

Integrating Water Supply Planning into Land Use Decision-Making

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ABSTRACT

The needed integration of water supply planning into land use decision-making may present one of the best examples of the opportunity for rational planning and the obstacles to rational planning. Constrained by economic and political realities, planners' efforts to raise the importance of water supply in the planning hierarchy often fall short. This paper reviews the steps taken towards integration in California, Florida, Maryland, New Jersey, New Mexico, Oregon, and Washington. Drawing from these states' examples and combining them with the relevant planning literature, this paper provides minimum recommendations to increase integration, namely including a water element in local comprehensive plans and requiring a demonstration of adequate water supply before approving new development. This paper aims to serve as an impetus to further study of the planning realities surrounding an ensured future water supply.

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I. INTRODUCTION

“A great deal of damage has been done in the past simply because planning was nonexistent or because planners did not appreciate the interplay of processes that affects their schemes.” –Dunne and Leopold, 1978, xiv.

To manage water resources more effectively, state and local governments need to achieve a higher level of water supply and land use planning integration. Unfortunately, land use planning that addresses water supply concerns is too often the exception rather than the rule (Tarlock and Lucero, 2002; McKinney, 2003; Cohen, 2004). Land uses affect water supply, and therefore land use decision-making that incorporates water supply concerns better protects water supply. For example, only building where an adequate water supply exists may seem like common sense. However, state legislatures only recently have mandated that water be available for new development, and a mere handful of states have passed such legislation. Perhaps if the economy reflected the true value of water, communities would be quicker to plan for its continued supply.

Communities and planners recognize what is at stake when deciding how high a priority they give water in their planning processes. However, political and economic realities may sidetrack their intentions. The case studies presented in this paper demonstrate how difficult it is to raise the priority of water over other community concerns such as available housing and needed revenue. Also, pressures from developers can cause local governments to focus on the short term, in other words, the benefits the project will bring to the community immediately, rather than addressing the long-term effects of the projects, such as its strain on the water supply. Moreover, few communities, especially in the East, have faced a severe water shortage. As a result, they lack a sense of urgency that could spawn improved planning.

For planners, the integration of water supply concerns into land use planning presents two challenges: what methods should they utilize to ensure a continued supply of water and how can they implement those methods. In the past, land use planners' consideration of water supply focused on storm water runoff and flood hazards. In other words, they have concentrated on managing too much supply rather than too little (Dunne and Leopold, 1978). Increasingly, water is becoming a scarce resource, even in the East. The recent droughts on both the east and west coasts demonstrate the need to assess water supply levels for present and future uses. Currently, many states in the West face a severe drought that is predicted to last the next six years (Sonner 2004). Given this changing context, it seems logical that planners' attention would expand to include the possibility of too little water.

However, many of the modeling tools that planners employ to forecast future water availability ignore factors such as climate change or drought scenarios (Cohen, 2004). Even if planners use forecasting methods that make such considerations, there is no guarantee that they will produce an accurate result. So many factors influence the consumption and availability of water supply that predicting a community's future needs will continue to involve some guesswork.

To further complicate supply modeling, different agencies as a rule manage land and water resources, yet land and water do not exist in isolation. Land use planners can no longer ignore water supply as a factor in their decision-making nor can land use planning agencies simply rely on water agencies to ensure a continued supply. A land use decision may have a serious impact on the surrounding water supply. Management of the two resources needs to connect to ensure a reliable water supply for the future.

After addressing these technical constraints, planners must then struggle with the problem of implementation. The need to integrate water supply concerns into land use decision-making is apparent. However, few communities achieve a high level of integration. This begs the question why. Like other areas of planning, the most environmentally sound policy may not be the most economically attractive, at least in the short term. Coupled with the relative uncertainty of making water predictions, planners may face opposition from members of the community if the choice is between ensuring water twenty years from now or building a development that may bring needed revenue a couple years from now. Often the ultimate authority to make these decisions resides with elected officials.

For communities, a reliable water supply is at stake, and the elected officials must ensure that they provide for this necessity. Many people cannot even envision a scenario of no water. However, a few communities already have experienced water shortages. Regrettably, even when local government officials have knowledge of water shortages, their priorities conflict with supply protection and lead to outcomes inconsistent with the available supply (Cohen, 2004). Namely, political and economic pressure on local communities to continue to grow and develop often overrides water supply concerns. (The communities who are not pushing for growth or not experiencing growth generally are not the communities lacking water, unless contamination of their existing supply has occurred.)

