

b. Promoting Development

The appropriation doctrine has long been characterized by a policy of promoting water development by giving security to investors in such development. As the Wyoming court put it in 1896:

The climate is dry; the soil is arid and largely unproductive in the absence of irrigation . . . . Irrigation . . . cannot be accomplished with any degree of success or permanency without the right to divert and appropriate water of natural streams for that purpose and a security afforded to that right.<sup>109</sup>

In fact, a study prepared for the National Water Commission concluded that the prime reason for the continued vitality of the appropriation doctrine is the economic development goal it accomplishes.<sup>110</sup>

Although the tradition of promoting development through security of investment began with surface streams, that policy was not forever limited to surface streams. The rule of absolute ownership, which dominated percolating ground water law in this country during the last half of the nineteenth century,<sup>111</sup> freely allows a landowner to extract ground water without regard to the impact upon a neighbor's well.<sup>112</sup> The doctrine's failure to protect well owners in their source of supply was an important factor in its subsequent decline;<sup>113</sup> fear was expressed that people would not invest to develop wells if a neighbor might later

sink a deep well that dries up the earlier well.<sup>114</sup> In contrast the reasonable use rule, which became popular during the early part of the twentieth century,<sup>115</sup> provided a measure of protection. It allowed one well owner to interfere with another's well only if his use was reasonable under the circumstances.<sup>116</sup> Ironically, appropriation doctrine advocates later criticized the reasonable use doctrine for failing to provide enough security of investment.<sup>117</sup> The objection was that anyone owning land overlying the source of supply might, at any time, commence a "reasonable" use of water that would interfere with the supply to prior users.

In a number of western states, preventing or curtailing overdevelopment was no doubt a stronger force behind extension of the appropriation doctrine to percolating ground water or adoption of the reasonable pumping level concept, or both, than was promoting development. In others, the reverse appears to have been the case. Nowhere was concern about promoting ground water development evidenced more strongly than in Idaho. In 1933 the Idaho court had held<sup>118</sup> that under the common law of appropriation a senior well owner's historic means of diversion was protected against interference without regard to its reasonableness.<sup>119</sup> The court's approach soon drew strong criticism from a commentator in an engineering journal on

the ground that it would impede water development: "[I]n many areas the first appropriator could require damages from every subsequent appropriator and each subsequent appropriator, in turn of priority could require damages from all later appropriators, until the last one would have to pay tribute to all."<sup>120</sup> At the annual state bar meeting in 1949, a leading Idaho water law authority discussed the need for a ground water code. He made the point that ground water is "probably . . . the greatest undeveloped asset or resource" in the state.<sup>121</sup>

Subsequent statutory enactments in Idaho reflect the same sentiment. In 1951 the legislature enacted a ground water code affirming earlier judicial adoption of the appropriation doctrine for all ground water,<sup>122</sup> and two years later it added:

. . . while the doctrine of "first in time is first in right" is recognized, a reasonable exercise of this right shall not block full economic development of underground water resources, but early appropriators of underground water shall be protected in the maintenance of reasonable ground water pumping levels as may be established by the state reclamation engineer has herein provided  
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This statute recognizes that: (1) stored ground water is not always used most economically to provide lift for the wells of early appropriators, and (2) absolute protection of historic means of diversion may hinder economic development.<sup>124</sup> The statutory safety valve against counterproductive security of investment under

the priority principle is the reasonable pumping level concept.

In concluding this examination of the economic development tradition of the appropriation doctrine as it relates to ground water pumping levels, the following observations by a lawyer-historian are instructive:

[The rule of priority] was put forth . . . as an offensive doctrine justified by its power to promote economic development. In a capital scarce economy, its proponents urged, the first entrant takes the greatest risks; without the recognition of a property right in the first developer -- and a concomitant power to exclude subsequent entrants -- there cannot exist the legal and economic certainty necessary to induce investors into a high-risk enterprise.

. . . .

The [subsequent] attack on the rule of priority reveals the basic instability of utilitarian theories of property. As property rights came to be justified by their efficacy in promoting economic growth, they also became increasingly vulnerable to the efficiency claims of newer competing forms of property. Thus, the rule of priority, wearing the mantle of economic development, at first triumphed over natural use. In turn, those property rights acquired on the basis of priority were soon challenged under a balancing test or "reasonable use" doctrine that sought to define the extent to which newer forms of property might injure the old with impunity.<sup>125</sup>

With slight revision this could have been written about modern ground water law in those western states where: (1) the doctrines of absolute ownership, reasonable use or correlative rights were rejected for the appropriation doctrine to promote economic development by giving security of investment, (2) the priority principle was

initially regarded as giving a secure right to historic diversion systems without regard to their reasonableness, but (3) the initial inclination was replaced by a reasonable pumping level approach. In a state like Idaho, then, it might be said that while great security of investment (even absolute protection of historic diversion systems) may initially have been perceived as promoting development, this approach "became increasingly vulnerable to the efficiency claims of newer competing forms of property." The competing claims were those of newcomers who wanted to take stored ground water that was providing lift for senior appropriators and use it more productively on the surface.

