89. Harnsberger, supra note 23, at 61.

90. Stewart v. White, 128 Ala. 202, 30 So. 526 (1901); Moal v. Boyd, 116 Tex. 82, 286 S.W. 458 (1926); Rhoades v. Barnes, 54 Wash. 145, 102 P. 884 (1909).

91. Illinois Steel Co. v. Bilot, 160 Wis. 218, 151 N.W. 258 (1915).

92. At common law there was no fixed period of perscription but the courts by analogy followed the statute of limitations for adverse possession. 2 American Law of Property, supra note 22, at §8.52. The common law period is twenty years, but in most states the prescriptive period is determined by statute.

93. Alta Land & Water Co. v. Hancock, 85 Cal. 219, 24 P. 645 (1890); Harmon v. Carter, 59 S.W. 656 (Tenn. 1900).

94. Harnsberger, supra note 23, at 65.

95. Illinois Steel Co. v. Bilot, 109 Wis. 418, 446, 85 N.W. 402, 408 (1901).

96. 5 R. Powell, supra note 31, at para. 720.

97. Anaheim Water Co. v. Semi-Tropic Water Co., 64 Cal. 185, 30 P. 623 (1883); Preston v. Clark, 238 Mich. 632, 214 N.W. 226 (1927); Schulenberg v. Zimmerman, 86 Minn. 70, 90 N.W. 156 (1902); Hanks, supra note 18, at 630.

98. Smith v. McElderry, 220 Ala. 342, 124 Sl. 896 (1929); Tinker v. Bessel, 213 Mass. 74, 99 N.E. 946 (1912).

99. 56 Am. Jur., Waters §337 (1947); 93 C.J.S., Waters §185 (1956); contra Burkman v. City of New Lisbon, 246 Wisc. 547, 19 N.W.2d 311 (1945).

100. Harnsberger, supra note 23, at 78-79.

101. Burkman v. City of New Lisbon, 246 Wis. 547, 19 N.W.2d 311 (1945).

102. Danielson, Ground Water in Nebraska, 35 Neb. L. Rev. 17, 19 (1955).

103. C. Meyers & D. Tarlock, Water Resources Management 554 (1971).

104. Maloney & Plager, Florida's Ground Water: Legal Problems in Managing a Precious Resource, 21 U. Miami L. Rev. 751, 754 (1967).

105. Thomas, Underground Sources of Our Water, U.S.D.A., The Yearbook of Agriculture - 1955 (House Doc. No. 32, 84th Cong., 1st Sess.) at 63.

106. Sorenson, Ground Water -- The Problems of Conservation and Interferences, 42 Neb. L. Rev. 765 (1963).

107. The water table may coincide approximately with the top of the zone of saturation in coarse gravel but is likely to be several inches or even several feet below it in finer grained materials, because capillary rise results in the saturation of a zone above the water table known as the capillary fringe.

108. Maloney & Plager, supra note 104, at 756.

109. Hanks & Hanks, The Law of Water in New Jersey: Groundwater, 24 Rutgers L. Rev. 621, 629 (1970).

110. F. Maloney, S. Plager & F. Baldwin, Water Law and Administration -- The Florida Experience §51.1 (1968).

111. Water enters the aquifer in several ways. Streams may connect beneath the surface with porous layers of earth. By this means, means can flow directly into tie aquifying strata. Streams may also connect on the surface with the aquifer by passing over areas which have defined vertical, as well as horizontal, water-bearing strata. Water filters down throgy these vertical areas and is transmetted to the horizontal layers at their point of contact. Finally, rain may be a source of supply. Rain waters may be absorbed in those areas of the basin where porous materials extend to the surface of the land. The water then percolates downward to the point of connection with the horizontal layers and is then transmitted through the basin structure. Reis, Legal Planning for Ground Water Production, 38 So. Calf. L. Rev. 484, 485 (1965).

112. C. Meyers & D. Tarlock, supra note 103, at 562.

113. Id.

114. Drieger & Banks, Ground Water Basin Management, 50 Calf. L. Rev. 56, 57 (1962).

115. Critchlow, Policies and Problems in Controlling Ground Water Resources, 40 J. Am. Water Works Ass'n, 775 (1948).

116. C. Meyers & D. Tarlock, supra note 103; at 561.

117. Hanks & Hanks, supra note 109, at 629.

118. See Generally, Bagley, Water Rights Law and Public Policies Relating to Ground Water "Mining" in the Southwestern States, 4 J.L. & Econ. 144 (1961).

119. Davis, Groundwater Pollution: Case Law Theories for Relief, 39 Mo. L. Rev. 117 (1974).

120. 93 C.J.S. Waters §86 (1956).

121. Canada v. City of Shawnee, 179 Okla. 53, 64 P.2d 694 (1937); Olson v. City of Wahoo, 124 Neb. 802, 8110, 248 N.W. 304, 308 (1933); 2 S. Weil, Water Rights in the Western-States §1077 (3d ed. 1911); Danielson, supra note 203, at 21; McHenrie, The Law of Underground Water, 13 Rocky Mt. L. Rev. 1, 3 (1940).

122. Gagnon v. French Lick Springs Hotel Co., 163 Ind. 687, 72 N.E. 849 (1904); Evans v. City of Seattle, 182 Wash. 450, 47 P.2d 984 (1935); Note, Water :aw -- Ground Water Rights in Missouri -- A Need for Clarification, 37 Mo. L. Rev. 357, 358 (1972); Cross, Groundwaters in the Southeastern States, 5 S.C.L.Q. 149 (1952); Kirkwood, Appropriation of Percolating Water, i Stan. L. Rev. 1, (1948); Comment, The Law of Underground Water: A Half-Century of Huber v. Merkel, 1953 Wis. L. Rev. 491, 499; Hanks & Hanks, supra note 109, at 626.

123. Ryan v. Quinlan, 45 Mont. 521, 124 P. 521, 516 (1912); contra Safranck v. Town of Limon, 123 Colo. 330, 228 P.2d 975 (1951).

124. Collins v. Chartiers Valley Gas Co., 131 Pa. 143, 18A. 1012 (1890); Crescent Mining Co. v. Silver King Mining Co., 17 Utah 444, 54 P. 244 (1898); Hayes v. Adams, 109 Ore. 51, 218 P. 933, 935 (1923); contra Maricopa County Municipal Conservation Dist. No. 1 v. Southwest Cotton Co., 39 Ariz. 65, 4 P.2d 369, 377 (1931), modified in other respects, 39 Ariz. 367, 7 P.2d 254 (1932).

125. Clinchfield Coal Corp. v. Compton, 148 Va. 437, 446, 139 S.E. 308, 311 (1927); see also Hanks & Hanks, supra note 109, at 628.

126. Hinton v. Little, 50 Idaho 371, 375, 296 P. 582, 583 (1931); Kan. Gen. Stat. Ann. §82a-702, 703 (1969); Ore. Rev. Stat. §537.515(3) (1973); N.D. Code Ann. §61-01-01 (1960).

127. Hanks & Hanks, supra note 109, at 627.

128. Stoner v. Patten, 132 Ga. 178, 63 S.E. 897 (1909); Edwards v. Haeger, 180 Ill. 99, 54 N.E. 176 (1899).

129. Roath v. Driscoll, 20 Conn. 533 (1850); Gagnon v. French Lick Springs Hotel Co., 163 Ind. 687, 72 N.E. 849 (1904); Greenleaf v. Francis, 35 Mass. (18 Pick) 117 (1836); Wheatley v. Baugh, 25 Pa. 528 (1855); Rose v. Sacony - Vacuum Corp., 54 R.I. 411, 173 A. 627 (1934); St. Amand v. Lehman, 120 Ga. 253, 47 S.E. 949 (1904).

130. 12 M.&W. 324, 152 Eng. Rep. 1223 (Ex. Ch. 1842). See also Chasemore v. Richards, 2 H. & H. 168 (1857), aff'd 7 H.L. Cas. 349, 11 Eng. Rep. 140 (1859).

131. 12 M. & W. at 350, 152 Eng. Rep. at 1233. This some sense of inadqueacy of knowledge was expressed in other cases. Chatfield v. Wilson, 28 Vt. 49 (1855); Ewart v. Graham, 7 Hil. 349, 11 Eng. Rep. (1859); Note, Wisconsin Ground Water Law -- A New Era, 1957 Wis. L. Rev. 309, 324.

132. 5 R. Powell, The Law of Real Property para. 725 (1974).

133. Note, Percolating Water Law -- Theories of Ownership and Problems of Distribution in the Western United States, 30 N.Y.U.L. Rev. 1419, 1422 (1955).

134. First District No. 1 v. Graniteville Spring Water Co., 103 Vt. 89, 91, 152 A. 42, 43 (1930); see also Davis v. Spaulding, 157 Mass. 431, 435, 32 N.E. 650, 651 (1892) where the court stated that "Water percolating underground . . . is in law a part of the land itself, in the same sence that earth, gravel, stones, or minerals of any king are constituted parts of the land, in the same way, and to the same extent, that the other constituent parts of his land are his absolute property so that he has the same right to . . . use it on the land or elsewhere, that he has to . . . use or sell sand, soil, clay, ores, or any other constitutent part of the land."

135. Maloney & Plager, supra note 104, at 768.

136. Note, supra note 133, at 1422.

137. Kirkwood, supra note 122, at 19.

138. Roath v. Driscoll, 20 Conn. 532 (1850); Haldeman v. Bruckhart, 45 Pa. 514 (1863); Saddler v. Lee, 66 Ga. 45 (1879); Kinnard v. Standard Oil Co., 89 Ky. 468, 12 S.W. 937 (1890); New Albany & S.R.R. v. Pererson, 14 Ind. 112 (1860); Chase v. Silverstone, 62 Mw. 175 (1873); Wilson v. City of New Bedford, 108 Mass. 261 (1871). The rule seems to have arisen independently in Massachusetts. See Greenleaf v. Francis, 35 Mass. (18 Pick.) 117 (1836).

139. E.g. Edwards v. Haeger, 180 Ill. 99, 54 N.E. 176 (1899); Logan Gas Co. v. Glasgo, 122 Ohio St. 126, 170 N.E. 874 (1930); White River Chair Co. v. Connecticut River Power Co., 105 Vt. 24, 162 A. 859 (1932). Professor Powell estimates that about one quarter of the states still adhere to the absolute ownership doctrine. 5 R. Powell, supra noe 132, at para. 725.

140. McHendrie, The Law of Underground Water, 13 Rocky Mt. L. Rev. 1, 5 (1940).

141. Although the American rule is often called the reasonable use rule, it should not be confused with the surface water reasonable use rule.

142. Harnsberger, Deltjen & Fischer, Ground water: From Windmills to Comprehensive Public Management, 52 Neb. L. Rev. 179, 205 (1973).

143. Barclay v. Abraham 121 Iowa 619, 96 N.W. 1080 (1903); Stillwater Water Co. v. Farmer, 89 Minn. 58, 93 N.W. 907 (1903); Comment, Note 226, at 503.

144. Hanks & Hanks, supra note 109; 5 R. Powell, supra note 132, at para. 726.

145. Pence v. Carney, 58 W. Va. 296, 52 S.E. 702 (1905); Drummond v. Whitoak Fuel Co., 104 W. Va. 368, 140 S.E. 57 (1927); Sloss-Sheffield Steel & Iron Co. v. Wilker, 231 Ala. 511, 165 So. 764 (1936); Board of Supervisors v. Mississippi Lumber Co., 80 Miss. 535, 31 So. 905 (1902). Note, supra note 133, at 1423; Lugar, Water Law in West Virginia, 66 W. Va. L. Rev. 191, 214 (1964); Cross, supra note 122, at 150-51. It cannot be said with certainty that the courts would find any use reasonable if it actually resulted in a substatntial injury to a neighboring landowner's ground water supply. In nearly all the cases applying the reasonable use rule, the percolating water was extracted for sale or use at distant points. No case was found in which both parties were using the water on overlying land for a beneficial purpose and the court applied the percolating water reasonable use rule in such a way that one party was allowed to use the water to the complete deprivation of

another's supply. Maloney & Plager, supra note 104, at 770.

146. Schenk v. City of Ann Arbor, 196 Mich. 75, 163 N.W. 109, (1917); Canada v. City of Shawnee, 179 Okla. 53, 55, 64 P.2d 694, 697 (1937); Comment, supra note 226, at 500; Erickson v. Crookston Waterworks, Power & Light Co., 100 Minn. 481, 111 N.W. 391 (1907); Rouse v. City of Kinston, 188 N.C. 1, 123 S.E. 482 (1924).

147. 164 N.Y. 522, 58 N.E. 644 (1900).

148. Bassett v. Salisbury Mfg. Co., 43 N.H. 249 (1862); Stevens v. Spring Valley Water Works & Supply Co., 42 Misc. 2d 86, 247 N.Y.S.2d 503 (1964); Gagnon v. French Lick Springs Hotel Co., 163 Ind. 687, 72 N.W. 849 (1904); Barclay v. Abraham, 121 Iowa 619, 96 N.W. 1080 (1903); Sloss-Sheffield Steel & Iron Co. v. Wilker, 231 Ala. 511, 165 So. 764 (1936); Drummond v. White Oak Fuel Co., 104 W. Va. 368, 140 S.E. 57 (1927); Bayer v. Nello L. Teer Co., 256 N.C. 509, 124 S.E.2d 552 (1962); Schenk v. City of Ann Arbor, 196 Mich. 75, 163 N.W. 109 (1917); Rothrauff v. Sink Springs Water Co., 339 Pa. 129, 14 A.2d 87 (1940). Professor Powell estimates that about half of the states currently follow the American rule. 5 R. Powell, supra note 132, at para. 726.

149. 2 W. Hutchins, Water Rights in the Nineteen Western States 634 (1974).

150. Note, supra note 133, at 1423; Hanks & Hanks, supra note 109, at 640.

151. Note, supra note 133, at 1423.

152. Id.

153. 141 Cal. 116, 70 P. 663 (1902); 141 Cal. 116, 74 P. 766 (1903).

154. Note, supra note 133, at 1424.

155. 5 R. Powell, supra note 132, at para. 727.

156. Hanks 7 Hanks, supra note 109, at 637.

157. Alameda City Water Dist. v. Niles Sand & Gravel Co. Inc., 112 Cal.2d 908, 207P.2d 17 (1949); Comment, 34 Minn. L. Rev. 574 (1950). In a later case it was held that the rights of overlying users are superior to outside users even where the outside use was earlier in time. Burr v. Maclay Rancho Water Co., 154 Cal. 428, 98 P. 260 (1908). However an outside user could gain a presecriptive right through the adverse taking of nonsurplus waters. Pasadena v. Alhambra, 33 Cal.2d 908, 926, 207 P.2d 17 of Kern, 113 Cal. App2d 286, 292, 248 P.2d 117 (1952); Comment, supra note 122, at 501.

158. Hanks & Hanks, supra note 109, at 638-39.

159. Cross, supra note 122, at 151.

160. Kirkwood, supra note 122, at 6; McHendrie, supra note 121, at 6; Note, supra note 133, at 1425; 6A American Law of Property, §28.66 (Casner, ed. 1952). But see F. Maloney, S. Plager & F. Baldwin, supra note 110, at §54.2(b) (3).

161. Cason v. Florida Power Co., 74 Fla. 1, 76 So. 535 (1917); Koch v. Wick, 87 So.2d 47 (Fla. 1956); Jones v. Oz-Ark-Val Poultry Co., 228 Ark. 76, 306 S.W.2d 111 (1957); MacArtor v. Graylyn Crest III Swim Club, Inc., 187 A.2d 417 (Del. Ch. 1963); Erickson v. Crookston Water-works Power & Light Co., 105 Minn. 182, 117 N.W. 435 (1908); Nashville, C. & St. L. Ry. V. Rickert, 19 Tenn. App. 446, 89 S.W.2d 889 (1935); Meeker v. City of East Orange, 77 N.J.L. 623, 74 A. 379 (E. & A. 1909).

162. McHendrie, supra note 121, at 5; Note, supra note 133, at 1424; W. Hutchins, Selected Problems in the Law of Water Rights in the West 159 (1942); Cross, supra note 122, at 151; 2 W. Hutchins, Water Rights in the Nine-teen Western States 635 (1974).

163. Kirkwood, supra note 122, at 6.

164. Id. at 6-7; 5 R. Powell, supra note 132, at para. 727.

165. Hanks & Hanks, supra note 109, at 641.

166. McHendrie, supra note 121, at 6.

167. Note, supra note 133, at 1425.

168. Maricopa County Municipal Water Conservation Dist. v. Southwest Cotton Co., 39 Ariz. 65, 4 P.2d 369 (1931); Chandler v. Utah Copper Co., 43 Utah 479, 135 P. 106 (1913).

169. 5 R. Powell, supra note 132, at para. 743.

170. Idaho Code Ann. §§42-226 to 42-239 (Cum. Supp. 1975); Montana Rev. Code Ann. §§89-2911-2936 (Supp. 1975); N.M. Stat. Ann. §75-11-1 to 75-11-40 (1968); Okla. Stat. Ann. Tit. 82, §§1002-1014 (1970); Ore. Rev. Stat. §§537.05-537.990 (1973); Wash. Rev. Code §§90.44.010-90.44.250 (1972); Wyo. Stat. Ann. §§41-121 to 41-147 (1959).

171. Kan. Gen. Stat. §82a-707 (1969); Williams v. City of Wichita, 190 Kan. 317, 374 P.2d 578 (1962); Cities of Hesston & Sedgwick v. Smrha, 192 Kan. 647, 391 P.2d 93 (1964); N.D. Cent. Code §61-01-1 (1960); Utah Code Ann. §73-1-1 (1968); Stubbs v. Ercanbrack, 13 Utah2d 45, 368 P.2d 461 (1902); Alaska Stat. §46.15.030; 46.15.040(a), 46.15.260(5) (1971).

172. Bristor v. Cheatham, 75 Ariz. 227, 255 P.2d 173 (1953); Olson v. City of Wahoo, 124 Neb. 802, 248 N.W. 304 (1933); In. re Metropolitan Utilities Dist. of Omaha, 179 Neb. 783, 140 N.W.2d 626 (1966).

173. Houston & Texas Central Railroad v. East, 98 Tex. 146, 81 S.W. 279 (1904); Pecos County Water Control & Improv. Dist. v. Williams, 271 S.W.2d 503 (Tex. Civ. App. 1954); Corpus Christi v. Pleasanton, 154 Tex. 289, 276 S.W.2d 798 (1955); Greenhill & Gee, Ownership of Ground Water in Texas: The East Case Reconsidered, 33 Tex L. Rev. 620 (1955).

174. Note, supra note 133, at 1426.

175. Id. at 1427.

176. McHendrie, supra note 121, at 8-9.

177. Comment, Groundwater Pollution in the Western States -- Private Remedies and Federal and State Legislation, 8 Land & Water L. Rev. 537, 553-55 (1973).

178. Good v. City of Altoona, 162 Pa. 493, 29 A. 741 (1894); Tampa Waterworks Co. v. Cline, 37 Fla. 586, 20 So. 780 (1896).

179. 1A G. Thompson, Commentaries on the Modern Law of Real Property §263 (1964).

180. 5 R. Powell, supra note 132, at para. 726.

181. Nelson v. C. & C. Plywood Corp., 154 Mont. 414, 465 P.2d 314 (1970); Iverson v. Vint, 243 Iowa 949, 54 N.W.2d 494 (1952); Clark v. Sunset Hills Memorial Park, 45 Wash.2d 180, 273 P.2d 645 (1954).