However, when the water runs out, growth stops. For example, in 2002, Frederick, Maryland imposed a construction moratorium on all new development as a result of a water shortage. Frederick has a method for forecasting future supply, but that method's results either proved inaccurate or officials ignored them. Although the moratorium lasted less than a year, the situation may exemplify the need for better planning in order to avoid evermore-severe

shortages. In the more likely alternative, it demonstrates the difficult political environment planners will encounter when reminding a community that water is not an inexhaustible resource.

While recognizing that planning does not exist in a vacuum but occurs in the midst of political and economic pressures, this paper focuses on steps planners can take to heighten a community's awareness of the value of considering water supply when making land use decisions. This paper first briefly summarizes traditional nonintegrated land use planning and water supply planning at the state and local levels. Conventionally, the different agencies that manage land and water resources rarely coordinate their efforts. Collaboration between the agencies during plan drafting rarely occurs. Most water supply planning is left in the hands of water service providers. These companies or agencies model and forecast present and future water use based on a population to consumption ratio. Since the water service providers possess no control over land use decisions, they cannot alter land use practices to protect water resources. This fragmented approach to water supply planning leaves communities with little control over their water resources.

When land use planning and water supply planning occur simultaneously and with coordination, communities can better manage their growth rather than leave the future of their water supply up to chance. A handful of states have recognized the need to improve land use and water supply planning integration. This paper reviews these states' recent efforts to coordinate land use and water supply planning. The paper examines these processes in California, Florida, Maryland, New Jersey, New Mexico, Oregon, and Washington. The paper analyzes practices at both the state and local level. Obviously, the political and economic environments differ from state to state, and these environments create different opportunities and constraints for planning. What may be possible in one community may not work in another. Still, detailing the efforts

these states have made provides a first step towards better understanding how the political and economic environment affects the work of planners seeking to integrate water and land use planning. Additionally, while none of these states' efforts demonstrate wholly successful integration, their efforts contain some elements worth replicating and also highlight elements still in need of further refinement.

Lastly, the paper extracts those replicable elements from the state's efforts and combines them with other recommendations found in the planning literature to improve integration further. Overall, this analysis concludes that states should encourage municipalities to consider the water supply implications of land use decisions. Municipalities can undertake this responsibility in two ways. First, they can include a water element in local comprehensive plans. Second, local governments can approve new construction only when a sufficient water supply exists to meet the demand that will arise from it.

II. NONINTEGRATED LAND USE AND WATER SUPPLY PLANNING: EXPLORING THE NORM

A. Traditional Land Use Planning

A.1 Statewide Management

State land use planning depends on a state's policy orientation towards new growth (Kaiser, et al., 1995). In states where rapid growth and a high degree of development strained local capacities, state governments now attempt to manage growth. In states where growth presents no apparent problem, state governments accommodate growth.

Growth managing states mandate local government planning policies in order to ensure that development matches state-developed goals and objectives (Kaiser, et al., 1995). These states make conventionally optional local planning ordinances mandatory. The states assume an

active role directing local growth and providing oversight. State control allows state government to overrule local decision-making inconsistent with state objectives.

Growth accommodating states provide enabling legislation for local planning and regulatory powers (Kaiser, et al., 1995). Localities may choose to use the enabling acts to create local plans, zoning ordinances, subdivision regulations, and health and building codes. However, growth accommodating states fail to mandate such local initiatives. The majority of states fall into the growth accommodating category.

A.2 Local Management

Most states delegate responsibility for land use control to local governments through standard state enabling acts (Kaiser, et al., 1995; Randolph, 2004). However, a vast majority of states do not require local comprehensive plans, instead choosing to make these efforts optional (Randolph, 2004). In fact, as of 1997, only fifteen states required local plans (Cobb, 1998).

Local governments manage land use decisions through local plans when created and through zoning, a more common tool. Local plans consist of a variety of elements that vary from locality to locality. These often include a land use element, a transportation element, an implementation element, an agriculture/open space element, a housing element, and a community facilities element (Cobb, 1998). New growth should follow the policies outlined in local plans. However, this frequently fails to occur.

Zoning plays a stronger role in local management of land use, determining what uses may exist where. For instance, through zoning, local governments may confine all industrial development to one area of a community. Local governments also frequently employ subdivision regulations to manage land use. As at the state level, the degree to which local governments attempt to control growth varies with the citizenry's attitude towards growth. Growth-managing

localities seek to shape their communities in accordance with public goals, placing the same emphasis on community and environmental aspirations as on economic aims (Kaiser, et al., 1995). Growth accommodating localities want a development market unconstrained by excessive land use regulations (Kaiser, et al., 1995). These localities implement minimum zoning and subdivision regulations, sometimes guided by comprehensive plans.