The commentary quoted above was in fact written about developments in American property law from 1780 to 1860 as the country moved from an agrarian to a more industrialized economy. It demonstrates that the tension between promoting economic development by affording security of investment and blocking new economic growth with too much security is neither peculiar to the pumping level problem nor of recent origin.

## 2. A Cost-Benefit Perspective

The dual objectives of promoting development and preventing or curtailing overdevelopment blend together in a policy of optimum development, i.e., neither too

little nor too much. The statutes that call for full or maximum economic development could readily be interpreted to mean optimum development in the sense just stated. The Idaho court might have had this in mind in Baker v. Ore-Ida Foods, Inc. when it said:

Idaho's Ground Water Act seeks to promote "full economic development" of our ground water resources. . . . We hold that the Ground Water Act is consistent with the constitutionally enunciated policy of promoting optimum development of water resources in the public interest. Idaho Const. art. 15, § 7. Full economic development of Idaho's ground water resources can and will benefit all of our citizens. Trelease, F.J., Policies for Water Law: Property Rights, Economic Forces and Public Regulations, 5 Nat. Res. J. 1 (1965); . . . .<sup>126</sup>

The cited article by Dean Trelease cautions that maximization "does not mean . . . that man should develop and use water compulsively. . . . What is to be maximized is welfare from water use, not water use itself."<sup>127</sup> Nor is the proper concern with immediate benefits only; the problem is one of optimum allocation of water resources over time.<sup>128</sup>

At the national level, planning for optimum water development has long been dominated by cost-benefit analysis.<sup>129</sup> The Trelease article cited in Baker v. Ore-Ida Foods, Inc. regards extension of cost-benefit analysis from its traditional sphere of federal public works expenditures to new private water development projects as being "[f]or the most part . . . obvious."<sup>130</sup> Further, a comprehensive study prepared for

the National Water Commission specifically advocates using a cost-benefit approach in ground water management.<sup>131</sup> Serious pursuit of a goal of optimum economic development in the setting of ground water pumping levels hardly seems possible without resort to some form of cost-benefit analysis.

Thorough treatments of cost-benefit analysis, including such difficulties as the selection of a proper discount rate to cope with the time dimension of resource allocation decisions and the avoidance of double counting of costs or benefits, are readily available.<sup>132</sup> Discussed below are some special considerations that arise in the use of cost-benefit analysis to implement the reasonable ground water pumping level concept.

a. Physical Complexity of Ground Water Management

Numerous potential physical effects from ground water withdrawal must be identified and quantified in dollars if the goal is to maximize net benefits from the resource over time.<sup>133</sup> One such effect is interference with the supply to other wells.<sup>134</sup> Another is interference with surface water rights if the aquifer is connected with a surface stream, either by receiving recharge from it or discharging into it.<sup>135</sup> Yet another is land compaction and subsidence.<sup>136</sup> In the San Joaquin Valley of California, for example, the land

surface has subsided as much as 29 feet in some areas and about 4200 square miles have experienced subsidence exceeding one foot.<sup>137</sup> The undesirable effects of land subsidence include alteration of the flow of surface streams and irrigation canals, breakage of pavement, collapse of well casings, obsolescence of topographical maps, and damage to buildings when pilings extend into the zone of subsidence. Ground water pumping can also affect the quality of future withdrawals if water level decline increases recharge from a polluted source.<sup>138</sup> The more dramatic occurrences have involved salt water intrusion into coastal aquifers, but extensive saline water intrusion of inland aquifers has also been reported.<sup>139</sup> Another environmental impact of ground water level decline may be the drying up of phreatophytes that provide wildlife habitat.<sup>140</sup>