182. Brown v. Lundell, 162 Tex. 83, 344 S.W.2d 863 (1961); O'Brien v. Primm, 243 Ark. 186, 419 S.W.2d 33 (1967); Adams v. Weingarten, 156 Colo. 402, 399 P.2d 774 (1965).

183. Berger v. Minneapolis Gaslight Co., 60 Minn. 296, 62 N.W. 336 (1895); Jackson v. Unites States Pipe Line Co., 325 Pa. 436, 191 A. 165 (1937); Shell Petroleum Corp. v. Blubaugh, 187 Okla. 198, 102, P.2d 163 (1940).

184. R. Krieger, R. Cushman & N. Thomas, Water in Kentucky 10 (Ky. Geol. Survey, Spec. Pub. No. 16, 1969).

185. Kentucky Water Resources Study Commission, Study Report to the Governor and 1960 Legislature 5 (1959).

186. Water Information Center, Inc., Water Atlas, plate 3 (1973).

187. U.S. Army Corp of Engineers, Kentucky Water Resources Development 15, (1975). Normal flows at the Ohio River are largely regulated by navigation structures which provide a channel depth of nine feet. This system consists of nine modern lacks and dams and eight order structures. Id. at 17.

188. Kentucky Water Resources Study Commission, supra note 1, at 62.

189. Ky. Dept. of Commerce, Natural Resources of Kentucky 28 (1967).

190. Id. at 30.

191. The Knobs Region is a subdivision which is omitted from some classifications.

192. Kentucky Water Resources Study Commission, supra note 185, at 77-79.

193. 86 Ky. 44, 5 S.W. 49 (1887).

194. 86 Ky. at 49, 5 S.W. at 51.

195. 5 S.W. at 52.

196. 229 Ky. 339, 17 S.W.2d 194 (1929).

197. 229 Ky. at 343, 17 S.W.2d at 195.

198. 297 Ky. at 565, 180 S.W.2d 278 (1944).

199. 297 Ky. at 569, 180 S.W.2d at 280.

200. Ky. Acts, ch. 247 §2 (1954). This statute, however, was repealed in 1966. See Ky. Acts, ch. 23 §39 (1966). There is no similar provision in Kentucky's present water resources legislation, K.R.S. chapter 15 (1975).

201. 294 S.W.2d 775 (Ky. 1952).

202. 131 Mich. 156, 91 N.W. 211 (1902).

203. 91 N.W. at 217.

204. 164 Ky. 674, 177 S.W. 286 (1915).

205. 164 Ky. at 684, 177 S.W. at 291.

206. 108 Ky. 357, 56 S.W. 525 (1900).

207. 254 S.W.2d 720 (Ky. 1953).

208. 200 Ky. 467, 255 S.W. 84 (1923).

209. 255 S.W. at 86.

210. 345 S.W.2d 46 (Ky. 1961).

211. Id. at 47.

212. 89 Ky. 468, 12 S.W. 937 (1890).

213. 89 Ky. at 471, 12 S.W. at 938.

214. 128 Ky. 26, 107 S.W. 203 (1908).

215. 107 S.W. at 205.

216. 200 Ky. 467, 255 S.W. 84, 86 (1923).

217. 292 Ky. 168, 166 S.W.2d 243 (1942).

218. 292 Ky. at 169, 166 S.W.2d at 294.

219. 89 Ky. 468, 166 S.W. 937 (1890).

220. 279 Ky. 239, 130 S.W.2d 22 (1939).

221. 279 Ky. at 241, 130 S.W.2d at 23.

222. 259 S.W.2d 466 (Ky. 1953).

223. Id. at 468.

224. Teass, supra note 27, at 237-38.

225. Lauer, supra note 43, at 13.

226. Davis, supra note 49, at 676.

227. Lauer, supra note 43, at 13-14.

228. Id. at 680.

229. Marquis, Freeman & Heath, supra note 67, at 832; Farnham, supra note 66, at 413.

230. Levi & Schneeberger, supra note 46, at 443-47.

231. Piper & Thomas, Hydrology and Water: What is Their Future Common Ground, 7 Water Resources and the Law 12 (1958).

232. Kirkwood, supra note 122, at 23.

233. Hanks & Hanks, supra note 109, at 645.

III. The Prior Appropriation System.

Prior appropriation, the great rival of the riparian system, is the primary method of water allocation west of the Mississippi River. There is some disagreement about the origin of prior appropriation. Some believe that it came from the Indian, Spanish and Mexican occupation of the Southwest. Another view is that it was born of necessity in the California gold mining camps.[1]

Priority and beneficial use are fundamental elements of the prior appropriation system. The doctrine provides that the appropriator who is first in time is first in right, and a prior or earlier appropriator is entitled to satisfy his water needs before a subsequent appropriator may take any.[2] Priorty of appropriation ordinarily governs the respective rights of the various users regardless of whether the senior appropriator diverts water at a point above or below the points at which junior appropriators make their diversions from the stream.[3] The junior appropriator also possesses a legally-protected water right, although it is subordinate to that of the senior appropriator. Hence, "if the person who first appropriates the waters of a stream only appropriates a part, another person may appropriate a part on the whole of the residue; and when appropriated by him, his right thereto is as perfect, and entitled to the same protection, as that of the first appropriator to the portion appropriated by him."[4]

Under prior appropriation, water rights are derived from beneficial use of the water rather than from land ownership.[5] Not only must the purpose of the use be a beneficial one, but the methods of diverting the water, conveying it to the place of use and applying it to the land or machinery for which it is appropriated, must also be as efficient as possible under the circumstances.[6]

Appropriations are fixed in terms of a definite quantity of water,[7] usually expressed in cubic feet per second for direct diversion or in acre-feet for reservoir storage.[8] Often diversions are limited to specific times of the day or week.[9] Moreover, administrative procedures for appropriating water invariably require the applicant to designate the proposed place of use for the water he desires to appropriate.[10] The place of use may be on nonriparian land.[11]

In the West water rights are perpetual in duration, although they may be lost or abandoned through nonuse.[12] For allocating water during times of shortage, or for chosing between simultaneous applications, several states have enacted statutes giving certain uses preferred status.[13] Some states also give these preferred uses condemnation powers.[14]

Nowadays, appropriative rights usually operate within a comprehensive statutory and administrative framework. In most jurisdictions permits are issued by a state administrative agency pursuant to some form of adjudicative process and the agency often has the power to deny or modify permit applications in order to protect senior appropriators or the public interest.[15]

The proponents of prior appropriation maintain that this approach provides for a more secure water right than the riparian system and thus encourages more efficient use of available water resources than its eastern rival. According to one commentator, the prior appropriation doctrine "avoids much of the uncertainty inherent in the riparian rights rule" by giving "each appropriator relative certainty as to the amount of water which will be available for his use."[16] Another commentator has characterized the prior appropriation system as one of "secure water rights that tend to encourage investment and thus lead to maximum use."[17] Certainly the more senior appropriators are assured a relatively dependable supply of water and thereby some security for capital investment.[18] Two additional features of prior appropriation promote efficient water use. One is the absence of place-of-use limitations. Since water may be used anywhere, approriators will be more likely to use it wherever it can best be used. The other feature is the beneficial use requirement. Appropriators may obtain rights only to water which they actually utilize and water rights which do not continue to be exercised beneficially will be lost under abandonment or forfeiture concepts."

The prior appropriation system is not without faults of its own. Although water rights under prior appropriation are generally regarded as more certain than those under riparianism, in many cases this is true only of senior appropriators. The rights of a junior appropriator are less secure. Since they can take only the water that remains

after the needs of senior appropriators have been satisfied, junior appropriators may be unable to obtain their full appropriation much of the time.[19] Also, there is some evidence that the prior appropriation system is inflexible and tends to freeze uses of water into a rigid pattern based upon the original appropriation pattern.[20] This is perhaps due to the fact that changes in use or location, although theoretically possible, are often difficult to make in practice.[21] In some states, for instance, changes in location of the diversion or place of use may require a new appropriation.[22] This creates rigidity because no appropriator will give up his senority in order to change his place of diversion or use. Several states have attempted to alleviate this problem by allowing such changes without loss of priority as long as existing rights are not adversely affected.[23] Unfortunately, the effect of such a change on other appropriators is often difficult (and expensive) to predict.[24] The same rule usually applies to changes of use as well. The difficulty in securing approval is especially acute when the applicant contemplates a change from a nonconsumptive to a consumptive use, thereby diminishing the rate of return flow to the stream and impairing the rights of downstream junior appropriators.[25]

Despite the beneficial use requirement, water is sometimes wasted in prior appropriation jurisdictions. Downstream sites tended to be developed first because they were easier to develop. Unfortunately, water sent down

a stream to those sites to satisfy senior rights may be subject to serious transmission losses as a result of high evaporation rates and porous stream beds.[26] Over-appropriation or the practice of "padding" and "pyramiding" water rights by obtaining permits in excess of reasonable needs is also a serious case of waste.[27] In some instances, the excess water claimed but not used has been allowed to run to waste in order to avoid forfeiture of the water right through nonuse.[28]

Finally, prior appropriation does not always protect water supply for public uses. Western courts have often refused to recognize public uses of water flows for recreational purposes as beneficial uses subject to appropriation and have subordinated these uses to the rights of private appropriators,[29] although some states have overcome this interpretation by expressly allowing appropriations for various public uses.[30]

Some commentators have urged that riparianism be replaced by the western system of prior appropriation.[31] Although nine eastern jurisdictions have considered the idea in the past thirty years,[32] only Mississippi has actually abandoned its common law system in favor of prior appropriation.[33] Such a move could create severe administrative problems. If presently exercised riparian rights were preserved, it would be very difficult to integrate the two systems into a single coherent allocative framework. The experiences of the "California rule" states in the West demonstrate the hazards of this approach.[34] On the other

hand, if riparian rights were abolished, assuming that it was constitutional to do so, and temporal priorities were established on the basis of historical use, the task of documenting such claims would be virtually impossible. The only alternative would be to allow all users to make new claims and recognize temporal priorities on the basis of date of application.[35]

At first blush prior appropriation seems better suited to the needs of the coal conversion industry than the riparian system. Water rights are more precisely defined and (at least for senior appropriators) more secure under the prior appropriation system than under common-law riparianism. The absence of place of use restrictions under prior appropriation is another advantage over the riparian doctrine.

On the other hand, as the discussion above has shown, there are a number of weaknesses in the prior appropriation system. Therefore, it will be necessary to examine a third approach, water allocation by means of a statutorily created permit system, to see if it is superior to both riparianism and prior appropriation.

1. See generally, Hutchins, Background and Modern Developments in Water Law in the United States, 2 Nat. Res. J. 416, 416-18 (1962); Clyde, Current Developments in Water Law, 53 N.W.U.L. Rev. 725, 725-28 (1959). The weight of opinion seems to favor the latter in view of the specific procedure which these customs left to us. Mining customs which based property rights on discovery and development are related to prior appropriation in which water rights depend upon the taking possession of water and putting it to geneficial use within a reasonable time. Busby, American Water Rights Law: Synopsis of Its Orgin and Some of Its Broad Trends with Special Reference to the Beneficial Use of Water Resources, 5 S.C.L.Q. 106, 117 (1952).

2. Pasadena v. Alhambra, 33 Cal.2d 908, 926, 207 P.2d 17 (1949); Bailey v. Idaho Irr. Co., 39 Idaho 354, 358, 227 P. 1055 (1924).

3. W. Hutchens, 2 Water Rights Laws in the Nineteen Western States 194 (1974); Beecher v. Cassia Creek Irr. Co., 66 Idaho 1, 154 P.2d 507 (1944).

4. Smith v. O'Hara, 43 Cal. 371, 375 (1872). This protection of the junior appropriative right may be had against unlawful acts of senior appropriators as well as by others.

5. 1A G. Thompson, Commentaries on the Modern Law of Real Property §263 (1964).

6. Hutchins, Background and Modern Developments in Water Law in the United States, 2 Nat. Res. J. 426, 417 (1962). Although the date of priority is generally established by the date of public notice or by the date of application for a permit, the appropriation is effectively secured merely by applying the water to the stated use. Davis, Australian and American Water Allocation Systems Companre, 9 B.C. Ind. & Com. L. Rev. 647, 688 (1968).

7. 5 R. Powell, The Law of Property 735 (1973).

8. 1 W. Hutchins, Water Rights Laws in the Nineteen Western States 491 (1971).

9. N.D. Cent. Code §61-04-04 (1960); Utah Code Ann. §73-3-2.

10. 1 W. Hutchings, supra note 8, at 517.

11. Davis, supra note 6, at 688.

12. Johnson, The Challenge of Prescriptive Water Rights, 30 Tex. L. Rev. 669, 673 (1952).

13. Ariz. Rev. Stat. Ann. §45-147 (Cum. Supp. 1975); Calif. Water Code §§106, 1254, 1460 (1971); Kan. Stat. Ann. §82a-707(b) (1969); Ore. Rev. Stat. §540.140; Utah Code Ann. §73-3-21 (1968); Wash. Rev. Code Ann. §90.03.040 (1972); Wyo. Stat. Ann. §41-3 (1959).

14. Colo. Const. Art XVI, §6; Neb. Const. Art. XV, §6.

15. Davis, supra note 6, at 688-89.

16. Marquis, Freeman & Heath, The Movement for New Water Rights Laws 23 Tenn. L. Rev. 797, 832 (1955).

17. Trelease, Alaska's New Water Use Act. 2 Land & Water L. Rev. 1, 36 (1967).

18. Davis, Water Rights in Iowa, 41 Iowa L. Rev. 216, 255 (1956).

19. Farnham, Improvement and Modernization of New York Water Law Within the Framework of the Riparian System, 3 Land & Water L. Rev. 377, 419-20 (1968).

20. Lauer, Reflections on Riparianism, 35 Mo.L. Rev.1, 17 (1970); Maloney, Florida's New Water Resources Law, 10 U. Fla. L. Rev. 119, 127-28 (1957).

21. Seastone & Hartman, Alternative Institutions for Water Transfers: The Experience in Colorado and New Mexico, 39 Land Econ. 31 (1963); Trelease, Policies for Water, 5 Nat. Res. J. 1, 33 (1965); Yeutter, Legal-Economic Critique of Nebraska Water Course Law, 44 Neb. L. Rev. 11, 41 (1965).

22. E.g. Neb. Rev. Stat. §45-172 (Cum. Supp. 1975); Wyo. Stat. Ann. §41-2 (1959).

23. Ariz. Rev. Stat. Ann. §45-172 (Cum. Supp. 1975); Calf. Water Code §§1700-1706 (1971); Colo. Rev. Stat. Ann. §148-a-22; Idaho Code Ann. §42-222 (Cum. Supp. 1975); Kan. Stat. Ann. §82a-708(b) (1969); Utah Code Ann. §73-3-3 (1968); Wash. Rev. Code. Ann. §90.03.380 (1972).

24. Farnham, supra note 19, at 421.

25. Davis, supra note 6, at 693-94.

26. Id. at 692; Maloney, supra note 20, at 127. But see, Trelease, The Model Water Code, The Wise Administrator and the Goddam Bureaucrat, 14 Nat. Res. J. 207, 226-27 (1974).

27. Hutchins, Background and Modern Developments in Water Law in the United States, 2 Nat. Res. J. 416, 419 (1962); Davis, supra note 6, at 690; Maloney, supra note 20, at 127; Hutchins, The Development and Present States of Water Rights and Water Policy in the United States, 37 J. Farm Econ. 866, 870 (1955).

28. National Water Commission, Water Policies for the Future 299 (1973).

29. Comment, Water Appropriation for Recreation, 1 Land & Water L. Rev. 209, 210-14 (1966).

30. E.g. Idaho Code Ann. §§67-4301-4304 (1973); Ore. Rev. Stat. §§538.110-538.300 (1974).

31. Trelease, A Model State Water Code for River Basin Development, 22 Law & Contemp. Prob. 301, 302 (1957).

32. Arkansas, Georgia, Florida, Michigan, Mississippi, North Carolina, South Carolina, Wisconsin and Virginia. See F. Maloney, R. Ausness & J. Morris, A Model Water Code 76 (1972).

33. Miss. Code Ann. §§51-3-1 to 51-3-53 (1973); Champion, Prior Appropriation in Mississippi: A Statutory Analysis, 39 Miss. L.J. 1 (1967).

34. Trelease, Coordination of Riparian and Appropriative Rights to the Use of Water, 33 Tex.L. Rev. 24 (1954); Farnham, supra note 19, at 431.

35. Davis, supra note 6, at 691.

IV. State Regulation of Consumptive Water Uses

Because water is usually plentiful in the East, the riparian system, despite its many deficiencies, has provided a satisfactory framework for water allocation. Since World War II, however, a number of states, including Kentucky, have modified the common law doctrines by legislative enactment. Although some states considered adoption of the western systems of prior appropriation, most preferred hybrid systems possessing characteristics of both riparianism and prior appropriation.

A. Consumptive Water Use Regulation in Eastern Coal-Producing States

There are twelve coal-producing states in the eastern United States. The common law riparian system is the primary water allocation mechanism in Alabama, Illinois, Ohio, Pennsylvania, Tennessee, Virginia and West Virginia. Statutory permit systems exist in the remaining coal-producing states of Indiana, Iowa, Kentucky, Maryland, and North Carolina.

1. Indiana

The 1951 Ground Water Conservancy Act gives the Department of Conservation power to restrict withdrawal of groundwater if natural replenishment is insufficient.[1] In a restricted area, users of groundwater, except cities, may not increase their use by more than 100,000 gallons per day without first obtaining a permit.[2] Indiana formerly

also had a surface water conservancy act, but this was repealed in 1963.

2. Iowa

In 1957 the Iowa Legislature passed a water rights law establishing a permit system under the control of the Natural Resources Council, administered by a Water Commissioner, and regulating rights to both surface and ground water. Though the law purports to leave unimpaired all "vested rights," it regulates both existing and unused rights to water.[3]

The Iowa law requires that all substantial uses of water be "beneficial." That term is defined to mean the application of water to a useful purpose enuring to the benefit of the water user and subject to his dominion and control.[4] Permits are issued by the Water Commission. These permits have a general limitation of ten years, and the law prohibits the diversion, storage, or withdrawal of water for most substantial uses from any natural watercourse, underground basin or watercourse, drainage ditch, or settling basin (except for ordinary household purposes and use for domestic animals) without a permit.[5] The Water Commissioner may suspend the operation of permits if necessary during an emergency, establish priorities for water distribution, and thus protect the public interest from danger.[6]

The statute directs that the standard for determining the disposition of applications is one of beneficial use to be applied in a broad manner.[7] The commissioner has not

sought to discriminate on the basis of differences among beneficial uses; if the applicant can show that his use is beneficial, he will receive a permit. The effect of this policy, along with the abundant rainfall in the state, has been that in the first ten years of operation only two applications for permits were denied. Both involved the disposition of drainage waters. Not a single application to divert, store, or withdraw water was denied during this period.[8]

3. Maryland

Maryland's permit is administered by the Department of Water Resources, which operates within the Department of Natural Resources.[9] Domestic, farming and municipal uses are exempted from regulation, as well as water uses in existence on January 1, 1934.[10] The Department may grant a permit if the proposed use provides for the greatest practicable utilization of the waters of the state and will promote the general welfare.[11] Conversely, the Department may reject any proposed use that is "inadequate, wasteful, dangerous, impracticable" or detrimental to the public interest.[12]

The permit specifies the amount of water to be used, as well as the nature and location of the proposed diversion.[13] There is no time limit on these permits, but water rights may be reduced or lost through nonuse.[14] There is no mention of transferability of permit rights in the Maryland statute.