B. Traditional Water Supply Planning

B.1 Statewide Management

Most states have agencies that are charged with managing water resources. Their duties frequently include constructing and maintaining large water supply projects, issuing permits for and regulating water appropriations exceeding a certain size, regulating water wells, protecting water quality, and managing water supply shortages in times of drought. State water agencies usually embrace a “supply-oriented approach” to water management (Cohen, 2004). This approach focuses on augmenting water supply through the construction of new water projects rather than practicing “integrated water-resources management” that controls demand (Cohen, 2004; Platt, 1995).

Augmentation involves “acquiring water rights and developing surface or ground water sources [often] distant from the user region through systems of such engineering projects as dams, reservoirs, aqueducts, tunnels, siphons, and pumping stations” (Platt, 1995, 185). “Integrated water-resources management” or demand management utilizes strategies aimed at conserving water such as recycling, reuse, pricing, leak repair, drought restrictions, and public education (Cohen, 2004; Platt, 1995). The incorporation of how land use decisions affect water supply remains largely absent from both augmentation and demand management. For example, both approaches largely ignore how increased impervious surfaces from development will

impact water supply. Nevertheless, agencies often examine land use effects on water quality, even if they often do not examine their impacts on overall water supply.

The water supply *planning* efforts of state agencies mainly extend to overseeing water permitting systems. Almost every state now utilizes at least a partial permitting system to allocate water. These administrative permit systems overlay the former common law of both surface and groundwater rights. Common law surface water rights generally follow two approaches: riparian rights in the East and prior appropriation in the West. Riparian rights give landowners the right to “reasonable use” of surface water contiguous to their property, so long as the use does not diminish the quality or flow for downstream owners. Prior appropriation became the favored system in the West because the region lacked abundant water supplies and water often failed to border or exist on the land where it was needed. The principle of first in time, first in right, governs the law of prior appropriation. An owner’s first claim to a water source establishes a priority to use the water over all successive users. This doctrine applies to both groundwater and surface water in most western states.

Originally, most eastern states’ groundwater law followed the absolute dominion rule. Under this rule, a landowner could take as much water as desired without limitation. Essentially, this rule views groundwater as part of the soil. This rule includes only one limitation, one may not maliciously interfere with another’s groundwater. Most eastern states adopted the reasonable use rule, beginning in the early 1900’s. According to this rule, groundwater appropriators may withdraw water only if the withdrawal was 1) used on the overlying tract and 2) a “reasonable” use (Richardson, 2003). Whichever the chosen approach, these common law systems often failed historically to allocate water efficiently and lacked any planning element. In an effort to manage

water resources better, many states adopted permit systems beginning in the late 1950s (Beck, Vol. 2, 1994).

Under permit systems, essentially no significant water withdrawals may be made without a permit from the state. All eighteen prior appropriation states, except Colorado, use a formal statutory permit procedure for appropriating water. Colorado uses a system of water courts that performs essentially the same function (Beck, Vol. 2, 1994). The eighteen prior appropriation states include Alaska, Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming. Partial permitting statutes can be found in each of the thirty-one riparian rights state while about half of the riparian states have adopted comprehensive permitting statutes (Beck, Vol. 1, 1994). Hawaii also utilizes a partial permitting system (Beck, Vol. 1, 1994). Permitting statutes vary widely among the states (Beck, Vol. 1, 1994).

Permit systems seek to ensure that water resources serve their most beneficial uses while also providing for public knowledge and community control of pumping activity (Getches, 1997). States may also use a permit system to shape state water policy (Beck, Vol. 1, 1994). In fact, ten states explicitly note in their permitting statutes that the statutes' purpose is to establish comprehensive state planning (Beck, Vol. 1, 1994). Those states include Connecticut, Delaware, Florida, Hawaii, Iowa, Massachusetts, New Jersey, New York, Virginia, and Wisconsin (Beck, Vol. 1, 1994).