Of course, not all of these potential physical consequences will be involved in every reasonable pumping level problem. In general, as one moves from widespread overdraft to localized overlapping cones of pressure relief or depression, significant physical consequences other than well interference should become less likely. Also, in a given state, widespread overdraft might be regulated more under a safe annual yield or natural recharge limitation<sup>141</sup> than under a reasonable pumping level statute. Nevertheless, to the extent that reasonable pumping levels are part of an

overall program to optimize ground water use, calculation of benefits and costs would seem essential. That, in turn, requires knowledge of the physical consequences of different alternatives. Unfortunately, all too often adequate hydrogeologic data to predict accurately the physical consequences of ground water withdrawal is lacking in specific cases.<sup>142</sup>

b. Uncertainty in the Psychology of Policy Implementation

Suppose a proposal is made to drop the water table below the economic reach of some senior appropriators, forcing them out of existence, because it is thought this will facilitate development of newer more productive uses of the water. Despite the expected short run economic gain, it must be asked whether the decrease in security of investment will reduce economic development in the long run. Thus, full cost-benefit analysis of ground water pumping level policies requires the making of conclusions (or assumptions) about how security of investment affects economic development.

A major difficulty is that little is known about the relationship between security of investment and economic development of ground water. The appropriation doctrine tradition holds that a fair degree of security is needed to promote development.<sup>143</sup> Another

line of thought, associated with an article entitled "The Tragedy of the Commons,"<sup>144</sup> leads to the exact opposite conclusion. This view calls ground water, unlike coal for example, a "common pool" resource because extracting ground water from one well can affect the availability of water at other wells.<sup>145</sup> Suppose the law does not limit ground water withdrawals but allows anyone to take as much as he can capture.

The tragedy of the commons develops in the following way: Overlying owners drill wells in a common groundwater basin. After a period of time, total extraction approximately equals total replenishment to the basin, so that the basin is in a steady-state condition. Each owner, at that point, calculates whether it is to his benefit to increase the amount he pumps. The advantage to him of an additional amount of water almost invariably exceeds the disadvantage to him of a slightly lowered water table in the basin overall. The owner will ordinarily conclude that he should pump the additional amount: "But this is the conclusion reached by each and every rational [overlying owner] . . . sharing a commons. Therein is the tragedy. Each man is locked into a system that compels him to increase his [pumping] . . . without limit -- in a world that is limited."<sup>146</sup>

This suggests that a rule of capture, which affords no security of investment, will cause not underdevelopment but overdevelopment of a common pool resource. The rationale is that a rule of capture will stimulate efforts by each well owner to capture as much water as fast as possible before someone else gets it.

Which view about the relationship of security of investment and economic development is correct --

traditional appropriation doctrine thinking or the tragedy of the commons analysis? If optimum, economic development is a goal of ground water management under the appropriation doctrine, the answer is important in setting pumping levels.

In theory, the question is subject to empirical investigation. If the appropriation doctrine tradition is correct, then the absolute ownership rule should impede ground water development because it is essentially a rule of capture.<sup>147</sup> If the tragedy of the commons view is correct, then the absolute ownership rule should lead to overdevelopment. In practice, however, empirical investigation can become terribly complex. For example, Texas has the absolute ownership doctrine while Kansas and New Mexico have the appropriation doctrine for percolating ground water.<sup>148</sup> Tragedy of the commons analysis suggests overdevelopment should be worse in Texas, while traditional appropriation doctrine thinking leads one to expect relative underdevelopment in Texas. Yet, an observer of ground water use in the High Plains region of those states (albeit a self-acknowledged casual observer) reported in 1961 that mining was occurring and tolerated in all three states and that the patterns of development in them were not dissimilar.<sup>149</sup>

Even if the observation was correct, it fails to refute traditional appropriation doctrine thinking

about security of investment. Early High Plains settlers believed their ground water came from an inexhaustible source -- a gigantic underground river that originated in the Rocky Mountain region to the northwest and flowed under the High Plains on its way to the Gulf of Mexico. This theory prevailed well into the 1950's.<sup>150</sup> Given this belief, it is hardly surprising that abstract legal insecurity of investment under the absolute ownership doctrine did not impede development in Texas. Furthermore, even if some Texans began to doubt the inexhaustible supply theory, there was also the economic impact of favorable agricultural prices after World War II.<sup>151</sup> As the editor of a southwest farm journal wrote in 1948: "it is unsound to advocate to a farmer that he curtail pumping when with top market prices he can pay for his irrigation installation in the first year of operation."<sup>152</sup>

Perhaps the traditional view that lack of security impedes development is correct in situations requiring heavy investment of labor and capital that probably could not be recouped without legally protected security of investment. The contrary view that insecurity, i.e., a rule of capture, leads to overdevelopment may be correct for situations in which large initial investment either is not required to capture the resource or can be quickly recouped under prevailing economic conditions. If so, the actual effect of a policy of

reduced security of investment under the reasonable pumping level concept will depend upon: (1) how landowners view their prospects of capturing enough ground water to recoup development costs before someone with a deeper economic reach puts them out of business and (2) their willingness to gamble.