4. North Carolina

North Carolina enacted a comprehensive permit system in 1967. The act declares that it is the policy of the state to put waters "to beneficial use to the fullest extent to which they are capable, subject to reasonable regulation."[15] The Board of Water and Air Resources is authorized to establish "capacity use areas" in any area where there is such demand for surface or ground water that regulation is necessary to protect both public and private interests.[16] The Board may adopt regulations to conserve both surface and ground water supplies in such areas and permits may be required for water uses in excess of 100,000 gallons per day.[17]

In determining whether to grant or deny an application, the Board is merely required to act in the public interest. However, section 143-215.14(h) sets forth nine guidelines to be considered by the Board in adopting rules and regulations, considering permit applications, and acting on revocations and modifications of permits. The act provides that if the applicant is able to prove that he was using water prior to the date of the declaration of a capacity use area and the Board finds that the use was "reasonably necessary," it must grant a permit as long as the use will not adversely affect existing or potential public and private uses in the area.[18] Moreover, in granting a permit, the Board is directed to consider the prior investments of any person in the land or plans made for utilizing water in connection with such land.[19]

Permits may be granted for (1) ten years, (2) the

duration of the existence of the capacity use area, or (3) the period found by the Board to be necessary for reasonable amortization of the applicant's water withdrawal or water-using facilities.[20] Although permits may be renewed, they are subject to modification or revocation upon not less than 60 days' notice to the permit holder. Water rights under the permit system are not transferable without the Board's approval.[21]

B. Consumptive Water Use Regulation in Other Eastern States

A number of other riparian jurisdictions have created consumptive use permit systems. These include Delaware, Florida, Minnesota, New Jersey, South Carolina, and Wisconsin. Of these, the Florida act is by far the most comprehensive.

1. Delaware

Delaware's water use regulation, enacted in 1966 are administered by the Department of Natural Resources and Environmental Control.[22] Both surface and ground water are covered. Existing uses are exempted from consumptive use regulation, but the act provided that "no increase in the amount of water used shall be made be a Delaware user without prior approval of the Department."[23] There are also exemptions for domestic and agricultural uses as well as some municipal uses.[24]

The time limit on the permits is uncertain and the agency may terminate any permit when the water use exercised thereunder is no longer deemed to be "reasonably beneficial."[25]

Water rights under permits may also be diminished or suspended if a water shortage or emergency is declared by the governor. In that event, water is allocated according to a priority schedule which provided that water first be used to sustain life, then to maintain health, and then to increase wealth.[26] Permit rights may be transferred with the approval of the agency.[27]

2. Florida

The Florida Water Resources Act of 1972 established an elaborate structure for the administration of water rights.[28] Primarily responsible for the implementation of the act, the Division of Interior Resources asserts broad authority over survey, research, and investigation into all aspects of water use and quality.[29] The statute also requires the Division to formulate a comprehensive state water plan.[30] There are eight criteria by which the plan is to be developed, each keyed to a different use to cover all possible water uses. The Act provides that the state water use plan cannot be adopted or modified without first publishing notice and holding a public hearing.

The Act creates five water districts divided according to natural water boundaries.[32] The governing boards of the districts are composed of nine resident members who are authorized to employ an executive director, attorneys, engineers, and staff.[33] The major function of these boards is to act on permit applications.[34] In order to issue, modify, or revoke a permit, formal procedures are required but in an emergency the board may issue orders that are to be immediately complied with. The affected party may then

require a hearing by the board.

The common-law rules of riparian rights are almost entirely negated by the 1972 act, and except for domestic use, all other uses must be by permit.[36] Existing riparian users are not entitled to permits as a matter of right but they are given a preferential right to them.[37]

Permit applications must demonstrate that the proposed use is a reasonable-beneficial one, will not interfere with any presently existing legal use, and is consistent with the public interest.[38] "Reasonable-beneficial use" is defined to mean "the use of water in such quantity as is necessary for economic and efficient utilization for a purpose and in a manner which is both reasonable and consistent with the public interest."[39]

The act created the following permit classifications: (1) consumptive use (2) wells (3) storage and impoundments (4) wast discharges (5) discharges into aquifiers, The application must contain the identity of the applicant, source of the water supply, quantity applied for, nature of proposed use, and point of diversion.[40] If the use is to be less than 150,000 gallons per month, no hearing is required if no objections are filed.[41]

To accommodate competing applications, the Department of Natural Resources can modify the applications to minimize conflict.[42] If two applications are otherwise equal, perference is to be given to renewal applications over initial applications.[43]

A permit may be issued for any period of time up to twenty years, but a permit may be issued for fifty years if the permittee is a municipailty, public works, or public service corporation.[44] Also, a permit may be modified or renewed prior to the expiration date. In addition, the act provides for permit revocation in five situations:[45] (1) when the permittee makes a materially false statement on the application, (2) wilful violation of permit conditions, (3) violation of any provision of the act, (4) non-use for two consecutive years, (5) permittee consent.

The Department is to formulate a plan of classificatio to determine which users are to be given priority of use during periods of water shortage.[46] "Shortage" within the meaning of the act exists when there is insufficient water to satisfy permit requirements, or when reduction in water use is necessary to protect water sources from serious harm

3. Minnesota

In Minnesota, the Commission of Natural Resources supervises the use and allocation of surface and underground water.[48] Under the Minnesota statute any person, including state agencies, must acquire a permit to use water, unless the use is specifically exempted.[49]

Riparian rights existing at the time of the statutory enactment are specifically exempted from permit requirement Further exempted is any domestic use serving less then twenty-five persons, any beneficial use in existence on July 1, 1973 outside a municipality, and any beneficial use

in existence prior to July 1, 1959 within a municipal boundary.[51]

To acquire a permit a prospective user must submit an application to the Commission; a copy must also be sent to the director of the watershed district.[52] Acting within twenty days, the commissioner must grant a permit if the use is practical and in the public interest.[53] A permit can be rejected if the proposed use would be wasteful or dangerous.[54] A hearing is not mandatory unless an interested party files notice demanding one.[55]

Any party in interested may appeal the commissioner's decision to the county court within thirty days.[56] The appeal is tried on the record; the commissioner's findings of fact are prima facie evidence of the matter therein, and his orders are deemed prima facie reasonable.[57]

Since state waters may not be utilized without a permit, the legislature has established a category of water use priorities. Rules governing the allocation among potential users are to be enacted in 1975.[58] The stated priorities upon which the rules are to be based are as follows: first priority, domestic supply excluding municipal but including agricultural irrigation involving consumption of less than 10,000 gallons per day; second, any use that involves consumption of less than 10,000 gallons per day; third, power production; fourth, industrial and commercial uses; fifth, other use involving

consumption of more than 10,000 gallons per day.[59]

Although statutory provisions exist for determining use preference among competing applicants there is no definition of the rights of permittee as against the rights of a riparian owner; and there is no mechanism for allocation of the resource in times of scarcity.

4. New Jersey

New Jersey's comprehensive permit system, applicable to both surface and ground water is administered by the Water Policy and Supply Council.[60] The regulations, however, only apply to those areas of the state where the Council determines that the surface or ground water resources need to be protected.[61] In areas where the permit system has been implemented, no person may divert or use surface water in excess of 70 gallons per minute for any private use, other than a reasonable domestic use, without obtaining a permit.[62] A permit is also required in such areas for extraction of ground water in excess of 100,000 gallons per day.[63] However, existing surface water uses are given priority and existing ground water uses are exempted from the permit requirement.[64]

Surface water permits may be granted for any period up to 25 years.[65] There are no provisions for revocation or transfer of permits, or for suspension of water rights during periods of water shortage.

5. South Carolina

There are no consumptive use controls for surface water in South Carolina, but since 1969 the Water Resources Planning and Coordinating Commission has regulated ground

water.[66] The Commission is authorized to establish "capacity use areas" and require permits in such areas for water users who withdraw more than 100,000 gallons per day.[67] Permits for nonconsumptive uses may be granted without a hearing, but one is required where a consumptive use is involved.[68]

In determining whether to grant a permit for a consumptive use, the commission may consider the number of persons using an aquifer and the extent, object, and necessity of their withdrawals; the nature and size of the aquifer; any physical and chemical impairment of the water which may affect its use for other purposes, including public use; the severity and duration of such impairment; the injury to the public health, safety, or welfare which might result if such impairment were not abated; the kinds of activities to which the various uses are related; the importance and necessity of the claimed uses; the effect upon other watercourses or aquifers; and "any other relevant factors."[69]

Permits may issued for up to 10 years, or the duration of the existence of the capacity use area, or a period sufficient to amortize the applicant's water withdrawal and water use facilities.[70] Although permits may be renewed, there are no specific standards connected with renewals. The Commission may also modify or revoke any permit after appropriate notice, provided that such action is in the public interest.[71] Permits are transferable with the approval of the Commission and there are

no special provisions for dealing with temporary water shortages.[72]

6. Wisconsin

In Wisconsin, the Division of Environmental Protection, a part of the state Natural Resources Board, is the primary agency for administering state water laws, including water quality control, irrigation permits, and permits for diversion. The legislature enacted a limited permit system in 1935 after a severe drought.[74] The act was amended in 1967 and 1969, and provided for diversion of surplus water from a stream to maintain the water level of any navigable lake or stream. Non-surplus water may be diverted for purposes of agriculture or irrigation "but no water shall be diverted to the injury of public rights in the stream or to the injury of any riparian located on the stream" unless consent is given.[75]

A permit is required for either agriculture or irrigation.[76] The application must state times of diversion, amounts, and place of diversion.[77] The permit must be issued if surplus water exists, or if there is no surplus water, when affected riparians have consented.[78] The Department is required to review annually all permits issued since 1957. A permit may be revoked if the permitted use if found to be detrimental to other riparians.[79]

Iron ore mining has been declared to be in the public interest, and water can be diverted for this consumptive use because it is a "public purpose", and a permit must be applied for.[80] The water can be transported to another

watershed where the operations occur.[81] Further, in passing on the application, the Department weighs the public rights in the stream against the public benefits from the mining. The legislature has further declared that persons engaged in mining must be assured of adequate and continuous supplies of water before large capital investments are made for mills or plants.[82] In passing upon an application for a permit for the diversion of consumptive use of water for mining, the Department must weigh the public rights in the stream which may be adversely affected, against the public benefits which will result from the proposed operation outweigh the public rights in the stream, the permit is to be issued. Only riparians within the area of prospective injury are entitled to notice and hearing on the mining water use application.[83] An injured riparian owner may contest the issuance at the hearing, or he may within three years bring an action of inverse condemnation.[84] The consent of riparian owners is not, however, required in order to have a permit issued. In addition, applicant is entitled to condemn adversely affected riparian rights.[85]

C. The Constitutionality of State Consumptive Water Use Regulations

The primary goal of any shift in water law would be to fully control water resources to acheive maximum beneficial use by creating an administration and permit system to regulate water use, impoundments, and to control flooding.

The major problem lies not in organizational structure and procedure, however, but in the constitutional objection to taking water use property rights from existing riparian users without just compensation. Precisely, water regulation is either a taking, constitutionally requiring compensation, or it is a valid exercise of state police power, in which case no compensation is required. Although every attempt to regulate use of property is in a sense a "taking" and "necessarily speaks as a prohibition,"[86] police power measures relating to the use of property tend to impair or destroy those interests included in the general concept of property.[87] State attempts to abrogate or alter the existing riparian doctrine of water use rights have met with stiff opposition, both at public forums and in the courts, and it can only be assumed that the same opposition will accur in any other state attempting a similar change.[88]

1. Riparian Rights as Property

Of particular concern in any attempt to establish an understanding of the relationship between the police power and riparian rights is the property nature of

riparian use itself. A riparian right to water is a right to the use of the water, not a right to the corpus of the water. In addition, the property interest in the riparian right has been recognized in three distinct areas, the right of access to water, the right to continued flow of water, and the right to use of the water.[89]

Justice Story early declared that riparian owners, and not the general public, were the possessors of rights to the flow of watercourses and the use of water: "The natural stream existing . . . for the benefit of the land through which it flows, is an incident annexed, by operation of law, to the land itself."[90] Justice Story's opinion reflects the traditional nineteenth century view that a property right is an independent and isolated entity, and that an owner may do with his property rights as he wished, subject only to the restrictions of common law nuisance and trespass doctrines.

Although remnants of this notion still appear[91] the trend is toward a more flexible notion of property rights that gives the public a vested interest in property use that in certain instances equals or surpasses the private right.[92] This is evidenced in changing judicial and legislative attitudes toward the nature of land as a concept. No longer is the idea generally accepted that land's only purpose is to enable the owner to make a profit from its use, or to use it in a way that might be harmful to the general public interest.[93] Indeed, the new attitude is most obvious in state legislation protecting natural areas or providing for regulation of development.[94] This represents

a policy of integrating both public and private interests in establishing a "best use" of natural resourced, a supposition almost entirely antagonistic to Justice Story's opinion.

Once the property factor in riparian use is seen in an interdependent network of competing uses, "an amended concept of property rights suggests a reformulation of the law of takings."[95] The new doctrine of public rights and interest provides a contervailing measure which would validate legislation as a police power regulation rather than classify the legislation as an exercise of eminent domain requiring compensation. As one commentator has declared:[96]

> Although the simple right to the use of water may be a property right, there remains the substantial problem of whether the elaborate legal doctrine which the courts have formulated to govern the enjoyment of the usufructury right can itself be described as property . . . . In this instance, however, the very fact of judicial silence seems to be evidence that they are not property.

This suggests that a property right exists in usufructury use, but that a similar property right does not exist in the judicial rules promulgated to define and protect riparian uses. By analyzing the property interest separately in this manner, legislative alteration of the existing legal structure supporting water use may not be as frought with constitutional snages as at first glance. Nevertheless, judicial rules and the uses they protect are not entirely inseparable, and an attack on one invariably

is an attack on the other. However, the advantage of viewing riparian rights from such a perspective diminishes the concept of usufructury use from the traditional status of a full property right to something less, a quasi-property right. Such a reduction provides additional weight to the proposition that modification or termination of riparian rights by regulation is a valid exercise of police power.

2. The Taking Issue

The recent literature and court cases attest to various judicial efforts to employ a meaningful and consistent test for determining where police power measures require compensation for loss of use of property.[97] No less than eight taking tests have been listed and described by the commentators.[98] Characterized by minimum predictability, the decisional law is confusing, rhetorical and patternless.[99] In addition, since courts are aware of the lack of a firm taking test, judicial statements are usually prefaced by the caveat that each case must be decided on its own facts.

Before a court can properly apply a test to determine whether or not an exercise of police power constitutes eminant domain or regulation, the relationship between the police power and the area involved must be examined to see if that area is outside the circumscribed bounds of legitimate police activity. Having been developed to include everything essential to the public health, safety,

and welfare to permit state interference whenever demanded by the public interest, the standard for constitutional review of police power legislation was delivered in 1894:[100]

> To justify the state in interposing its authority in behalf of the public, it must appear, first, that the interests of the public . . .require such interference; and, second, that the means are reasonably necessary for the accomplishment of the purpose, and not unduly oppressive on individuals.

After considering whether the regulation falls within an appropriate area of police power concern, the court must examine the legislative means adopted to effectuate the regulatory intent. Using a test of rational relationship, courts are reluctant to question legislative wisdom, and unless "no state of facts could exist to justify such a statute", the statute is presumptively valid and shielded from judicial inquiry.[101]

Since the criteria of public purpose and rational relationship of legislative means to ends have been excluded almost entirely from judicial consideration, the third area laid down in Lawton v. Steele of individual regulatory burden has become the nucleus of the dispositve constitutional test. This burden most often has been translated into economic loss in the form of a diminution-in-value test.

Most state police power regulations that restrict property or activity impose little or no observable economic loss on those regulated, and the regulations are generally

unassailable if they do not substantially erode private property values.[102] In addition, when economic loss results from regulation and there is the high public interest in having the activity curtailed, then the element of general welfare validates the regulation. The catalogue of such cases stretches over a broad spectrum of banned activities from alcohol production and prostitution[104] to the outdoor burning of trash.[105] On the other hand, environmental land use regulations are prone to constitutional assault, "not only because they seek to prevent cost externalizations that courts do not customarily recognize, but also because they drastically curtail the market value of private property, posing a sharp constitutional conflict between public and private interests."[106] Similarly, any regulation of consumptive riparian uses would diminish marketable land value, create a new legal category for regulations, and be an unrecognized and hypothetical public benefit.

(a) Physical Invasion Test

The Supreme Court first expanded the notion of police power, permitting full government intrusion on the absoluteness of private property, in the case of Mugler v. Kansas.[107] The Mugler opinion stands for the constitutional proposition that police power regulations do not constitute compensable takings where there is no direct governmental appropriation of the property, where use is absolutely impaired, and where

the regulation has a significant relationship to the public welfare.[108] Mugler amplied a position taken earlier by Mr. Justice Harlan stating that "taking" was necessarily concomitant with acquiring possession or title to that which was regulated.[109]

(b) Harm-Benefit and Diminution-In-Value Tests

While Mr. Justice Harlan viewed the difference between a police power regulation upon property use and the public taking of property as a difference in the kind regulation, Mr. Justice Holmes viewed the distinction as one of degree. Announcing the doctrinal transition in Pennsylvania Coal Co. v. Mahon,[110] Holmes created a new set of criteria by which to judge the issue:[111]

> One consideration in determining whether limitations on private property, to be implied in favor of the police power, are exceeded, is the degree in which the values incident to the property are diminished from the facts of the particular case. . . .
>
> The general rule, at least, is that if regulation goes too far it will be recognized as a taking for which compensation must be paid. . . .
>
> In determining whether there has been a diminution in values incident to property under the police power as to require an exercise of eminant domain and the payment of compensation, the greatest weight is given to the judgment of the legislature, but it is always open to interested parties to contend that the legislature has gone beyond its juristictional power. . . .
>
> We are in danger of forgetting that a strong public desire to improve the public condition is not enough to warrant achieving the desire by a shorter cut than the constitutional way of paying for the charge.

Because of the crucial significance of this decision as the genesis of all subsequent taking cases, the background and facts of the case are worth examining. The case concerned the Pennsylvania coal fields and the tendency of mine shafts to collapse when abandoned. Termed mine subsidence, the effect was to remove support from under towns and cities of the anthracite region. The Pennsylvania legislature responded to the problem by passing the Kohler Act of 1921, which made unlawful the mining of coal so as to cause the subsidence of any building, structure, or transportation route within the limits of a designated class of municipalities.

Mahon and his wife resided in one of these restricted areas. Forty years earlier the coal company had owned the property on which they lived but the company subsequently sold the surface rights to another party, who in turn sold to Mahon in 1917. The original deed and Mahon's contained a reservation of mineral rights by the coal company and included a waiver of any future claim against the coal company for personal injury or property damages. Mahon brought suit seeking permanent injunction. Holmes, reversing the Pennsylvania Supreme Court, declared the Kohler Act unconstitutional and denied relief.