Permitting systems implicitly suggest or explicitly assert that the states own or at least have the right to allocate water, taking ownership of water out of private hands. This underlying recognition of the public good nature of water leads some to believe that this system presents the greatest potential to manage water supply effectively (Dellapenna, 2000). However, critics argue

that water permitting does not substitute for proper land use planning that addresses water supply protection (Angelo, 2001). As one critic has argued, “[u]sing a regulatory program to attempt to achieve proper land use planning is a losing proposition. Planning decisions cannot be made when a developer requests a permit application. All that can be done at this point is minimize environmental impacts...The burden is passed on to the permitting agency, rather than being dealt with as a land use and natural resources protection policy”(Angelo, 2001, 245).

Within the permit systems, states often treat and administer surface and groundwater separately, founded on the misconception that the two types of water are unrelated (Getches, 1997). Such a distinction hampers water supply planning as this approach prevents a holistic view of the available resources and ignores the effects that a diminution in one source can have on the other. This disjointed approach heightens the need for better communication and increases the transaction costs associated with planning.

Water permitting statutes effective only during water shortages, only applicable to particular geographic areas, or statutes exempting large classes of users, such as domestic users and agriculture, further weaken the utility of these efforts to accomplish comprehensive planning. If the regulatory system deals with less than the whole pie, then how can it accurately divide it?

Essentially, water permitting regulations ensure that a land use has as little impact on the water supply as possible. However, mitigating the land use’s effects is limited to the project as already located and approved. As one critic has succinctly put it, planning asks “what,” “where,” and “when” while permitting merely asks “how” (Angelo, 2001).

Water management regulation...does not look at a particular location and evaluate what types, densities or intensities of land use are appropriate at that location. Instead, water management regulation asks “how” a project proposed for a particular site can meet applicable permitting criteria to protect water resources.

For example, [it] should ask: ‘how’ the proposed project can be designed to ensure [that] there is compensation for flood-plain storage loss; ‘how’ wetland impacts can be reduced or eliminated by design modifications; ‘how’ remaining wetland impacts can be mitigated; and ‘how’ alternative lower-quality water supply sources can be developed and utilized. Water management districts, in their permitting role, must assume that a particular land use on a particular site is appropriate—i.e., that questions of ‘what’, ‘where’ and ‘when’ have already been answered by the local government. Then permitting is used to minimize and alleviate environmental impacts through technology and mitigation (Angelo, 2001, 233-34).

Integrating water and land use planning allows public officials to answer [or more holistically address] “what,” “where,” “when,” and “how.”

B.2 Local Management

In theory, local water supply planning involves three areas: inventory, impact assessment, and management (Kaiser, et al., 1995). Localities inventory their water supply through a determination of how much supply they possess and whether the supply meets their demands. Localities then consider how factors such as increases in consumptive demand, water source pollution, and droughts or other natural occurrences influence/affect the water supply. Lastly, localities manage the water supply through conservation measures, such as restricted water use hours and leak repairs, and through water quality improvements. But in particular cases, even these measures can fail to ensure an adequate water supply for communities.

For example, Frederick, Maryland experienced a severe water shortage in 2002. In spite of the city’s use of a system for determining water supply needs for new development, the community still ran out of water (Snyder, “New Direction,” 2002). Local public works engineers utilize a standard procedure to forecast water demand and supply. In Frederick, that system either produced an inaccurate result or was ignored suggesting that the existing local water supply planning standards either lacked efficacy or influence.

III. REVIEW OF CURRENT INTEGRATION ATTEMPTS: ADJUSTING THE NORM

Recognizing that the traditional approach to land use and water supply planning fails to integrate the two resources, some states have begun to combine these processes. Existing studies of the integration of land use and water supply planning evaluate the efforts of only a handful of America's fifty states. These may represent the only states that have attempted integration or more hopefully, other states have made similar efforts that remain undocumented.

In 1996, O'Brien and Markham examined how effectively California and Florida link water supply and land use planning. Other studies (Angelo, 2001; Cohen, 2004) subsequently examined Florida, a state known for linking water and planning issues. After the passage of two statutes aimed at integrating water supply into development decisions, three studies (Epstein and Kibel, 2002; Torgan, 2004; Waterman, 2004) reevaluated California. Brief studies were also undertaken of the water supply planning and growth integration efforts of Washington (McDonald, 1998) and New Mexico (Lucero, 2003). Finally, in 2004, Cohen examined the land use and water supply planning integration of four states known for their growth management efforts—Florida, Maryland, New Jersey, and Oregon. This paper reviews these analyses by state (in alphabetical order) rather than by study.