The premise of some reasonable pumping level statutes that absolute protection of security of investment stifles economic development<sup>153</sup> presents an analogous situation. Opponents of this premise contend that junior well owners must be held liable for interference with the historic diversion systems of senior wells to avoid overdevelopment.<sup>154</sup> Their rationale is that without liability, a junior will pump as long as the benefits he obtains exceed his own water extraction costs even though the total costs, i.e., his own costs plus increased pumping costs to seniors, exceed the benefits. This is the tragedy of the commons analysis all over again. Which view is correct should depend upon: (1) the availability and reliability of predictive ground water basin models, and (2) the willingness of landowners to gamble on new development.

Suppose, for example, that a landowner wants to put in a new well. Over a given time period, his expected gross benefits are \$100,000 and his expected pumping costs are \$60,000. In addition, the well will cause water level decline that increases the pumping

costs of senior well owners by \$20,000. Under a rule making him liable to seniors for interference with their historic diversion systems, he would develop the well if he were omniscient, since the total benefits are \$100,000 and the total costs to him are \$80,000 (assuming no litigation or negotiation expenses). The goal of economic efficiency says he should develop the well. Not being omniscient, however, the landowner does not know whether his liability to seniors will run \$20,000 or double or triple that. If the landowner is not inclined to gamble, he will not develop the new well. If this illustration is typical, a legal rule giving seniors absolute (or high) security of investment will stifle desirable economic development.<sup>155</sup>

In short, using cost-benefit analysis to establish ground water pumping level policy requires assessment of costs in the form of undue deterrence or overstimulation of development associated with varying levels of security of investment. The difficulty is the amount of guesswork that is likely to have to go into such an assessment.

### c. Selection of a Geographical Accounting Area

Cost-benefit analysis requires choice of a geographical accounting area, i.e., a physical area over which to count costs and benefits.<sup>156</sup> The area might be national, regional over several states, state-wide,

or regional within a state. Ground water codes have been a matter of state legislation and typically are administered by state agencies. Thus, the natural tendency may be to stop counting costs and benefits at state lines. One problem with this is that the physical effects of ground water withdrawal are not necessarily limited to state boundaries. Also, if populations and economies develop at higher rates than can be supported by the long term water supply, crisis-oriented solutions may be required that involve large expenditures and federally funded assistance.<sup>157</sup> Thus, a geographically wide cost-benefit perspective seems desirable.

This raises the legal question of whether a state water agency has power to count costs and benefits accruing outside state borders. Bean v. Morris<sup>158</sup> and Thompson v. Colorado Ground Water Commission<sup>159</sup> are of interest in this regard.<sup>160</sup> In Bean, the United States Supreme Court upheld a Montana federal court decree protecting senior Wyoming appropriators from an interstate stream against depletion of the stream by upstream junior appropriators in Montana. The Court "assumed" Montana would be willing to ignore boundaries and allow the same rights to be acquired from outside the state as within. It made this assumption because, absent legislation to the contrary, it had done so in earlier cases involving easements and other private

rights across a common boundary and because: "Montana cannot be assumed to be intent on suicide, and there are as many if not more cases in which it would lose as there are in which it would gain, if it invoked a trial of strength with its neighbors."<sup>161</sup> Thus, a state inclined<sup>162</sup> to administer water for the benefit of people in another state would seem to have power to do so.

The remaining questions are whether such power may be delegated to an administrative agency and how readily such delegation will be found. The Colorado Ground Water Commission applies a three mile test to determine whether designated ground water is available for new wells:

[A] circle with a three mile radius is drawn around the proposed well site. A rate of pumping is determined which would result in a 40% depletion of the available ground water in that area over a period of 25 years. If that rate of pumping is being exceeded by the existing wells within the circle, then the application for a permit to drill a new well may be denied.<sup>163</sup>