Applying a balancing test of extent of public harm if the area is left unregulated against the diminution in value of the thing if regulated, Holmes stated that the effect on the public would be slight if the act were invalid and that the

value of the coal company's reserves, if the act were valid, would be reduced beyond an acceptable level. In other words, "if the result of the regulation is to achieve a benefit for the community, compensation must be paid; but if it is to terminate a harmful activity, no compensation is necessary."[111] Furthermore, implicit in the harm-benefit analysis lies the concept of reciprocity -- that the regulation is justifiable so long as those regulated share to some degree in the benefits of the restriction.[113]

Harm and benefit may be regarded as opposite sides of the same coin, but harm imposed by private property use provides an obvious judicial analog to nuisance, and therefore becomes more readily acceptable as part of any balancing equation. When police power relies on the nuisance factor (eliminating a public harm), the economic value of the activity can be virtually destroyed,[114] but if the activity is not a nuisance or can not be characterized as spillover (or producing public harm), then the traditional test of diminution-in-value is used, combined with the factor of extent to which the property can be put to some other use, not necessarily the most profitable.[115] This analysis posits the doctrine that no property rights exist in a nuisance or spillover-producing activity.

Using the opinion in Pennsylvania Coal as a touchstone, the courts began to validate police power regulations in land and property use areas whenever public health, safety,

or general welfare demanded. The result produced many decisions which sought to determine the degree or percentage of loss that could be imposed upon property owners for which no compensation was necessary.[116] A particular problem lies in the inability of courts to arrive at a standard definition of property base for the diminition measure.[117] "The degree of loss inquiry apparently attempts to judge the personal burden imposed upon property owners, yet it does so only by viewing arbitrary subdivisions of particular holdings."[118] If a court views only the regulated or restricted part of an area, it will necessarily determine that there is a greater percentage loss than if it views the entire area. For example, substantial diminution may be sustanied in an attack on riparian regulation if intense development of an unregulated area is overlooked. On the other hand, if the diminution evaluation encompasses an entire area, regulated and unregulated, an accounting of a larger property base may compel invalidation of the regulation.[119]

Seldom, however, does a court only consider either the diminution-in-value or the harm-benefit approach in its analysis of the taking problem. More often the inquiry establishes a balance between private loss and public interest,[120] linking the two tests together. Public interest, furthermore, has been couched in terms of preventing public harm and not just any interest the public might have, which may also be defined to include benefits. The definitional

relationship between the regulation and the thing regulated, then, returns to that given by Holmes in Pennsylvania Coal: substantial diminution can occur through regulation if non-regulation would produce a public harm. In addition, police power concerns more than just noxious uses of private property. Zoning, for instance, relies on police power to regulate the compatible location of non-noxious uses by establishing "enforcible priorities between incompatible uses in the interest of the general welfare."[121] In like manner, as the need becomes recognized as it was in zoning, a legislature may choose to establish water use priorities.

(c) The Residuum Test

A corollary approach to the standard diminution test provides an alternative perspective for viewing degree of loss imposed by gegulation. The residuum test has two variants, each of which may yield a different result. If a court looks only to residual beneficial use left after regulation, so that the land may have a number of economically profitable uses (even if marginal and/or inconsistent with prior use), the regulation may be upheld as a valid exercise of the police power.[122] However, if the residual use is viewed in terms of reasonable rate of return for permitted remaining uses, taking into account prior use, surrounding uses, amd market conditions, a court may determine that the regulation has taken too much and may require that compensation be paid.

Which branch of the residuum test to employ rests with the perceived relationship of the regulated activity to the public interest. As the first residuum approach permits more of an encroachment on private property, and hence more of a taking without compensation, that test should be utilized when non-regulation would result in public harm, but by defining public interest in terms of "harms", extraordinary flexibility can be given to police power regulation.[123] The other approach relies more heavily on market profitability of remaining uses. If the residual use can not realize a reasonable return, then the regulation is invalid. Significantly, such factors as public harm and externalization costs are afforded minimum weight in this analysis, while the component of private property is given great consideration.

This second of the residum approaches tends to parallel Justice Story's implicit property right definition, but the absolute use of private property, without the internalization of external costs, even if the externalization is a public benefit, is an anachronism in an era when the public interest has become critically involved with private resources usage. However, not all takings question should be decided by the balancing test of the first residuum approach. All public harms (or benefits) do not necessarily outweigh private loss. If the contrary were so, and as Plater suggests,[124] the state would prevail in every instance of confrontation. By necessity, the residuum approach must be subjective in order to maintain the delicate balance between public interest and institution of private property.

(d) The Diminution-Balancing Test

The movement in analysis and theory of the taking problem evidences a definite shift toward an economic perspective,[125] in which private loss and public gain are quantified according to real loss or gain, administrative, and demoralization costs. But the economic analysis is not an end in itself; rather, it provided a frame of reference from which to view a complex issue. With the added factor of fairness, this economic diminution-balancing approach avoids the paradoxes of a harm-benefit approach and accounts for societal need not explicit in the diminution test. This test proposes minimum total social costs while recognizing "both the costs that private uses impose upon the public and individual losses that government action causes."[126]

The judicial inquiry requires two steps to determine if compensation is necessary. First, no private loss is excessive if, balanced against the public, it is less than the costs it would impose on others, whether public costs resulting from unrestricted uses exceed or are less than private property losses caused by government regulations.[127] The suggestion here goes to the nature of private property rights in relation to public rights: that a public trust doctrine operates to control the property rights distribution wherever the public and private conflict and public costs are greater than private costs.[128] In economic terms,

this test imposes internalization costs on a private property owner whose use of his property can be classified as a harmful externality.

"The first stage inquiry is only minimum review, and the converse proposition that any regulation imposing more costs than it prevents is ipso facto invalid does not hold."[129] Further, excessiveness of individual loss is not measured solely in terms of contervailing public harms. When private loss is less than public gain, the second stage dimininution analysis may still be controlled by the question of fairness when combined with the utilitarian inquiry of the first part of the test.

Certainly it must be emphasized that none of these theories alter or remove the necessity for compensation when government exercises its power of eminant domain and gains actual title to property, when regulations are arbitrary or unreasonable,[130] or when private loss so outweighs public gain that an obvious inequite would result. Each alternative test provided a constitutional safeguard for private property rights while recognizing that the public has a vested interest in the use of private property.

3. The Constitutionality of Changes in Water Law Systems

In the past, because of the important relationship of water to the public welfare, the United States Supreme Court has generally upheld state regulation of water based on the police power.[131] The Court has rejected the assertion that

each riparian owner has a vested right in the use of unimpaired and uncontaminated flowing waters and instead has held that every state is free to change its law governing riparian ownership and to permit the allocation of flowing waters for such purposes as it may deem best.[132]

A number of state courts have also upheld systems altering the existing uses of riparian owners. The Kansas Supreme Court, in State ex rel. Emery v. Knapp,[133] upheld the validity of that state's new appropriation law against the objection that the property of riparian owners was taken without due process of law. The court indicated that the rights of the riparian owners were always subject to modificat by the legislature to the extent required by the conditions and wants of the people. Likewise, in In re Hood River,[134] the Oregon Supreme Court upheld sections of a statute which redefined "vested rights" and preserved the riparian rights only to the extent of their use at the time of its enactment or shortly prior thereto. The constitutionality of the Orego Code, regulating both used and unused rights, was upheld by the Ninth Circuit in California-Oregon Power Co. v. Beaver Portland Cement Co.[135]

D. State Regulation of Consumptive Water Use in Kentucky

Kentucky made the first significant legislative change in its riparian system in 1954. The droughts of the two preceding years caused many farmers to divert water from nearby streams and lakes in order to satisfy their water needs. The increased use of riparian water demonstrated the need for a more satisfactory definition of riparian rights in Kentucky.[136] With this in mind, the legislature set forth in the 1954 act a basic statement of the rights of landowners in such waters.[137] The statute also provided for the Legislative Research Commission to make a thorough study of all problems relating to water resources and to report its findings to the 1956 legislature.

The act applied to "public water" which included contained surface water and ground water, but not diffused surface water. Section 3 of the act set forth the rights of landowners to use the public waters of the state. The act provided that the use of water by a riparian owner for domestic purposes would have priority over other uses and declared that riparian owners "shall have a right to make such reasonable use of the water for other than domestic purposes as will not deny the use of such water to other owners for domestic purposes or impair existing uses of other owners heretofore established, or unreasonably interfere with a beneficial use by other owners." Finally, the act allowed riparians under certain conditions to impound and store water on their land as long as this would

not injure the rights of other users.

In 1966 the older act was replaced by a more comprehensive statute,[138] KRS chapter 151. This legislation, attempts to deal with the state's water resources on a coordinated and comprehensive basis. Comsumptive uses of water, as well as the construction of dams and impoundments are gegulated by the agency. In addition, the legislation authorized water resources planning and construction for flood control and water development purposes.

1. Administrative Structure

The Department for Natural Resources and Environmental Protection administers the act.[139] Originally, the Division of Water performed adjudicatory and planning functions. The first five years of the Division's operation concentrated on the gathering of data and the study of federal water plans. The data collected was designed to provide the factual basis necessary to coordinate the planning for Kentucky's water.[140] The Division's most important function was implementation of the state's water plans, and it was empowered to issue permits for the use of water in Kentucky. The 1974 General Assembly transferred the Division's regulatory powers to the Department of Natural Resources and Environmental Protection and the Commissioner of that agency.

KRS 151.330 (1) created the Water Resources Authority of the Commonwealth. This agency consists of the governor,

the commissioner of Natural Resources and Environmental Protection, the secretary for finance and administration, the commissioner of health, the commissioner of commerce, the commissioner of agriculture, the attorney general, the secretary of the department of transportation, the commissioner of fish and wildlife resources, and the commissioner of parks. The Authority is "empowered to coordinate the programs of all state agencies in the conservation, development, and wise use of public water,"[143] and to simultaneously "promote the beneficial and proper distribution of water throughout the state."[144]

A special revolving trust fund, known as the Water Resources Fund, has been established, from which the Water Resources Authority is authorized to make loans and expenditures.[145] The loans are available to any county, city, water district, watershed conservance district, or other governmental subdivision,[146] their interest is determined by the Authority, and they must be secured.[147] In addition, the Authority is authorized to issue revenue bonds for the purpose of paying all or part of such projects.[148]

Another important function of the Water Resources Authority is to contract with agencies of the federal government, primarily the U.S. Army Corps of Engineers, in order to obtain water supply space in federal reservoirs.[149]

The Department for Natural Resources and Environmental Protection and the Water Resources Authority are only two

of the many governmental agencies which affect the use and development of water resources in Kentucky. The governor's cabinet possesses some planning responsibility over water resources at the state level,[150] while a variety of institutions exercise authority at the local level.[151]

2. Consumptive Use Permits

In its declaration of policy, the Kentucky Water Resources Act declares that "The advancement of the safety, happiness and welfare of the people and the protection of property require that the power inherent in the people be utilized to promote and to regulate the conservation, development and most beneficial use of the water resources. It is hereby declared that the general welfare requires that the water resources of the Commonwealth be put to the beneficial use to the fullest extent of which they are capable, that waste or nonbeneficial use of water be prevented, and that the conservation and beneficial use of water be exercised in the interest of the people."[152]

This policy is implemented by a permit system by which the Department regulates diversions and consumptive uses of public water.[153] According to KRS 151.120 (1) "public waters" include "[w]ater occuring in any stream, lake, ground water, subterranean water or other body of water in the Commonwealth which may be applied to any useful or beneficial purpose." However, neither diffused surface water, as defined in KRS 151.100 (5), or water left standing in pools in a natural stream when the flow of

the stream has ceased, are regarded as public waters.[154]

KRS 151.140 declares that "no person, business, industry, city, country, water district, or other political subdivision" may withdraw, divert or transfer public water unless a permit is first obtained form the Department. Permit application procedures are simple and expeditious. Permits are usually issued after an inspection by the agency to determine whether the applicant's proposed use is consistent with the statutory requirements.[155] When the circumstances warrant, the Department may allow less water than the applicant requested, and permits may be amended by either the Department or the permittee. KRS 151.180 provide that "any person aggrieved" by an order, determination, regulation or ruling of Department personnel may appeal to the Commissioner. This proceeding calls for a full quasi-judicial hearing. Public notice must be given and the hearing is open to the public. The Department may issue subpoenas, administer oaths, and examine witnesses. On the basis of the evidence produced at the hearing, the Commissioner makes findings of facts and conclusions of law and enters a decision or final order. The Water Resources Act also provides for judicial review by the agency under KRS 151.180. The scope of this review, however, is limited, and findings of fact by the agency are conclusive if supported by substantial evidence.[156]

There is some question as to what parties can seek administrative or judicial review under the provisions of KRS 151.180 and 151.190. Clearly, one whose application for a

permit is rejected or substantially modified could make such an appeal. Arguable, exempted riparian users as well as existing permit holders would also have standing as "aggrieved persons" since their interests are specifically protected by the statute.[157] It is less clear whether another applicant whose permit has not yet been granted can avail himself of these provisions to challenge the pending permit application of another. Finally, it is uncertain to what extent other governmental agencies, conservation organizations or private citizens may qualify as "aggrieved persons" in order to protect public interests within the purview of the statute.[158]

Once a permit is issued, the water user must keep accurate records of all water withdrawn, diverted or transferred and submit periodic reports to the Department.[159] The agency, may after warning, order the suspension or revocation of a permit if the owner fails to comply with the conditions of his permit or with provisions of the Act of related orders, rules or regulations.[160] The Department may enforce the provisions of the Act in a number of ways. The Department has general authority to adopt rules and regulations[161] and to issue orders[162] to carry out the provisions of the Act.

The Department may issue a cease and desist order against one who makes a withdrawal, diversion or transfer of public water without obtaining the necessary permit.[163] The agency may also institute court proceedings to enforce its orders.[164]

Moreover, unauthorized diversions of public water,[165] as well as other violations of the Act, may subject the violator to civil penalties of up to $1000 per day.[166]

The scope of the Department's regulatory power over public water is substantially limited by a series of exemptions found in KRS 151.140. These include (1) domestic users; (2) agricultural users, including irrigators; (3) uses exempted by administrative regulation; (4) stream generating plants; and (5) water injected undergrouns in connection with oil and gas production.

The exemption for domestic use reflects the high priority given to such uses under riparian doctrine. KRS 151.100 (10) defines "domestic use" as "the use of water for ordinary household purposes, and drinking water for poultry, livestock and domestic animals." Domestic uses are often exempted from regulation in Eastern states[167] because it is often impractical to regulate numerous small users; individual domestic users collectively account for a relatively small amount of the total water demand; and regulation of municipal waterworks and other public water suppliers can effectively control domestic consumption in urban areas.[168]

The exemption for agriculture is more significant. Irrigation in Kentucky in 1970 averaged about seven million gallons per day on 25,000 acres of land.[169] Tobacco is the principal crop using irrigation waters, and if a drought year occurs, some 36,000 acres would require 4,320,000,000 gallons of water.[170] Maryland is the only other state which

specifically exempts agricultural uses.[171] In Kentucky the exemption is due largely to the efforts of the Farm Bureau which views with extreme alarm any regulation of farm activities. Nevertheless, this exemption is a major weakness in the regulatory scheme.

No permit is required "if the amount of water withdrawn, diverted or transferred is less than the amount established by regulation." This exemption was created as a result of an amendment in 1974 to KRS 151.140 requested by the agency. The agency now exempts from the permit system those who use less than 10,000 gallons per day. Similar provisions appear in Iowa and Florida water regulatory legislation.[172]

The 1966 act orginally exempted many manufacturing and industrial users from the permit requirements, provided that the water was returned in substantially the same quantity and condition as when it was withdrawn. This provision was repealed in 1972, leaving only stream-generating facilities still exempt.

Finally, the use of water for secondary recovery operations continues to remain exempt from the permit requirements.

The exact nature of a water right under Kentucky's permit system is somewhat unclear. For purposed of illustration, it will be compared with water rights under the common-law riparian system and prior appropriation.

In the East, surface water rights are based on ownership of riparian land and rights to ground water arise from the ownership of overlying land. Under prior appropriation water rights are derived from beneficial use of the water and not land ownership.[173] In Kentucky, beneficial use rather than ownership of land, appears to be the basis of the permit right. KRS 151.170 states that no permit shall be denied "to a responsible applicant who has established an amount of water for which he has a need for a useful purpose." There is no requirement in the statute that the applicant be a riparian or overlying owner. In addition, municipalities, which are considered nonriparians in most states, are specifically mentioned as eligible applicants.[174] Moreover, the statute does not suggest that riparian or overlying owners are to be given any preference in the granting of permits. A modified watershed rule, however, is applied: KRS 151.200 (2) provides that permits which allow a use beyond the watershed must be authorized by the Water Resources Authority.

The riparian right is usufructory in nature. The water user merely has the right to make a reasonable use of the available surface water. Under each of three "common law" ground water doctrines, the water right is likewise unquantified. Under prior appropriation, however, the water right is much more specific. The appropriator's right is fixed in terms of time, location and quantity.

Each of these prior appropriation features is found in the Kentucky statute. KRS 151.170 (1) provides that permits be specific in terms of quantity, time, place and rate of diversion, transfer, or withdrawal.

Water rights under the prior appropriation system are perpetual in nature although they can be lost or abandoned through nonuse.[175] Riparian rights in a sense are, also perpetual since they are appurtenant to the land. On the other hand, the continuing right to make a particular use of water (except for domestic uses) is of indefinite duration under the reasonable use rule since changing circumstances may compel an existing user to modify his water use or cease it altogether in order to accommodate new users. Most permit systems in the East place durational limits on the permits and require periodic renewal.[176] The Kentucky statute, however, does not specify any particular time limit, although it is doubtful that they are intended to be perpetual.

The transfer of water rights apart from a sale of the land is difficult or impossible in most riparian jurisdictions. While theoretically possible in prior appropriation states, in practice it is difficult because the rights of junior appropriators must be protected.[177] The Kentucky stature is silent on whether permit rights are transferable. Presumably the permit would have to be amended pursuant to 151.170 (4) if the place of diversion or any other material aspect of the permit were changed as a result of the transfer.

Preferences and priorities are two related and often confused concepts. In the East temporal priority is not significant. Established users have no protection against the initiation of new uses. As a general rule, there are few preferential rights to water either. An exception to this is the domestic user in the case of surface water. The rights of the overlying owner to ground water are superior to those of a nonoverlying user under the American rule and the correlative rights doctrine. Use preferences are sometimes found in prior appropriation jurisdictions, although they operate somewhat differently than in the East.[178]

Priority, however, is very important under prior appropriation. In times of water shortage the rights of senior appropriators are superior to those of junior appropriators.[179] Priority is a factor under the Kentucky Act, but operates somewhat differently than in the West. Under prior appropriation, priority determines the relative access to water when supply is inadequate to meet the needs of all users. In Kentucky, existing users, both regulated and unregulated are protected from competition from new users by the provisions of KRS 151.170 (2), which states that a permit application will be granted only if the proposed use "will not be detrimental to the . . . rights of other public water users . . . ." and if "the requested amount of water is available." Thus, temporal priority can become a factor when a new user seeks to obtain a permit. Once the permit is secured, however, older uses have

inherent superiority over recently commenced uses. Instead, during periods of "drought, emergency, or other similar situations requiring a balancing of the rights and available water between water users." The Department, with the approval of the Water Resources Authority, "may temporarily allocate the available public water supply among water users and restrict the water withdrawal rights of permit holders until such time as the condition is relieved and the best interests of the public are served."[180] This approach differs from both riparianism and prior appropriation. Under the former, adjustments among users would be make according to the dictates of the reasonable use rule; under the prior appropriation system, allocation would be made on the basis of relative priority.

The relationship between permit users and unregulated riparian users is uncertain in many respects. This promises to be troublesome because there are a great number of unregulated users in Kentucky due to the many exempted categories in KRS 151.140.

What happens when an unregulated riparian owner increases his water use, or makes a new use, and this interferes with a permitee? For example, if a farmer begins to make a withdrawal of water for purposes of irrigation, an unregulated use, is his right to the water superior to that of the permittee if insufficient water is available to accommodate fully the needs of both users? If it is determined that unregulated users have a preferential right to the

water, permit users who are also riparian to a watercourse would be worse off under the statutory allocation framework than under the common law riparian doctrine. Arguably, this might constitute a taking of property without due process of law.

On the other hand if permit holders are given superior rights to the water unregulated riparian users might raise the due process issue. A compromise might be proposed whereby both the permitee and the riparian user must adjust the water use in accordance with the reasonable use rule. While this approach seems viable, it is not without problems. If the permit user is making a nonriparian use, he might still argue that his riparian rights have been impaired, since at common law, a nonriparian use is unreasonable and can be enjoined when it harms a riparian user. On the other hand, if both the permit user and the unregualted user are riparian owners, the utility of the permit system itself might be questioned since water allocation formula would then be the same under the statutory system as under the riparian system.

Conflicts between regulated and unregulated users are likely to be most acute during periods of prolonged drought or water shortage conditions. During such periods, KRS 151.200 (1) allows the Department, with the permission of the Water Resources Authority, to suspend the operation of the permit system and temporarily allocate water on some other (but disclosed) basis. This provision states that the

Department may "allocate the available public water supply among water users" and "restrict the water withdrawal rights of permit holders" (emphasis supplied). This language is ambiguous and somewhat inconsistent unless "water users" is interpreted as being synonymous with "permit holders." This view is supported by KRS 151.140 which states that "nothing herein shall interfere with the use of water for agricultural and domestic purposed including irrigation." This language suggests that the entire act, including the provisions of KRS 151.200 (1), are inapplicable to these two exempted categories. However, KRS 151.140 merely states that "no permit shall be required" for other classes of exempt uses such as small uses, stream generation and oil and gas production. Conceivably, the Department may have some authority to regulate these uses under KRS 200 (1) during periods of water shortage.

On the whole, the relationship between unregulated riparian and permit users in Kentucky needs substantial clarification. This clarification should come from further legislation, but may well have to be settled instead by litigation. Needless to say this issue is a difficult and complex one, involving as it does the underlying proprietary nature of both riparian ownership and statutory property rights.

1. Burns Ind. Stat. Ann., Tit. 13-2-2-3 to 13-20-2-4 (1973).

2. Burns Ind. Stat. Ann., Tit., 13-2-2-5 (1973).

3. Iowa Code Ann. §455A.21 (1971).

4. Iowa Code Ann. §455A.1 (1971).

5. Iowa Code Ann. §455A.25 (1971).

6. Iowa Code Ann. §455A.28(3) (1971).

7. Iowa Code Ann. §455A.21 (1971).

8. Hines, A Decade of Experience Under The Iowa Water Permit System, 7 Natural Res. J. 499, 532-33 (1967).

9. Md. Code Ann., art. 96A, §1 (1964).

10. Md. Code Ann., art. 96A, §11 (1964).

11. Md. Code Ann., art. 96A, §16 (1964).

12. Md. Code Ann., art. 96A, §16 (1964).

13. Md. Code Ann., art. 96A, §16 (1964).

14. Md. Code Ann., art. 96A, §18 (1964).

15. N.C. Gen. Stat. §143-215.12 (1974).

16. N.C. Gen. Stat. §143-215.13 (1974).

17. N.C. Gen. Stat. §143-215.15 (1974).

18. N.C. Gen. Stat. §143-215.16(e) (1974).

19. N.C. Gen. Stat. §143-215.16(f) (1974).

20. N.C. Gen. Stat. §143-215.16(a) (1974).

21. N.C. Gen. Stat. §143-215.16(b) (1974).

22. Del. Code Ann. §7-6101 (1970 Supp.).

23. Del. Code Ann. §7-6105(a) (1970 Supp.).

24. Del. Code Ann. §7-6103(1) (1970 Supp.).

25. Del. Water & Air Res. Comm. Reg. 201.d (1970).

26. Del. Water & Air Res. Comm. Reg. 201.d (1970).

27. Del. Water & Air Res. Comm. Reg. 201.g (1970).

28. Fla. Laws 1972, ch. 72-299; now codified as Fla. Stat. Ann. ch 373 (1975 Supp.).

29. Fla. Stat. Ann. §373.091(a) (1975 Supp.).

30. Fla. Stat. Ann. §§373.036, 373.039 (1975 Supp.).

31. Fla. Stat. Ann. §373.039 (1975 Supp.).

32. Fla. Stat. Ann. §373.069(1) (2) (1975 Supp.).

33. Fla. Stat. Ann. §§373.073, 373.079 (1975 Supp.).

34. Fla. Stat. Ann. §373.106 (1975 Supp.).

35. Fla. Stat. Ann. §373.201 (1975 Supp.).

36. Fla. Stat. Ann. §373.219 (1975 Supp.).

37. Fla. Stat. Ann. §373.226 (1975 Supp.).

38. Fla. Stat. Ann. §373.223 (1975 Supp.).

39. Fla. Stat. Ann. §373.109(5) (1975 Supp.).

40. Fla. Stat. Ann. §373.233(1) (1975 Supp.).

41. Fla. Stat. Ann. §373.229(3) (1975 Supp.).

42. Fla. Stat. Ann. §373.233(1) (1975 Supp.).

43. Fla. Stat. Ann. §373.233(2) (1975 Supp.).

44. Fla. Stat. Ann. §373.236(1)(2) (1975 Supp.).

45. Fla. Stat. Ann. §373.243 (1)-(5) (1975 Supp.).

46. Fla. Stat. Ann. §373.246(1) (1975 Supp.).

47. Fla. Stat. Ann. §373.246 (3) (1975 Supp.).

48. Minn. Stat. Ann. §105.39 (1964).

49. Minn. Stat. Ann. §105.41 (1975 Supp.).

50. Minn. Stat. Ann. §105.38 (1975 Supp.).

51. Minn. Stat. Ann. §105.41 (1975 Supp.).

52. Minn. Stat. Ann. §105.44 (Supp. 1975).

53. Minn. Stat. Ann. §105.45 (Supp. 1975).

54. Minn. Stat. Ann. §105.45 (Supp. 1975).

55. Minn. Stat. Ann. §105.44(3) (Supp. 1975).

56. Minn. Stat. Ann. §105. 47 (Supp. 1975).

57. State Dept. of Conservation v. Sheriff, 207 N.W.2d 358 (Minn. 1973).

58. Minn. Stat. Ann. §105.41 (Supp. 1975).

59. Minn. Stat. Ann. §105.41 (Supp. 1975).

60. N.J. Stat. Ann. §58:1-35B (1966).

61. N.J. Stat. Ann. §58:1-36 (1966).

62. N.J. Stat. Ann. §58:1-37 (1966).

63. N.J. Stat. Ann. §58:4A-2 (1966).

64. N.J. Stat. Ann. §58:4A-4 (1966).

65. N.J. Stat. Ann. §58:1-44 (1966).

66. S.C. Code §70-35 (Supp. 1975).

67. S.C. Code §70-36 (Supp. 1975).

68. S.C. Code §70-36 (Supp. 1975).

69. S.C. Code §70-36(h) (Supp. 1975).

70. S.C. Code §70-37(a) (Supp. 1975).

71. S.C. Code §70-35(b) (Supp. 1975).

72. S.C. Code §70-37(b) (Supp. 1975).

73. Wis. Stat. Ann. §144.025 (1974).

74. Wis. Stat. Ann. §30.18 (1973); Omernik v. State, 218 N.W.2d 734 (Wis. 1974).

75. Wis. Stat. Ann. §30.18(1)(b) (1973).

76. Wis. Stat. Ann. §30.18(1)(b) (1973).

77. Wis. Stat. Ann. §30.18(3) (1973).

78. Wis. Stat. Ann. §30.18(5) (1973).

79. Wis. Stat. Ann. §30.18(5) (1973).

80. Wis. Stat. Ann. §107.05 (1973).

81. Wis. Stat. Ann. §107.05(2) (1974).

82. Wis. Stat. Ann. §107.05(3) (1974).

83. Wis. Stat. Ann. §107.05(3) (1974).

84. Wis. Stat. Ann. §107.05(5) (1974).

85. See generally, Mandelker, Inverse Condemnation: The Constitutional Limits of Public Responsibility, 1966 Wis. L. Rev. 4.

86. Goldblatt v. Town of Hempstead, 369 U.S. 590, 592 (1962).

87. Sax, Takings, Private Property and Public Rights, 31 Yale L.J. 149, 150 (1971).

88. See, e.g., Iowa Natural Resources Council v. Van Zee, 158 N.W.2d 111 (1968); State ex. rel. Chain O' Lakes Protection Assn. v. Moses, 53 Wisc.2d 579, 193 N.W.2d 708 (1972).

89. Lauer, The Riparian Right as Property, Water Resources and the Law 174 (1958).

90. Tyler v. Wilkinson, Fed. Cas. 14, 312, 24 Fed. Cas. 472, 474 (C.C.D.R.I. 1827).

91. MacGibbon v. Board of Appeals, 356 Mass. 635, 255 N.E.2d 347 (1970); Commissioner of Natural Resources v. S. Volpe and Co., 349 Mass. 104, 206 N.E.2d 666 (1905); State v. Johnson, 265 A.2d 711 (Me. 1970). In each case a regulation restricting the filling of estuarine wetlands was struck down, even though substantial damage to the public might occur through flooding or ecological imbalance.

92. Bosselman, The Taking Issue, 213 (1971).

93. Just v. Marinette County., 56 Wis.2d 7, 201 N.W.2d 761 (1972); and Qandlestick Properties, Inc. v. San Francisco Bay Construction and Development Commission, 11 Cal. App3d 557, 89 Cal. Rptr. 897 (1970).

94. See, e.g. Fla. Stat. Ann. sec. 380 et. sec.; Cal. Govt. Code §666000 et seq. (1972); 38 M.R.S.A. sec. 481 et sec. (Maine Site Location Law). For New York's solution to the water problem, see Sax, Water Law, Planning Policy, (1968), at 185.

95. Sax, supra, Note 87 at 150.

96. Lauer, supra, Note 89 at 209.

97. See generally, Van Alstyne, Taking or Damaging by Police Power: The Search For Inverse Condemnation Criteria, 44 So. Cal. L. Rev. 1 (1971); Berger, A Policy Analysis of the Taking Problem, 49 N.Y.U.L. Rev. 165 (1974); Plater, The Taking Issue in a Natural Setting; Floodlines and the Police Power, 52 Tex. L. Rev. 201 (1974); Cf. Just v. Marinette County, 56 Wis.2d 7, 201 N.W.2d 761 (1972) with Morris Co. Land Improvement Co. v. Parisippany-Troy Hills Township, 40 N.J. 539, 193 A.2d 232 (1963). The courts in these cases used the identical harm-benefit (or Freund-Dunham) approach and reached opposite results with respect to a regulation for filling wetlands.

98. See e.g., Dunham, Griggs v. Allegheny Co. In Perspective: Thirty Years of Supreme Court Expropriation Law, 1962 Sup. Ct. Rev. 63.

99. Van Alstyne, supra, note 97 at 2.

100. Lawton v. Steele, 152 U.S. 133 (1894); See also, Beacon v. Walker, 204 U.S. 311, 317 (1907) "[the police power] is not confined . . . to the suppression of what is offensive, disorderly, or unsanitary. It extends to so dealing with the conditions which exist in the state as to bring out of them the greatest welfare of its people."

101. Munn v. Illinois, 94 U.S. 113 (1876) at 132. See also, Day-Brite Lighting, Inc. v. Missouri, 342 U.S. 421 (1953) at 423; courts are not "to sit as a superlegislature to weigh the wisdom of legislation nor to decide whether the policy . . . offends the public welfare."

102. Plater, supra, note 97, at 221.

103. Mugler v. Kansas, 112 U.S. 623 (1887).

104. L'Hote v. City of New Orleans, 177 U.S. 578 (1900).

105. Lees v. Bay Area Pollution Control Dist., 48 Cal. Rptr. 295 (1965).

106. Plater, supra, note 97, at 221 cf. Hammer v. Ross, P.2d 375 (Cal. 1963), in which the court made clear that economic loss alone, without supporting factors, was insufficient to invalidate a regulation.

107. 112 U.S. 623 (1887).

108. Bosselman, supra, note 92, at 120.

109. Pumpelly v. Green Bay Co., 80 U.S. 166 (1871), at 667, 668. Cases supporting the Mugler and Pumpelly line of analysis are: Chicago, Burlington and Quincy R.R. Co. v. Drainage Commissioners, 200 U.S. 561 (1906),

and New Orleans Gas Light Co. v. Drainage Commissioners, 197 U.S. 453 (1905).

110. 260 U.S. 393 (1922). The germ of this stance was first developed in Rideout v. Knox, 148 Mass. 368 (1889), two years after Holmes was appointed to the Supreme Judicial Court of Massachusettes.

111. Id., at 413-416.

112. Berger, supra, note 97, at 172. Professor Ernest Freund stated a similar idea in The Police Power (1964), at 546.

113. Van Alstyne, supra, note 97, at 5.

114. See, e.g., Consolidated Rock Products, Inc. v. City of Los Angeles, 57 Cal.2d 515, 20 Cal. Rptr., 638, 370 P.2d 342, appeal dismissed, 371 U.S. 36 (1962).

115. See, e.g., Miller v. Schoene, 276 U.S. 272 (1928), and, Van Alstyne, supra, note 97, at 16.

116. Plater, supra, note 97, at 230, 231.

117. Cf. State v. Johnson, 265 A.2d 711 (Me. 1970), with Curry v. Young, 173 N.W.2d 410 (Minn. 1970).

118. Plater, supra, note 97, at 231.

119. Id.

120. Turner v. County of Del Norte, 24 Cal. App.3d 311, 101 Cal. Rptr., 93 (1972). Denying development of a flood-plain area, the court stated that "[t]he zoning ordinance in question imposes no restrictions more stringent than the existing danger demands," (at 96).

121. Van Alstyne, supra, note 97, at 17.

122. See, e.g., Turner v. County of Del Norte, 24 Cal. App.3d 311, 101 Cal. Rptr. 93 (1972).

123. See, e.g., Turnpike Reality Co. v. Town of Dedham, 284 N.E.2d 891 (Mass. 1972), cert. denied, 409 U.S. 1108 (1973).

124. Plater, supra, note 97, at 236.

125. See generally, Michaelman, Property Utility and Fairness: Comments on the Ethical Foundations of "Just Compensation" Law, 80 Harv. L. Rev. 1165-1258 (1968).

126. Plater, supra, note 97, at 244.

127. Id., at 245.

128. See, e.g., Just v. Marinette County, 56 Wis.2d 7, 201 N.W.2d 761 (1972).

129. Plater, supra, note 97, at 251.

130. See, e.g., Lyon Sand and Gravel Co. v. Township of Oakland, 190 N.W.2d 354 (Mich. 1971), in which an ordinance was held invalid that prohibited in a rural area gravel mining without a permit.

131. O'Connell, Iowa's New Water Statute--The Constitutionality of Regulation Existing Uses of Water, 47 Iowa L. Rev. 549, 596-98 (1962).

132. Connecticut v. Massachusetts, 282 U.S. 660, 670 (1931). See also Hudson County Water Co. v. McCarter, 209 U.S. 349 (1908).

133. 167 Kan. 546, 207 P.2d 440 (1949).

134. 114 Ore. 112, 227 P.1065 (1924).

135. 73 F.2d 555 (9th Cir. 1934), aff'd on other grounds, 295 U.S. 142 (1935). See 9 Temp. L. Q. 354 (1935).

136. For a discussion of the 1954 statute see Gregory, Riparian Rights -- Analysis of New Statutory Provisions, 43 KY. L.J. 407 (1955).

137. Ky. Acts ch. 247 (1954).

138. Ky. Acts ch. 23 (1966).

139. K.R.S. 151.130 (1974).

140. A. Tarlock, Evaluation of the Legal Institutions of Diversion, Transfer, Storage, and Distribution of Water in Kentucky, 44 (K.W.R.I. Research Dept. N. 15, 1968).

141. K.R.S. 151.180 (1974).

142. Ky. Acts ch. 285 §§2,4,5,7, (1974).

143. K.R.S. 151.360 (2) (1974).

144. K.R.S. 151.360 (3) (1974).

145. K.R.S. 151.380 (1974).

146. K.R.S. 151.390 (1974).

147. K.R.S. 151.400 (1974).

148. K.R.S. 151.420 (1974).

149. K.R.S. 151.360 (1) (1974).

150. K.R.S. 147.070 (1) (a) (1974).

151. K.R.S. ch. 266-269 (1974) (drainage, levee and reclamation districts); (soil and water conservation districts); (watershed conservancy districts); (flood control districts); and (water districts).

152. K.R.S. 151.110 (1974).

153. K.R.S. 151.140 (1974).

154. K.R.S. 151.120 (2) (1974).

155. K.R.S. 151.170 (2) (1974).

156. K.R.S. 151.190 (1974).

157. K.R.S. 151.170 (2) states that the department may issue a permit only if the proposed use "will not be detrimental to... the rights of other public water users." See also K.R.S. 151.170 (3) and K.R.S. 151.210 (2) (1974).

158. K.R.S. 151.170 (2) provides that the permit must not be "detrimental to the public interests." See also K.R.S. 151.170 (3) (1974).

159. K.R.S. 151.190 (1974).

160. K.R.S. 151.125 (9) (1974).

161. K.R.S. 151.125 (3), (4) (1974).

162. K.R.S. 151.125 (5) (1974).

163. K.R.S. 151.125 (10) (1974).

164. K.R.S. 151.125 (11); K.R.S. 151.460 (1974).

165. K.R.S. 151.150 (2) (1974).

166. K.R.S. 151.990 (1974).

167. E.g. Minn. Stat. Ann 105.41; Fla. Stat. Ann. §373.219 (1) Iowa Code Ann. §455A.1.

168. F. Maloney, R. Ausness & J. Morris, a Model Water Code 178 (1972).

169. Water Information Center, Inc., Water Atlas, plates 79.-80 (1973).

170. A. Tarlock, supra note 140, at 56.

171. Md. Stat. Ann. Art. 96A §11 (1974).

172. Iowa Code Ann. §455A.25(2); Fla. Stat. §373. Cf. Model Water Code §2.04 (3).

173. 1A G. Thompson, Commentaries on the Modern Law of Real Property §263 (1964).

174. E.g. K.R.S. 151.140; 151.150 (1974).

175. Johnson, The Challenge of Prescriptive Water Rights, 30 Tex. L.ev. 669, 673 (1952).

176. Model Water Use Act. §406 (50 years); Iowa Code Ann. §455 A. 20 (10 years); Model Water Code §2.06 (20 years; 50 years for municipolities).

177. Seastone & Hartman, Alternative Institutions for Water Transfers, 39 Land Econ. 31 (1963).

178. Thomas, Appropriations of Water for a Preferred Use, 22 Rocky Mt. L. ev. 422 (1950); Trelease, Preferences to the Use of Water, 27 Rocky Mt. L. Rev. 133 (1955).

179. 1A G. Thompson, supra note 173, §263.