The issue in Thompson was how to apply the three mile test to a well that the plaintiff proposed to sink in Colorado near the Nebraska border, so that 24% of the circle fell in Nebraska. The aquifer flowed from Colorado into Nebraska. The commission considered only the Colorado portion of the circle, concluded the proposed well would cause depletion exceeding 40% over 25 years, and denied plaintiff's application for a

permit. If the commission had considered the water supply in the whole three mile circle, the plaintiff would have been entitled to a permit because only the Colorado portion of the three mile circle was overappropriated. The court held that the state-line policy was within the commission's delegated authority and that it implemented legislative directives in a reasonable manner. The court accepted the commission's view that further appropriation on the Colorado side of the line "with intent to stabilize or reverse the aquifer flow to the benefit of Colorado, would seriously impair vested Colorado rights far west of the state line and could ignite a destructive aquifer depletion race with Nebraska, an adjoining state."<sup>164</sup>

The court upheld an application of the three mile test that benefited Nebraska, then, partly because it also benefited Colorado by avoiding a destructive aquifer depletion race with Nebraska. The Colorado commission's refusal to go beyond state boundaries in applying the three mile test in Thompson was held proper not because the effect in Nebraska was irrelevant to Colorado interests but, at least partly, for the exact opposite reason. The Thompson case arguably is authority for a state agency empowered to do cost-benefit analysis of ground water pumping levels to carry the accounting beyond state boundaries if there would be something in it for the agency's own state through improved interstate water relations.

## B. Social Goals

### 1. Normative Limitations of Cost-Benefit Analysis

The theoretical basis of cost-benefit analysis is a measure of economic efficiency known as the Pareto criterion.<sup>165</sup> The basic Pareto criterion states that a resource allocation is optimal if no change could be made under which at least one person would believe he is better off and no one would believe he is worse off. Conversely, a new allocation would be superior if at least one person would believe he is better off under it and no one would believe he is worse off.<sup>166</sup> This form of the Pareto criterion has virtually no practical application, though. The status quo will almost always be Pareto optimal; a superior alternative will seldom be available.<sup>167</sup> To illustrate, suppose existing law protects the historic but inefficient diversion systems of senior appropriators. Changing the law to protect only reasonable diversion systems would not be Pareto superior even though large net benefits were expected to accrue to society if, as will almost certainly be the case, any senior appropriator would consider himself worse off under the change.

A variation of the Pareto criterion states that a new allocation is superior to the status quo, even though some would believe they are worse off under it, if those who gain from the change could compensate the

losers and still be better off.<sup>168</sup> This modifies the basic Pareto criterion with a compensation principle and may be described as Pareto with hypothetical compensation. What it requires to make an alternative allocation superior is not actual compensation but only the ability of the gainers to compensate the losers and still be better off. This version of the Pareto criterion is not a value neutral decision-making tool, however.<sup>169</sup> Because the compensation is only hypothetical and the losers in fact lose, some normative argument is required to explain why they should do so for the benefit of the gainers. This normative problem can be avoided only if an alternative is superior under the basic Pareto criterion, i.e., when there are no losers but only gainers.<sup>170</sup>

It is the Pareto criterion with hypothetical compensation that underlies cost-benefit analysis. If the dollar value of expected benefits exceeds the dollar value of expected costs, then hypothetically the gainers could compensate the losers and still come out ahead. In this way, cost-benefit analysis can identify the alternative that maximizes net benefits. In addition to quantifying costs and benefits, a thorough cost-benefit analysis will include a separate statement of the distributional effects of a proposed course of action.<sup>171</sup> After this is done, however, the normative question remains of whether the gainers should gain at the expense of the losers.

Although the courts are unaccustomed to talking in terms of the Pareto criterion or cost-benefit analysis, the normative problem just stated has not escaped judicial attention. For example, in a negligence action for property damage due to leakage from an irrigation canal, the Oregon court said:

if the plaintiff's land is harmed by the conduct of the defendant, the latter cannot escape compensating the plaintiff for the harm simply by showing that the defendant's use had a greater social value than the plaintiff's. Thus, in the present case, it is immaterial that defendant's conduct in the operation of the canals was of great social value in that it would substantially benefit the other farmers in the area and the public generally, far outweighing the harm done to plaintiff alone. A landowner does not have to contribute to others a part of the value of his land without compensation, even if it is for a public purpose. The requested instruction, in effect, would have told the jury that it could deny plaintiff recovery if it decided that the social value of the operating canal was sufficiently great. This would clearly have constituted reversible error.

This is not meant to imply that courts allow efficiency to be pursued only if a change in the status quo meets the basic Pareto criterion or if actual compensation is paid under liability rules or eminent domain procedure. Rather, the point is that efficiency in resource allocation is seldom if ever the sole concern of legal rules regarding water use. It is thus now appropriate to turn to other possible concerns of the reasonable pumping level statutes and related appropriation doctrine law.