180. K.R.S. 151.200 (1) (1974).

V. Federal Regulatory Powers Over Water Resources

A. The Constitutional Basis of Federal Regulatory Powers Over Water Resources

Federal regulatory authority over water resources is based primarily on the commerce clause of the Federal Constitution.[1] The Supreme Court first recognized the power of the federal government to regulate navigation and general commercial relations in Gibbons v. Ogden:[2] "The power of Congress, then comprehends navigation within the limit of every state in the Union, so far as that navigation may be, in any manner, connected with 'Commerce with foreign nations, or among the several states or with the Indian tribes.'" The court later stated that the power to regulate navigation and commerce permitted the government to keep the navigable waters free from obstructions to navigation "imposed by the states or otherwise; to remove such obstructions, when they exist; and to provide, by such sanctions as they may deem proper, against the occurrence of the evil and for the punishment of offenders."[3]

A line of Supreme Court decisions has expanded the concept of navigability to allow federal regulation over a preponderance of the United States' flowing waters. The first test for navigability endorsed by the court was a factual one: if the stream was navigable in fact, it was navigable for purposes of regulation under the commerce clause.[4] Later the court held that nonnavigable water

which affected the navigable capacity of a river was also subject to federal regulation,[5] and that a watercourse that was nonnavigable in its natural state but capable of being made navigable by means of "reasonable improvements" would be considered navigable for jurisdictional purposes.[6] The test has evolved to the point that, at the present time, the federal government has the authority to protect its interest in navigation in any stream, river or lake that affords a channel for useful commerce, without regard for whether it is navigable in its natural state, or whether it could be made so as a result of reasonable improvement.[7] When necessary, the federal government can override contrary state regulations.[8]

The fifth amendment to the United States Constitution requires that just compensation be provided to the private owner of private property that the federal government requisitions for public purposes. However, the federal government has a "navigation servitude" on the flow of all navigable waters and does not have to recognize private property interests in them. This results without having to provide compensation for so doing, and this is so irrespective of whether private rights in the waters are recognized by law:[9]

> It is no answer to say that these private owners had interests in the water that were recognized by state law. We deal here with federal domain, an area which Congress can completely pre-empt, leaving no vested claims that constitute 'private property' within the meaning of the fifth amendment.

The navigation servitude applies not only to government activities which directly contribute to the protection or maintenance of navigation, but also may extend to such related matters as flood control or power production, although as a practical matter Congress follows a policy of cooperating with the states on water issues and seldom exercises the navigation servitude.

The general welfare power and the property power have also provided constitutional bases for federal activitity in water resources areas. Concerning the international rivers that form boundaries with Canada and Mexico, Congress has power to do "whatever is necessary to comply with the treaties it makes concerning those rivers to enforce compliance by its states and citizens."[10] Consequently, the treaty power has been used to justify steps taken to maintain an agreed-upon level of an international lake,"[11] construction of reservoirs on boundary rivers,[12] and projects designed to carry out treaty obligations to deliver water to neighboring countries.[13]

Article I, section 8 of the Constitution gives Congress the power to levy taxes "to pay the Debts and provide for the common Defense and general Welfare of the United States." This welfare clause has provided the justification for the federal government construction and maintenance of reclamation works and flood control projects.

Article 4, section 3, clause 2 of the Constitution is known as the property clause and states:

> The Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States; and nothing in this Constitution shall be so construed as to Prejudice any Claims of the United States, or of any particular state.

The property clause applies mainly to unapprppriated, non-navigable waters found on public lands in western states. With the exception of Texas, the federal government at one time owned all the land, and the water therein, of the seventeen western states. When the states entered the union, this did not affect water on public lands and consequently, the United States is still the owner and in control of such waters.

A final possible source of federal authority is the war power. It is little used for water resource purposes, but the Tennessee Valley Authority project was at least partly upheld on this basis.

B. Federal Water Resource Legislation

1. The Reclamation Act

The Reclamation Act of 1902 is the legislative foundation for reclamation projects in the United States. This act was designed to provide for the building of irrigation works from the proceeds of public land sales in the sixteen arid western states. The water obtained thereby was made available for use on both public and private lands. Each recipient agreed to reimburse his *pro rata* share of the cost of construction in full within ten years and also to repay annually the maintenance costs incurred from his use of the

project. To prevent any monopoly on precious water rights, the act provided that water could not be sold for use on more than 160 acres of any one private owner's land, and the user had to be a resident on the land. The water rights are appurtenant to the land.[14]

The original act has been modified several times with most revisions concerning the repayment provisions. The Reclamation Project Act of 1939[15] provides that any costs allocated to flood control and navigation do not have to be reimbursed, and the Federal Water Project Recreation Act[16] provides that one half of the costs allocated to recreation and fish-wildlife enhancement do not have to be reimbursed, provided that a non-federal public body will agree to administer the recreation, fish-wildlife aspect of the project, pay the maintenance costs of such, and pay the other half of the costs of the project incurred for these purposes.

Section 7 of the original Reclamation Act provides for the use of eminent domain in connection with federal reclamation projects, Section 8 is concerned with the role of state law in relation to federal power:[17]

> That nothing in this Act shall be construed as affecting or intended to affect or to in any way interfere with the laws of any State Territory relating to the control, appropriation, use, or distribution of water used in irrigation, or any vested right acquired thereunder, and the Secretary of the Interior, in carrying out the provisions of this Act, shall proceed in conformity with such laws, and nothing herein shall in any way affect any right of any state or of the Federal Govern ment or of any landowner, appropriator, or user of water in, to, or from any interstate stream or

> the waters thereof: Provided, That the right to the use of water acquired under the provisions of this Act shall be appurtenant to the land irrigated, and beneficial use shall be the basis, the measure, and the limit of the right.

Section 8 has been construed by the Supreme Court as merely requiring the United States to comply with state law when it becomes necessary to acquire water rights, "[b]ut the acquisition of water rights must not be confused with the operation of federal projects.[18] The court later further restricted the extent to which state law can influence reclamation projects, emphasizing that "We do not suggest that where Congress has provided a system of regulation for federal projects it must give way before an inconsistent state system."[19]

Although reclamation law was originally limited to dealing with irrigation, it now applies to power production, municipal, commercial and industrial uses, as well as to recreation and fish-wildlife conservation.[20] As early as 1906, Congress authorized the use of reclamation water for ". . . towns and cities on or in the immediate vicinity of irrigation projects."[21] The Reclamation Project Act of 1939[22] authorized the federal government to furnish water for municipalities or other "miscellaneous purposes." Most commentators agree that these "miscellaneous purposes" include domestic and industrial supply.

Under the 1939 act, the federal government has two choices in contracting for municipal or other water supplies. (1) Make a contract requiring repayment in a maximum of 40 years of interest not over 3 1/2 per cent. (The interest charges are in theory discretionary, but have been included

in every municipal water supply contract since 1949.)[23] (2) Contract to supply water for a period not exceeding 40 years at rates at least sufficient to produce revenue adequate to cover annual operation and maintenance costs.

The 1939 Act also provides that every contract user is entitled to renewal of his contract, subject to renegotiation of charges and other matters. The federal government gives an appropriative right to users during the term of their use, "a first right to a stated share or quantity of the project's water supply for municipal, domestic, or industrial use."[24]

2. The Federal Flood Control Act of 1944

The first major federal flood control activities began with the creations of the Mississippi River Commission in 1879[25] and the Missouri River Commission in 1884.[26] Each commissioner was assigned the responsibility for developing plans to improve the navigability of its respective river and to prevent flooding. Federal jurisdiction over flood control matters on all navigable rivers began with the creation of the Inland Waterways Commission in 1908.[27]

Federal interest in flood control intensified after extensive flooding of the Mississippi River early in the 20th Century. The creation of the Tennessee Valley Authority in 1933[28] established a new pattern of federal power over watercourses and natural resources in order to facilitate the full development of a specific river basin area.

The Flood Control Act of 1936[29] designated the U.S. Army Corps of Engineers as the primary federal agency in dealing with flood control. This act also set forth the "ABC requirement" of local involvement and co-operation in flood control projects; i.e., that no money will be appropriated by the federal government unless the states furnish assurances that they will give full cooperation.[30] The Flood Control Act of 1944[31] extended the definition of flood control to include channel and major drainage improvements and authorized the Corps of Engineers to construct, operate, and maintain recreation facilities in reservoir areas. This act also empowered the Corps to prescribe regulations for the use of storage water allocated for flood control or navigation and to contract for the sale of surplus water. The provisions of the act apply to any reservoir constructed with the help of federal funds.

3. The Watershed Protection and Flood Prevention Act of 1954.

Watershed protection encompasses the federal government's efforts to develop small upstream projects for soil erosion prevention and flood control, as opposed to the grant projects on major watercourses. The primary watershed protection legislation is the Watershed Protection and Flood Prevention Act of 1954.[32] This act and its amendments set forth three ways in which the federal government, through the U.S. Department of Agriculture, may help local organizations

with small watershed projects: (1) by giving technical assistance in building and maintaining projects; (2) giving financial assistance; (3) extending long-term credit.

4. The Federal Water Power Act of 1920

Federal regulation of water as a power source began in 1896,[33] but piecemeal legislation was the rule until the Federal Water Power Act of 1920[34] established a national policy for the use and development of water power on public lands and navigable streams.[35] The Federal Water Power Act of 1920 established a national policy for the use and development of water power on public lands and navigable streams. The Federal Water Power Act of 1920 put a firm federal grip on water power projects by limiting licenses for hydroelectric power developments to 50 years and by providing for takeover by the federal government at the expiration of the original licensed period.[36] More importantly, the Act established the Federal Power Commission, which was later reorganized by Congress as an independent agency.[37] The FPC has the responsibility of properly planning and utilizying the nation's valuable water power resources. The Commission studies plans for proposed federal power projects and makes recommendations. Its main power is its control of licensing for the use of sites located on watercourses over which Congress has jurisdiction.

Two provisions of the Act are of interest because of their possible relationship to water supply. The first is an amendment[38] that allows th FPC to license all or part of a federal hydroelectric power system for non-power purposes.

and therefore conceivably for water supply purposes. The second provides for the issuance of licenses which allow the holder to use surplus water from a federal dam.[39]

5. The Water Supply Act of 1958

The Water Supply Act of 1958[40] serves as the primary authorization for the majority of federal water supply and storage activities. The Act is of special importance in that it is designed to look to future water needs - provisions are made whereby the federal government, through the Corps of Engineers and the Bureau of Reclamation, can incorporate additional storage into a water supply project in anticipation of future demands. The act allows states or local interests to contract with the agency involved for storage space in a proposed reservoir, with the stipulation that the state or local interest will pay for the cost of such storage space. The cost can be deferrred over the life of the project, up to fifty years, and can be federally funded up to 30% of the project's total estimated cost. More important, however, is the fact that the act elevated ". . . water supply from an incidental function to one of the primary purposes of reservoir construction. . ."[41] by the federal government.

The Water Supply Act specifically allows storage water to be contracted for by the state or local interests "for present or anticipated future demand or need for municipal or industrial water,"[42] and implies that the contract water may also be used for domestic and "other purposes."[43] In addition, a 1961 amendment to the Federal Water Pollution

Control Act authorizes the storage of water in federal reservoirs for the purpose of water quality control.[44] The 1944 Flood Control Act[45] expressed a change in Congressional policy from single purpose impoundments to allowing the fullest range of established and potential uses possible and since that time virtually all federal reservoir projects have been multiple-purpose, allowing the storage water in them to be earmarked for a variety of potential uses.

The administrative procedure for modifying the use of water supply storage is not complicated. Each project has its own authorizing legislation, which usually consists of one sentence in an amendment to a water statute. This leaves the agency that built the project pretty much on its own in regard to administering the project. Thus there are two means by which to change the use of water stored for water supply purposes: Persuade the agency in charge of the project to allow the change in use; or persuade Congress to amend the authorizing legislation. Changing the use of storage water involves the problems of acquiring the rights to use the water for a different purpose; of complying with federal and state procedures, which may lead to federal-state conflicts; of complying with various environmental guidelines; and possible disruptions of repayment schedule.

Every federal reservoir project comes into existence as the result of a study analyzing cost-benefit feasibility. Each project, once authorized, is placed under the auspices

of an administrator by the agency in charge of its construction. Because the authorizing legislation leaves the agency that builds a project on its own as far as the administration of the project goes, the administrator will have considerable discretion in the operation of the project.[46] As a practical matter, the administrator's primary concern will be to insure that the federal government is repaid according to the schedule outlined for the project, and to make the cost-benefit ratio of the project as favorable as possible. Indeed, the only major concern about the administration of a given project by the statute itself is that the government be repaid on time.[47] The easiest means by which to change the use of water supply storage is thus to convince the administrator of the particular project involved that the proposed change in use of the water will enhance, or at least not diminish, the cost-benefit ratio and that the existing repayment schedule will not be unduly disrupted. (As a practical matter, this is probably the only way by which the use can be converted. In theory a modification of the authorized use could also be effected by amending the authorizing legislation. Legislatures are as influenced by economics as administrative agencies are, however, and if the cost-benefit study renders a proposed change of use unattractive to the administrator of a project, it will most likely also render the change unattractive to Congress.)

There may be a problem in switching the use of contracted water to a use not stipulated in the authorizing legislation of a project. The annual appropriation for

Corps flood control projects in advanced planning and construction stages is subject to the express condition that "no part of this appropriation shall be used for projects not authorized by law."[48] There is also a section in the Water Supply Act that requires Congressional approval for modification of a reservoir project which would "seriously affect the purposes for which the project was authorized, surveyed, planned, or constructed, or which would involve major structural or operational changes."[49] The problem is not likely to arise, however, because virtually all recent projects are authorized for all conceivable purposes. Therefore modification of the use of contracted water from them would merely be a switch from one authorized purpose to another, and would not be sufficient enough to require Congressional approval. Coal conversion will probably fit into the category of "industrial" use, a purpose for contract water specifically contemplated by the Water Supply Act. Apparently, then, all a local interest will have to do to change the use of its contracted water storage is apply to the agency involved, which may then revise "the existing lease or agreement to evidence the conversion of its rights to the use of the storage."[50] This is apparently so for projects build prior to the passage of the Water Supply Act as well as for those constructed after 1958.

The only limitations upon any such change expressed by the Act is that "all authorized purposes served by the project shall share equitably in the benefits of multiple

purpose construction.[51] At least two cases have held that where a unit of a project cannot serve its principle anticipated purpose, it can be used to advance any other authorized purpose of the project.[52]

The administrative procedure aside, there are problems that will be encountered in attempting to alter the use of water supply storage. The National Environmental Policy Act requires that an environmental impact statement be filed for "every recommendation or report on proposals for legislation and other major Federal actions."[53] Courts have applied this requirement broadly, with one court declaring that "triviality of the federal action will not necessarily mean no impact statement is required."[54] Coal conversion, with its tremendous water needs and potential for thermal pollution, will assuredly affect the environment enough that a N.E.P.A. impact statement will be required before water supply storage may be converted to its use. In addition, the Water Resources Planning Act of 1965[55] authorized the Water Resources Council to establish principles, standards and procedures for planning and evaluating federal water and related land resource projects. These standards were published in 1971 and became effective October, 1973.[56] The standards state two objectives: enhancement of national economic development, and enhancement of the environment. Thus both an economic study and an environmental study are required to change the use of reservoir.[57] The N.E.P.A. impact statement can serve as the economic study, but the environmental study is not to be done on a dollars and cents basis, but rather the W.R.C. guidelines give a detailed procedure for determining the

environmental impact.[58] The guidelines require all alternative plans to be considered.[59]

Another problem involves the nature of the rights vested in the stored water. The Water Supply Act of 1958 leaves the acquisition of rights to the water to be stored to the contracting party, who must follow state procedures in acquiring them, which is usually done either through condemnation proceedings or by negotiated purchase. The rights acquired by a local interest may allow the storage water to be used for coal conversion or may not, depending on what system of water law the state uses. Kentucky water law is a sort of modified riparian rights system wherein most parties who wish to draw from the state's navigable waters must apply for and receive a permit before doing so, but with some users exempted from the permit system and free to use the water on a riparian rights basis. The Kentucky permit system is not well drawn and whether a permit holder will be allowed to switch the use of the water from the use for which he acquired the permit is anybody's guess, and the acquired rights in storage water may vary from project to project depending on whether the contracting party is a state interest, a local interest operating under a permit, or a local interest, with riparian rights.

There is also the possibility of a federal-state conflict in changing the use of storage water in that it is the individual state that specifies the nature of a user's rights in the water involved and the means by which

they are to be acquired, but it is the federal agency involved that must approve the change of the use of that water. For example, Kentucky has a statute that would forbid the switch of storage water to coal conversion if such would interfere with agriculture, but federal law does not accord such paramount rights to farmers. There is also a possible, albeit improbable, federal-state conflict if the state should happen to have more stringent environmental standards than the national standards. The outcome of a federal-state conflict is unclear. Federally created water rights would obviously, in light of the Ivanhoe Irrigation District v. McCracken[60] and Nebraska v. Wyoming[61] decisions, prevail over state-created water rights, but the federal government usually prefers to cooperate with the states in water matters.

6. The Federal Water Pollution Control Act of 1972

In addition to regulating the discharge of pollutants in waters of the United States, Federal water pollution control legislation also affects water storage. The 1961 Amendment to the Federal Water Pollution Control Act[62] reads "In the survey or planning of any reservoir by the Corps of Engineers, Bureau of Reclamation, or other Federal agency, consideration shall be given to inclusion of storage for regulation of streamflow for the purpose of water quality control, except that any such storage and water releases shall not be provided as a substitute for adequate treatment or other methods of controlling waste at the source." The 1972 Federal Water Pollution Control Act Amendments[63] seem to have directly dealt with the question of whether water stored for water quality

purposes can later be converted to some other use: "In the case of any reservoir project authorized for construction by the Corps of Engineers, Bureau of Reclamation or other Federal agency, when the Administrator of the Environmental Protection Agency determines . . . that any storage in such project for regulation of streamflow for water quality is not needed, or is needed in a different amount, such project may be modified accordingly by the head of the appropriate agency, and any storage no longer required for water quality may be utilized for other authorized purposes of the project when in the opinion of the head of such agency, such use is justified . . ."[64]

Thus there is authorization for modifying the use of water quality storage. There are, however, several restrictions. Water stored for water quality is not going to be free for coal gasification unless it is not needed for water quality control; the federal government is going to have an interest in seeing that the water is used for the contracted purpose, an interest that a long history of cases has shown will prevail over any conflicting state or local interests.

The resolution of the question as to whether the contracted water is in fact needed for water quality purposes may ultimately hinge on when the contract was entered into. There have been several amendments to the Federal Water Pollution Control Act since 1961, the most significant being those of 1972. The 1972 F.W.P.C.A. amendments made one significant change in the 1961 act, this being that whereas under the 1961 act the need for and value of storage for

water quality purposes was determined by the federal agency creating the project, since 1972 "the need for, the value of, and the impact of, storage for water quality control" shall be determined by the EPA Administrator.[65] The 1961 act and the 1972 act taken together have been judicially interpreted to mean that it is up to the Corps to determine the need for water quality storage for projects that were beyond the planning or authorization stage as of the passage of the 1972 amendments, but for the EPA Administrator to determine if the project was not beyond the authorization stage as of 1972.[66] That the Corps and EPA might have different views as to whether storage water is needed for water qualtiy purposes hardly needs elaboration.

The 1972 amendment also places some limitations on the modification of use of water quality storage. These are that if water quality was to provide between 15 and 25% of the benefit of a project, water stored for water qualtiy may be used for another authorized project only with Congressional approval; if water quality was to provide more than 25% of the projected benefits of the project, the water earmarked for water quality purposes may not be used for any other purpose under any conditions.[67] If water quality was to provide less than 15% of the benefits of a project, the storage water may be converted to some other use upon the EPA Administrator's determination (or, presumably, the Corp's determination for projects beyond the authorization stage as of 1972) that the storage is not needed for water quality purposes.

In addition, the same problems with regard to acquiring the necessary water rights and complying with the N.E.P.A. impact statement and Water Resources Council standards that exist for changing the use of water supply storage also pertain for changing the use of water quality storage.

N.E.P.A. requires notice to the public with regard to environmental impact statements, so challenges from environmental groups concerning conversion from water quality to coal gasification are inevitable. The major pollution problem arising from water being used for gasification will be thermal pollution. The possible detrimental effect on water quality include reducing species' diversity or abundance, reducing capacity of water to hold disssolved oxygen, and indirect effects on aquatic organisms, such as changes in metabolic rate, respiration, behavior and migration, feeding rates, growth and reproduction, and increased susceptibility to parasites and diseases.[68] Thus even if the water is not needed to reduce the effects of pollution, the fact that the use of it for gasification may add to pollution may prohibit its being used for that purpose.

C. Federal Regulatory Powers and Coal Conversion.

Federal water resource policies will undoubtedly have significant impact on the development of a coal conversion industry in Kentucky. The construction of physical facilities such as levees, dams and reservoirs under various flood

control programs or the Water Supply Act of 1958 will may substantially increase (or decrease) the availability of water at a particular site. In some cases, part of the water impounded in these facilities could be utilized for coal conversion purposes.

However, some aspects of federal regulatory policies will place serious constraints on the development of an independent water allocation program at the state level. For example, the state could not authorize diversions under its water permit system that interfered with federal regulatory powers over navigation. This may prove troublesome in connection with the location of large-scale coal conversion facilities on the Ohio River and its tributaries. Moreover, thermal discharges by coal conversion facilities clearly will be subject to existing federal water pollution control legislation.[69]

No state water allocations system can ignore the existence of federal powers in the water resources area. In the past decade or so there has been an increasing tendency to treat water resources development as a national problem.[70] This does not mean that a state has no voice with respect to the internal allocation of water resources within its boundaries, but it does suggest that the various states and the federal government will have to coordinate their respective policies in the water resources area.[71] Common goals and priorities should be agreed upon and pursued in a cooperative fashion. If the federal government maintains its

commitment to a policy of energy independence and continues to regard the development of a coal conversion industry as a means of achieving this goal, the chances for agreement on a water allocation program for this purpose seem very good.

1. U.S. Const. Art. 1, §8.

2. 22 U.S. (9 Wheat.) 1 (1824).

3. Gilman v. Philadelphia, 70 U.S. (3 Wall.) 713, 725 (1865).

4. The Genesse Chief v. Fitzhugh, 53 U.S. (12 How.) 443 (1851); The Daniel Ball, 77 U.S. (10 Wall. 557 (1870). The Court in Daniel Ball declared: "Those rivers must be regarded as public navigable rivers in law which are navigable in fact. And they are navigable in fact when they are used, or are susceptible of being used, in their ordinary condition, as highways for commerce, over which trade and travel are or may be conducted in the customary modes of trade and travel on water." 77 U.S. at 563.

5. United States v. Rio Grande Dan & Irr. Co., 174 U.S. 690 (1899).

6. United States v. Appalachian Power Co., 311 U.S. 377 (1940).

7. Baldwin, The Impact of the Commerce Clause on Riparian Rights Doctrine, 16 U. Fla. L. Rev. 370 (1963); Trelease, Federal Limitations on State Water Law, 10 Buffalo L. Rev. 399 (1961). Federal jurisdiction under the Federal Water Pollution Control Act Amendments of 1972 has recently been expanded to cover waters that are clearly nonnavigable. United States v. Holland, 373 F.Supp. 665 (M.D. Fla. 1974).

8. First Iowa Hydro-Electric Cooperative v. Federal Power Commission, 328 U.S. 152 (1946).

9. United States v. Twin City Power Co., 350 U.S. 222, 227 (1956).

10. F. Trelease, Federal-State Relations in Water Law 45-46 (1971).

11. Sanitary District of Chicago v. United States, 266 U.S. 405 (1925).

12. Act of Oct. 5, 1949, ch. 593, 63 Stat. 701.

13. Arizona v. California, 283 U.S. 423 (1931); New Mexico v. Backer, 199 F.2d 426 (10th Cir. 1952).

14. 2 Waters and Water Rights 121-122 (R. Clark, ed. 1971).

15. 43 U.S.C. §485 (1964).

16. 16 U.S.C. §460L-12 (1974).

17. Act of June 17, 1902, ch. 1093, §8, 32 Stat. 90, now codified as 43 USC §383 (1974).

18. Ivanhoe Irrigation Dist. v. McCracken, 357 U.S. 275 (1958).

19. Nebraska v. Wyoming, 325 U.S. 589 (1945).

20. 2 Waters and Water Rights, supra note 14, at 112.

21. 43 U.S.C. §567 (1964).

22. 43 U.S.C. §485 (1964).

23. 2 Waters and Water Rights, supra note 14, at 246.

24. Id. at 247.

25. 21 Stat. 37 (1879) now codified as 33 U.S.C. §641 (1970).

26. Act of July 5, 1884, ch. 229, §2, 23 Stat. 147. Repealed in part by Act of June 13, 1902, §1, 32 Stat. 331 at 367.

27. 35 Stat. 1632 (1908).

28. 48 Stat. 58 (1933) now codified as 16 U.S.C. §831 (1974).

29. 33 U.S.C. §§701a et seq. (1970).

30. The "ABC requirement" has since been modified by later Flood Control Acts of 1938 (33 U.S.C.A. 701 c-1) and 1941 (33 U.S.C. 701m).

31. Act of December 22, 1944, ch. 665, 58 Stat. 887, 16 U.S.C. §460d, 825s (1974); 33 U.S.C. §701-1 et seq. (1970); 43 U.S.C. §390 (1964).

32. 16 U.S.C.A. §§1001-1008; 33 U.S.C.A. §701b (1970).

33. 43 U.S.C. §957 (1964).

34. 16 U.S.C. §791a-823 (1974).

35. See Pinchot, The Long Struggle for Effective Federal Water Power Legislation, 14 Geo. Wash. L. Rev. 9 (1945).

36. See Schwartz, Niagara Mohawk v. F.P.C.: Have Private Water Rights Been Destroyed by the Federal Power Act? 102 U. Pa. L. Rev. 31 (1953).

37. 16 U.S.C. §792 (1974).

38. 16 U.S.C. §808 (1974).

39. Act of Aug. 26, 1935, ch. 687, 49 Stat. 803, 840.

40. 43 U.S.C. §389 (b) (1964).

41. Legal Aspects of Water Storage for Flow Augmentation 21 (E.P.A., Water Pollution Control Research Series, 1970).

42. 43 U.S.C. §390b (b) (1964).

43. 43 U.S.C. §390b (A) (1964).

44. 33 U.S.C. §1153 (b) (1) (Supp. 1975).

45. 33 U.S.C. §701-1 (1970).

46. Environmental Defense Fund v. Corps of Engineers, 325 F.Supp. 749, 754-55 (E.D. Ark. 1971).

47. 43 U.S.C. §390b (b) (1964).

48. Public Works Appropriateion Act of 1972, Pub. L. 92-405.

49. 43 U.S.C. §390b (d) (1964).

50. 43 U.S.C. §390f (1964).

51. 43 U.S.C. §390b (b) (1964).

52. Environmental Defense Fund v. Corps of Engineers, 325 F.Supp. 749 (E.D. Ark. 1971); Sierra Club v. Frochlke, 345 F.Supp. 440 (W.D. Wis. 1970).

53. 42 U.S.C. §4332 (c) (1970).

54. City of New York v. United States, 344 F.Supp. 929 (E.D. N.Y. 1972).

55. 42 U.S.C. §1962A-2 (1970).

56. 38 Fed. Reg. 24781 (1973).

57. Comment, Legal Problems in Changing Uses or Coordinating Uses of Keyhole Reservoir, 9 Land & Water L. Rev. 485 (1974).

58. 38 Fed. Reg. 24791-24823 (1973).

59. 38 Fed. Reg. 24781 (1973).

60. 357 U.S. 275 (1958).

61. 325 U.S. 589 (1945).

62. 33 U.S.C. §1153 (b) (1) (Supp. 1975).

63. 33 U.S.C. §§1252 et seq. (Supp. 1975).

64. 33 U.S.C. §1252A (Supp. 1975).

65. 33 U.S.C. §1252 (b) (3) (Supp. 1975).

66. Sierra Club v. Froelke, 392 F.Supp. 130, 132 (E.D. Mo. 1975).

67. 33 U.S.C. §1252A (Supp. 1975).

68. U.S. Water Resources Council, Water for Energy Self-Sufficiency 161 (1973).

69. Maloney, More Heat than Light: Thermal Pollution Versus Heat Energy Utilization, 25 U. Fla. L. Rev. 693 (1973).

70. E.g. Water Resources Planning Act. of 1965, 42 U.S.C. §1962 (1966); Stewart, Federal Water Resource Development, 45 Ore. L. Rev. 322, 324-29 (1966). This policy has also been recognized by the U.S. Supreme Court, United States v. Appalachian Power Co., 311 U.S. 377, 426-27 (1940); First Iowa Hydro-Electric Co-op. v. FPC, 328 U.S. 152, 180-81 (1946).

71. Maloney & Ausness, Administering State Water Resources: The Need for Long-Range Planning, 73 W. Va. L. Rev. 209, 211-212 (1971).

VI. Conclusion

A. Water Allocation Systems and Coal Conversion

Coal gasification and liquefaction facilities will require large quantities of water both for cooling purposes and for use as a raw material in some of the conversion processes. Therefore, the feasibility of coal conversion as a means of meeting the nation's future energy needs depends, at least in part, on the availability of an adequate and dependable water supply in areas where such facilities will be located. This involves legal as well as technological considerations. Not only must the necessary water be physically available, but coal conversion facilities must be able to obtain a sufficient legal interest in it to justify the huge capital outlays that such an enterprise requires.

This study has examined three systems of water allocation in order to determine which of them is most responsive to the needs of the coal conversion industry. The first was the traditional riparian doctrine that prevails in the eastern United States. The second was prior appropriation; which is found in most of the western states. The third approach, state regulation under a permit system, was a hybrid which contained features of both riparianism and prior appropriation.

Each of these systems of water allocation has its advantages and disadvantages. The riparian system, especially where surface water is concerned, is probably

too restrictive for the needs of large-scale industrial users such as the coal conversion industry. Moreover, water rights under the riparian reasonable use rule are uncertain and insecure. On the other hand, water rights under the prior appropriation system are secure, at least in the case of senior appropriators, but the system is inflexible in many respects and may be difficult to establish in a riparian state such as Kentucky. Therefore, the third approach seems to be the most promising one. Properly conceived, a water allocation framework involving state regulation under a permit system will combine many of the best aspects of both riparianism and prior appropriation while avoiding many of the undesirable features of these systems.

While it is not possible at present to propose draft legislation,[1] the remainder of this section will examine some of the features a well-designed water allocation system should have and suggest ways in which Kentucky's existing water rights legislation might be improved. Such a system would advance the interests of the coal conversion industry by improving the efficiency of the state's entire water allocation system. The resulting reduction of waste and the stabilization of water rights would hopefully make more water available for productive uses, thus benefiting both the coal conversion industry and other private water users.

B. A Proposed System of Water Allocation

1. Water Resources Planning

Comprehensive planning, which is essential to a sound water resources policy,[2] requires adequate legislative authority, sufficient financial support and an effective administrative structure.

a. Administrative Structure

Ideally, planning responsibility should be concentrated within a single agency.[3] This objective, is seldom realized in practice, however, because of the large number of federal, state and local governmental agencies involved in water-related activities. It may be more realistic, therefore, to avoid unnecessary fragmentation and duplication of planning effort while providing mechanisms for coordination in those areas where planning responsibility is apportioned among several agencies or levels of government.

In Kentucky, planning authority, as in most states, is widely dispersed among various instrumentalities of state and local government. At the state level the Department for Natural Resources and Environmental Protection has substantial planning responsibilities.[4] However, both the Water Resources Authority[5] and the governor's cabinet[6] also possess planning power in the water resources area. At the local level numerous public

organizations have a limited planning function associated with their respective water resource development activities. These include drainage, levee and reclamation districts;[7] soil and water conservation districts;[8] watershed conservancy districts;[9] flood control districts;[10] and water districts.[11] Furthermore, municipal and county planning units are authorized under the state zoning enabling act to do water resources planning.[12] Finally, planning by federal agencies such as the U.S. Army Corps of Engineers[13] or the Environmental Protection Agency[14] may have a significant impact on the water resources of this state.

Despite the plethora of institutions with planning powers in Kentucky, some coherence is nonetheless achieved in the planning process by both formal and informal provisions for coordination. Federal agencies, usually work closely with their counterparts at the state level. Often such coordination is required by statute,[15] but even in the absence of such provisions, cooperation on an informal basis no doubt occurs. On the state level, the Department for Natural Resources supervises many aspects of local water resource planning. The Department, for example, may study and review all reports concerning or affecting water related projects within the state which are proposed for construction for federal, state or local governmental agencies.[16] In addition, the Department may review proposals for any project which involves the use of state funds in the construction or maintenance of works for flood

control or water development purposes.[17] Finally, local governmental bodies (and private individuals) must obtain a permit from the Department before they can construct any dam, embankment, levee, dike, bridge, fill or other obstruction across or along any stream.[18] Thus, it seems that the Department may prevent local water resource development agencies from acting contrary to its own policies.

The relationship between the Department and the Water Resources Authority is not clearly defined in Kentucky's water resources statute. The Department's planning responsibilities are rather explicitly defined in the statute.[19] Its regulatory powers over consumptive water uses and impoundments[20] as well as its supervisory powers over local public water development agencies and its relatively large staff all suggest that it should be the primary water resources planning agency in the state. The Secretary of Natural Resources and Environmental Protection is a member of the Water Resources Authority[21] and its vice-chairman.[22] This contact between the two agencies would allow at least some form of planning coordination.

The Water Resources Authority, appears to be primarily concerned with the financing, rather than the planning of state and local water resource development projects.[23] Nevertheless, the Water Resources Authority is authorized "to coordinate the programs of

all state agencies in the conservation, development and wise use of public water,"[24] and to "promote the beneficial and proper distribution of water throughout the Commonwealth."[25] Moreover, the Authority has explicit power to engage in water development planning[26] and maintains some supervisory authority over the Department.[27]

It appears that most of the actual planning is carried on by the Department subject to some oversight by the Water Resources Authority. This arrangement may be a satisfactory one, but the relationship between these agencies with respect to water resources planning should be defined more specifically in the statute.

2. The Planning Process

The planning process involves the formulation of goals and objectives, the establishment of priorities, the acquisition of data and the development of implementation procedures and strategies. The planning process may also be divided into developmental and allocative elements. Developmental planning is concerned with increasing the available water supply in a particular area by reducing evaporation and run off or by promoting the transfer of water from another region. This aspect of water resources planning usually involves the location and design of physical structures such as levees, dikes, dams and reservoirs. The Kentucky statute authorizes such

planning by both the Department for Natural Resources and Environmental Protection[28] and by the Water Resources Authority.[29]

Comprehensive planning must also deal with problems of water allocation. Just as zoning and other land use controls must be made in accordance with a comprehensive plan,[30] so also must consumptive use regulations, such as those suggested below, be based on institutionalized planning. Regulation should be viewed, not as an end in itself, but as a means of implementing the planning process. A system of consumptive water use permits coordinated with a program of comprehensive planning is the most effective means of implementing the state's planning objective and of directing development along planned lines.[31]

Ideally, each of the elements of the planning process should be described in some detail by the legislature and further supplemented by administrative regulations.[32] Furthermore, it may be desirable to require a specific document, known as a state water plan. Florida has adopted this approach,[33] which was taken from the Model Water Code.[34]

2. Consumptive Use Permits

As the discussion in chapter 4 indicated, there are a number of weaknesses in Kentucky's existing water permit system. In fact it is doubtful whether the present regulatory structure could be used effectively to implement planning decisions. Accordingly, a

number of suggestions have been made below to remedy this deficiency.

(a) Exemptions

Arguably Kentucky's present regulatory framework is not comprehensive enough to permit the allocation of water resources on a truly rational basis. The definition of "public waters," which includes both surface and ground water,[35] is broad enough,[36] but the regulatory scheme is undermined by a variety of use exemption categories.

(i) Existing Uses

The constitutional implications of water resources regulation by the state have been examined elsewhere in this study. Some states have attempted to avoid or at least minimize the substantive due process issue by exempting presently-exercised riparian rights from regualtion. Existing users may be exempted entirely,[37] given a preferential right to a permit,[38] or required to obtain a permit only when their present use is increased.[39] Other states, such as Florida[40] and Iowa,[41] regulate existing water users in the same manner as new users. Kentucky also regulates existing users[42] and this practice should be maintained.

(ii) Exempted Use Categories

Kentucky exempts a substantial number of water use categories from regulation,[43] as do many other states.[44] Generally this is undesirable. Not only does this practice undermine the effectiveness of the state's water

allocation policy, but it may lead to conflicts between regulated and unregulated water users. In particular, the security of the water use permit right may be compromised by the existence of a large number of unregulated users. Domestic[45] and other small users[46] may be exempted for reasons of economy or administrative convenience, but other users should be subject to regulation.

(iii) Geographical Limitations

Kentucky's water use regulations are applied on a state wide basis. Some states, however, regulate water users only in those areas where serious water resource problems have developed.[47] This approach has merit because it permits the state to act where a response is needed but avoids unnecessary regulation. This approach seems particularly suited to a state where long-term water supply problems are likely to be localized rather than state-wide in nature. Another response is to proceed, as Florida has done, on a regional basis. Under the Florida Water Resources Act of 1972, the state is divided into five water management districts[48] and consumptive use regulations vary from district to district in accordance with the supply and demand pattern of each area. One of these forms of decentralized regulation might be desirable in Kentucky if coal conversion facilities are concentrated along a few water courses instead of being widely dispersed throughout the state.

(b) Specificity of Water Right

One advantage of the permit system over common-law riparianism is that consumptive use rights may be clearly defined in terms of quantity, place of withdrawal, place of use and so forth. Kentucky's present water use regulations conform to this desirable practive.[49]

(c) Beneficial Use

The encouragement of productive uses and the prevention of waste are important objectives of any system of water allocation. This principle is embodied in the terms "reasonable use" and "beneficial use." Nevertheless, it appears that something more than economic efficiency is involved in the distribution of water rights. Water rights in the West,[50] and under some eastern permit systems,[51] are based on a finding of beneficial use. Although this term is not always legislatively defined, it seems that it functions as a threshold standard. A proposed use is either beneficial or wasteful; beneficial uses are permitted while wasteful or nonbeneficial ones are not. Rarely does a water regulatory agency attempt to characterize one use as "more beneficial" than another for purposes of allocating water rights even though an economist might be able to measure the relative efficiency of the respective uses. In other words, beneficial use is an absolute rather than a relative standard and, therefore, provides little help in distinguishing among various alternative water uses. Consequently, consumptive use permits, under both prior appropriation

and eastern non-riparian jurisdictions, are usually awarded on a "first-come, first served" basis as long as the proposed water use is beneficial[52] and water is available.[53] In Kentucky, a permit must be granted for a "useful purpose."[54] The term "beneficial use" is used elsewhere in the statute,[55] but is not defined. Nevertheless, it seems that beneficial use is the basis of permit rights in Kentucky. Therefore, it is recommended that the term be defined and explicitly incorporated into the regulatory structure.[56]

(d) Duration of Water Right

Each system of water allocation must strike a balance between security and flexibility. This problem arises in connection with fixing the length of time for which a permit may be granted. A system of water rights based on permits of perpetual duration, like the prior appropriation system of the West, may suffer from problems of excessive rigidity.[57] If a permit period is too short, however, investment in long-term facilities may be discouraged.[58] Most regulatory proposals provide for permits of specific duration. These range from a ten-year maximum in Iowa,[59] to a fifty-year maximum under the Model Water Use Act.[60] At the present time permits of indefinite duration are granted in Kentucky. This is undesirable. A durational limit of some sort should be placed on the issuance of all permits. The time period allowed should bear some reasonable relationship to the projected duration of the intended

enterprise. In the case of coal conversion, a permit of fifty year's or more duration may be necessary to insure that the original investment is full amortized.

(e) Locational Use Limitations

Locational use limitations are among the most serious weaknesses of the riparian system.[61] Nevertheless, a surprising number of statutory water allocation systems fail to treat these matters very explicitly.[62] In Kentucky, for example, nothing is said about whether a nonriparian can obtain a consumptive use permit.[63] Use beyond the watershed, is expressly authorized if the permission of the Water Resources Authority is obtained.[64]

In prior appropriation jurisdictions, of course, such uses are allowed as a matter of right if the proposed use is otherwise qualified. This position also prevails in Florida[65] and would seem to be the better approach. The agency should not distinguish between riparian and nonriparian applicants and transportation beyond the watershed should be allowed unless it can be shown that existing users would be adversely affected.

(f) Reallocation Mechanisms

Since the beneficial use standard does not distinguish among water uses on the basis of economic efficiency, the initial allocation pattern will almost certainly fail to achieve maximum productive use of the resource. In other words, once the available water supply has been allocated to permittees by the regulatory agency, a net increase in

efficiency may occur if water within the system is reallocated from less productive uses to more productive uses.[66] This feature would be important to the coal conversion industry, as well as other industrial users, since such uses will usually be more productive than agricultural uses. This reallocation may be accomplished by either market or nonmarket mechanisms.

(i) Voluntary Transfers

All other things being equal, the market is probably a better resource allocation mechanism than an administrative agency.[67] Resource allocation decisions are seldom made by collective means in the United States except where the market cannot allocate efficiently (or no market exists at all)[68] or where distributional or other considerations are more important than efficiency goals.[69] Unfortunately, these conditions often occur where water resources are involved. Because of the nature of water, changes in circumstances or location of use sometimes adversely affect other users. These conditions may be regarded as negative externalities. If the costs to other users are not taken into account by the transacting parties, an inefficient allocation of resources may result (at least from society's point of view).[70] In order to prevent this from occurring, some restrictions on voluntary transfers may be necessary. At the present time the Kentucky statute is silent on the issue of transferability. Instead of ignoring the problem, a better approach would be to allow

such transfers to occur, but also to subject them to administrative review in order to protect the interest of other users and the public.[71]

(ii) Involuntary Transfers

Transaction costs or other factors sometimes prevent water users from effecting a more efficient allocation of the resource by means of voluntary transfers.[72] In such cases it may be desirable to allow one user to acquire a water right from another user by condemnation. Municipalities and other public bodies often possess such authority.[73] The power of eminent domain, including the power to condemn water rights, has also been given in many states to public utilities and other private corporations affected with the public interest.[74] Arguably such power could be given to coal conversion facilities. In fact, coal conversion development and demonstration projects in Kentucky currently possess explicit statutory authority to acquire water rights through the exercise of eminent domain.[75] If this power were extended to commercial coal conversion facilities generally, it would allow them to obtain additional water supplies as their operations expanded in the future.

Of course it may be unwise to single out one enterprise for preferential treatment since this smacks of "special interest" legislation. The use of a preference system may provide a suitable compromise. Under this approach, found in some prior appropriation jurisdictions, a system of statutory preference categories is created which

allows a water user in a high preference category to condemn the water right of a water user in a lower preference category.[76] If this approach were adopted in Kentucky industrial users, including coal conversion facilities, should occupy a high preference category, perhaps below only that of municipal water supply and recreational uses.

(iii) Renewal Applications

Many permit systems in the East contain procedures for the renewal of a permit,[77] although some states, such as Kentucky, ignore the matter entirely. Moreover, even where renewal is mentioned, no state, with the exception of Florida,[78] deals effectively with the problem of competing applications where one of the parties is a renewal applicant.[79] This is the stage at which the regulatory system can most effectly promote a particular water use pattern. As long as the available water supplies are ample it is difficult to deny a permit to any applicant whose proposed use meets the beneficial use standard. On the other hand, when there is not enough water to go around, some applicants must be denied a permit. In such situations, contests between renewal applicants and initial applicants are bound to occur. The renewal applicant would have a strong equitable claim to retain his water right, but the other applicants might request for more productive uses. A system that is efficiency-oriented would require that the more productive use be favored. However, since beneficial use is an absolute rather than a compariative standard, one use cannot be deemed more beneficial than another. One approach is to

use preference categories. For example, the regulatory scheme may provide that where competing applications are made before the agency it shall prefer industrial uses over agricultural uses (or vice versa). A better approach, however, would be to favor in such circumstances the applicant whose proposed use best conforms to the state water use plan. In theory, the renewal applicant, if he is displaced by the new applicant, has not been treated unreasonably since his original investment has been fully amortized over the period of his initial permit. However, the regulatory system could properly require the new water user to pay some compensation to the displaced user such as relocation expenses.[80]

(g) Temporary Water Shortage

Kentucky, like most states,[81] fails to provide an adequate mechanism for allocating water during periods of water shortage. Kentucky's approach is essentially crisis-reactive and does little to prevent a crisis condition from arising in the first place.[82] Advance planning for periods of water shortage seems more productive. As part of this planning process, the regulatory agency should adopt a system of permit classification according to source of supply, method of extraction or diversion, use of water, or some combination of these factors.[83] This plan will be implemented upon declaration of the water shortage and would remain in effect until the agency rescinded its declaration of water shortage.[84] Since restrictions on water use would

be applied on a class basis, individual permit users would have some advance idea of their relative priority in time of shortage.

C. Recommendations

Although this study is primarily concerned with the projected water needs of coal conversion facilities (should a coal conversion industry develop in this state), it is difficult and probably undesirable to isolate this problem from the broader issue of water rights generally. A system of water rights which couples comprehensive planning with a rational and effective regulatory policy will benefit all water users, including the coal conversion industry.

Therefore, it is suggested that the Legislature consider a comprehensive revision of KRS chapter 151 in the near future. The existing statute can be improved by (1) clarifying the planning functions of the Department for Natural Resources and Environmental Protection and the Water Resources Authority; (2) expanding the scope of the consumptive use permit system by removing most of the exempted use categories; (3) adopting beneficial use as the basis upon which consumptive use permits will be granted; (4) imposing a durational limit on water use permits and delineating renewal procedures; (5) adopting a scheme for both voluntary and involuntary transfers of water rights; and (6) specifying more explicit provision for dealing with temporary water shortages.

1. For examples of such proposed legislation see Model Water Use Act (1958); Maloney & Ausness, A Modern Proposal for State Regulation of Consumptive Uses of Water, 22 Hast. L. Rev. 523 (1971); F. Maloney, R. Ausness & J.S. Morris, A Model Water Code (1972). The Model Water Use Act was drafted by the Legislative Research Center at the University of Michigan Law School and was approved in 1958 by the National Conference of Commissioners on Uniform State Laws. At the present time the Model Water Use Act has been enacted only in Hawaii, where it was accepted in modified form and affects only ground water. Hawaii Rev. Laws §177-15 (1968). The Model Water Code, on the other hand, is a newer and somewhat more comprehensive proposal. At the present time major portions of it have been incorporated into Florida's water rights legislation. Fla. Stat. Ann. ch. 373 (1975 Supp.).

2. Smith, Total Management of Water Resources, 59 J. Am. Water Works Ass'n. 1335, 1336 (1967).

3. Maloney & Ausness, Administering State Water Resources: The Need for Long-Range Planning, 73 W. Va. L. Rev. 209, 213 (1971).

4. K.R.S. 151.220 (1974).

5. K.R.S. 151.360 (2) (3) (1974).

6. K.R.S. 147.070 (1) (a) (1974).

7. K.R.S. ch. 266-269 (1974).

8. K.R.S. ch. 262 (1974).

9. K.R.S. ch. 262 (1974).

10. K.R.S. ch. 104 (1974).

11. K.R.S. ch. 74 (1974).

12. K.R.S. 100.187 (5) (1974).

13. 33 U.S.C. §701-1 (1970).

14. 33 U.S.C. §§1252; 1258 (d); 1289 (1975 Supp.).

15. E.g. 33 U.S.C. §701-1 (a) (1970); 42 U.S.C. §1962 (1974).

16. K.R.S. 151.220 (2) (1974).

17. K.R.S. 151.240 (1974).

18. K.R.S. 151.250 (1) (1974).

19. K.R.S. 151.220 (1), (3) (1974).

20. K.R.S. 151.250 - 151.299 (1974). These provisions are discussed in R. Ausness & B. Flynn, The Law of Water Allocation in Kentucky 51-53 (U.K. Water Resources Research Inst. Rep. No. 86, 1975).

21. K.R.S. 151.330 (1) (1974).

22. K.R.S. 151.330 (3) (1974).

23. See K.R.S. 151.360 (1); K.R.S. 151.370 - 151.450 (1974).

24. K.R.S. 151.360 (2) (1974).

25. K.R.S. 151.360 (3) (1974).

26. K.R.S. 151.370 (11) (1974).

27. See K.R.S. 151.200 (1974).

28. K.R.S. 151.220 (1974).

29. K.R.S. 151.360 (1); 151.370 (11) (1974).

30. K.R.S. 100.183 (1974).

31. Trelease, Policies for Water Law: Property Rights, Economic Forces and Public Regulation, 5 Natural Resources J. 1, 44-45 (1965).

32. Cf. Cal. Water Code §10000 (West 1971); ch. 58, §11.101 1971 Tex. Laws 165; Conn. Gen. Stat. Ann. §25-5 (b) (Supp. 1971); Ore. Rev. Stat. §§536.300 - 536.310 (1969).

33. Fla. Stat. Ann. §373.036 (1975 Supp.). The text of this provision is set forth as an appendix at the end of this study.

34. Model Water Code §1.07 (1972).

35. K.R.S. 151.120 (1) (1974). However, diffused surface water is not subject to consumptive use regulations. K.R.S. 151.120 (2) (1974).

36. While most states regulate both surface and ground water, Indiana and South Carolina regulate only ground water. Burns Ind. Stat. Ann., Tit. 13-2-2-3 (1973); S.C. Code §70-35 (Supp. 1975).

37. Md. Code Ann., art. 96A, §11 (1964); Minn. Stat. Ann. §105.38 (1975 Supp.).

38. N.C. Gen. Stat. §143 - 215.14 (h) (1974).

39. Burns Ind. Stat. Ann., Tit. 13-2-2-5 (1973).

40. Fla. Stat. Ann. §373.226 (1) (1975 Supp.).

41. Iowa Code Ann. §455A.21 (1971).

42. K.R.S. 151.140 (1974).

43. K.R.S. 151.140 (1974).

44. Md. Code Ann., art. 96A, §11 (1964); Del. Code Ann. §7-6103 (1) (1970 Supp.).

45. Fla. Stat. Ann. §373.219 (1) (1975 Supp.); Iowa Code Ann. §455A.25 (1971); Minn. Stat. Ann. §105.41 (1975 Supp.).

46. N.C. Gen. Stat. §143-215.15 (1974) (100,000 gal./day); N.J. Stat. Ann. §58:1-37 (1966) (70 gal./minute); S.C. Code §70-36 (Supp. 1975) (100,000 gal./day).

47. Burns. Ind. Stat. Ann., Tit. 13-2-2-3 (1973); N.C. Gen. Stat. §143-215.13 (1974); N.J. Stat. Ann. §58:1-36 (1966); S.C. Code §70-36 (Supp. 1975).

48. Fla. Stat. Ann. §373.069 (1975 Supp.).

49. K.R.S. 151.170 (1) (1974).

50. 1A G. Thompson, Commentaries on the Modern Law of Real Property §263 (1964).

51. Iowa Code Ann. §455A.1 (1971); cf. Fla. Stat. Ann. §373.019 (5), 373.223 (1) (a) (1975 Supp.).

52. See F. Maloney, R. Ausness § J. Morris, A Model Water Code 186-188 (1972).

53. The agency, however, should be authorized to reserve some water for future public or quasi-public uses in accordance with the state water plan. See Model Water Code §1.07 (7) (1972); Cal. Water Code §§10500, 10504 (West 1971).

54. K.R.S. 151.170 (2) (1974).

55. K.R.S. 151.110 (1974).

56. See Wash. Rev. Code Ann. 90.54.020 (1) (1972).

57. Lauer, Reflections on Riparianism, 35 Mo. L. Rev. 1, 17 (1970).

58. O'Connell, Iowa's New Water Statute--The Constitutionality of Regulating Existing Uses of Water, 47 Iowa L. Rev. 549, 579 (1962); Trelease, Policies for Water Law: Property Rights, Economic Forces, and Public Regulations, 5 Natural Resources J. 25 (1965).

59. Iowa Code Ann. §455A.20 (1971).

60. Model Water Use Act §406 (1958). The Model Water Code provides for a 20-year maximum for most permits, although of up to 50 year's duration are allowed for public facilities. Model Water Code §2:06 (1972).

61. Lauer, supra note 57, at 13-14.

62. Davis, Australian and American Water Allocation Systems Compared, 9 B.C. Ind. & Com. L. Rev. 647, 700 (1968).

63. See discussion at page 37 supra.

64. K.R.S. 151.200 (2) (1975).

65. Fla. Stat. Ann. §373.223 (2) (1975 Supp.).

66. Johnson, An Optimal State Water Law: Fixed Water Rights and Flexible Market Prices, 57 Va. L. Rev. 345 (1971).

67. Trelease, The Model Water Code, The Wise Administrator and the Goddam Bureaucrat, 14 Natural Resources J. 207, 217-225 (1974).

68. See generally, Calabresi & Malamed, Property Rules, Liability Rules and Inalienability: One View of the Cathedral, 85 Harv. L. Rev. 1089 (1972).

69. See generally Tobin, On Limiting the Domain of Inequality, 13 Law & Econ. J. 263 (1970).

70. Begley, Some Economic Considerations in Water Use Policy, 5 Kan. L. Rev. 499, 506 (1957); Randall, Market Solutions to Externality Problems: Theory and Practice, 54 Am. J. Agr. Econ. 175 (1972).

71. N.C. Gen. Stat. §143-215.16 (G) (1974); S.C. Code §70-37 (b) (Supp. 1975).

72. On the problem of transaction costs generally see Calabresi, Transaction Costs, Resource Allcoation and Liability Rules--A Comment, 11 J. Law & Econ. 67 (1968).

73. E.g. K.R.S. 106.220 (1974).

74. E.g. K.R.S. 96.080; K.R.S. 416.220 (1974).

75. K.R.S. 152.750 (5) (1974).

76. Thomas, Appropriations of Water for a Preferred Purpose, 22 Rocky Mt. L. Rev. 422 (1950); Fisher, Western Experience and Eastern Appropriation Proposals, The Law of Water Allocation in the Eastern United States 75, 123-127 (Haber & Bergen, eds. 1958).

77. Fla. Stat. Ann. §373.239 (3) (1975 Supp.).

78. Fla. Stat. Ann. §373.233 (a) (1975 Supp.).

79. See discussion in Maloney & Ausness, A Modern Proposal for State Regulation of Consumptive Uses of Water, 22 Hastings L. J. 523, 539-40 (1971).

80. In most instances a water user will not cease his operation entirely when his expired permit is not renewed, but instead will be forced to obtain his water from another (and presumably more expensive) source.

81. But see Model Water Use Act §§501,502 (1958); Iowa Code Ann. §455A.28 (3) (1971).

82. K.R.S. 151.200 (1) (1974). See discussion supra at pp. 125-126.

83. See Model Water Code §209 (1972); Fla. Stat. Ann. §373.246 (1975 Supp.).

84. A water shortage is a temporary condition. Cf. Model Water Code §2.09 (1972). This provision is not designed to deal with long-term or permanent water shortage conditions.

APPENDIX

State Water Use Plan

Florida Statutes §373.036 (1974)

(1) The department shall proceed as rapidly as possible to study existing water resources in the state; means and methods of conserving and augmenting such waters; existing and contemplated needs and uses of water for protection and procreation of fish and wildlife, irrigation, mining, power development, and domestic, municipal, and industrial uses; and all other related subjects, including drainage, reclamation, flood-plain or flood-hazard area zoning, and selection of reservoir sites. The department shall cooperate with the division of state planning of the department of administration, or its successor agency, progressively to formulate, as a functional element of a comprehensive state plan, an integrated, coordinated plan for the use and development of the waters of the state, based on the above studies. This plan, with such amendments, supplements and additions as may be necessary from time to time, shall be known as the state water use plan.

(2) In the formulation of the state water use plan, the department shall give due consideration to:

(a) The attainment of maximum reasonable-beneficial use of water for such purposes as those referred to in subsection (1).

(b) The maximum economic development of the water resources consistent with other uses.

(c) The control of such waters for such purposes as environmental protection, drainage, flood control, and water storage.

(d) The quantity of water available for application to a reasonable-beneficial use.

(e) The prevention of wasteful, uneconomical, impractical, or unreasonable uses of water resources.

(f) Presently exercised domestic use and permit rights.

(g) The preservation and enhancement of the water quality of the state and the provisions of the state water quality plan.

(h) The state water resources policy as expressed by this chapter.

(3) During the process of formulating or revising the state water use plan, the department shall consult with, and carefully evaluate the recommendations of, concerned federal, state, and local agencies, particularly the governing boards of the water management districts, and other interested persons.

(4) Each governing board is directed to cooperate with the department in conducting surveys and investigations of water resources, to furnish the department with all available data of a technical nature, and to advise and assist the department in the formulation and drafting of those portions of the state plan applicable to the district.

(5) The department shall not adopt or modify the state water use plan or any portion thereof without first

holding a public hearing on the matter. At least ninety days in advance of such hearing, the department shall notify any affected governing boards, and shall give notice of such hearing by publication within the affected region pursuant to the provisions of chapter 120, except such notice by publication shall be extended at least ninety days in advance of such hearings.

(6) For the purposes of this plan the department may, in consultation with the affected governing board, divide each water management district into sections which shall conform as nearly as practicable to hydrologically controllable areas and describe all water resources within each area.

(7) The department shall give careful consideration to the requirements of public recreation and to the protection and procreation of fish and wildlife. The department may prohibit or restrict other future uses on certain designated bodies of water which may be inconsistent with these objectives.

(8) The department may designate certain uses in connection with a particular source of supply which, because of the nature of the activity or the amount of water required, would constitute an undesirable use for which the governing board may deny a permit.

(9) The department may designate certain uses in connection with a particular source of supply which, because of the nature of the activity or the amount of water required, would result in an enhancement or improvement of

the water resources of the area. Such uses shall be preferred over other uses in the event of competing applications under the permitting systems authorized by this chapter.

(10) The department, in cooperation with the division of state planning of the department of administration, or its successor agency, may add to the state water use plan any other information, directions, or objectives it deems necessary or desirable for the guidance of the governing boards or other agencies in the administration and enforcement of this chapter.