A. California

O'Brien and Markham (1996), Epstein and Kibel (2002), Torgan (2004), and Waterman (2004) outline and provide some evaluation of California's attempts to increase the integration of water supply and land use planning. An evaluation of how well California plans for new growth's impacts on water supply lacks an easy answer without making a long-term, detailed, technical, and costly study of the state's new development and its effect on water resources. The same applies to any of the other states examined in this paper. Therefore, evaluators base their

determinations often on what could be—how integration could be improved in the abstract—rather than whether such increased integration will help these states preserve their water resources.

A.1 State Management

Two state agencies play a role in regulating the state's water supply. The State Water Resources Control Board bears responsibility for controlling all surface water development and transfer and must balance the needs of all water users in the state. The Department of Water Resources (DWR) combines water management with new project development, subject to the oversight of the State Water Resources Control Board. DWR mainly runs the State Water Project, a series of water supply infrastructure projects that provide water throughout the state.

However, California leaves the integration of water supply and land use planning to local governments. This lack of state control may be partly to blame for the number of court cases involving water supply issues in the state. Therefore, whether desirable or not, the judicial branch of the state government exercises the only broad authority over ensuring adequate water supply for development. Some of California's clearest mandates regarding the inclusion of water supply into land use decision-making have arisen in the courts.

In *Stanislaus Natural Heritage Project v. County of Stanislaus*, 48 Cal.App.4th 182 (1996), the state's Fifth District Court of Appeal held that water supply assessments under the California Environmental Quality Act [CEQA] could not be made on a piecemeal basis. CEQA requires public agencies to undertake environmental impact assessments before approving any project subject to the law's provisions. Before adopting a specific plan for a development, a water supply analysis must be prepared that takes into account the whole development and all its phases. In *County of Amador v. El Dorado County Water Agency*, 76 Cal.App.4th 931 (1999), the

Third District Court of Appeal held that specific project plans could not drive local general plans. Rather, the court found that an adopted general plan must be in place before reasonable project-scale assessments of the environmental impacts of proposed water uses could be developed.

In *Planning and Conservation League v. Department of Water Resources*, 83 Cal.App.4th 892 (2000), the Third District Court of Appeal remonstrated the Department of Water Resources for depending on paper water, known as water rights or water entitlements existing in agreements or plans but whose actual physical availability was less clear (Epstein and Kibel, 2002), in assessing the impacts of changes to water contracts. “Where land use planning determinations can be made on the basis of entitlement rather than real water, development can outpace the availability of water, leading to detrimental environmental consequences” (*Planning and Conservation League*, 83 Cal.App.4th at 914).

Santa Clara Organization for Planning the Environment (SCOPE) v. County of Los Angeles, 106 Cal.App.4th 715 (2003) reiterated the court’s reminder not to rely on paper water. According to Waterman (2004), “this opinion is the clearest statement to date that CEQA requires a realistic discussion of a development’s water supply in its EIR [environmental impact report]” (149). The Second District Court of Appeal also found that water supply analyses need to occur in the environmental impact report early in the planning process and not at the last moment before the tract map is recorded. While the courts may prove somewhat successful at integrating water concerns into land use planning via specific case decisions, their efforts should not substitute for the legislature’s responsibility to ensure adequate coordination early in the planning process. The state should integrate land use and water supply planning at the state and regional (intra-state) level to provide for a more comprehensive approach to ensuring water for future growth (O’Brien and Markham, 1996).

A.2 Local Management

California has sought to integrate water supply and land use planning at the local level in two ways, through the coordination of local general plans and water management plans and through the development approval process (O'Brien and Markham, 1996). Regarding the coordination of plans, local water suppliers develop water management plans, and local governments oversee land use planning. To ensure that the two sets of plans are integrated, the state relies on its state law, CEQA, modeled on the National Environmental Policy Act. While CEQA requires public agencies to make environmental impact assessments before approving any project, this approach aims to protect water resources at a project level and fails to involve a significant planning element (O'Brien and Markham, 1996). Only planning for water supply at the project level largely ignores how one project may affect another water use or how water uses interrelate. Also, project-level planning fails to further a regional or statewide perspective on possible impacts to the state's water supply.

a. Land Use Plans

California law requires that municipalities draft local general plans that include “a variety of elements that *implicate* water supply—land use, circulation, housing, and conservation” (O'Brien and Markham, 1996, 4 [emphasis added]). However, these general plan elements that *implicate* water supply provide minimal inclusion of water planning into the general plans (Waterman, 2004). For example, the state's land use element requirement for general plans only requires the identification of areas subject to flooding (Cal. Gov. Code § 65302(a)). In the abstract, the land use element provides an ideal place for more detailed attention to water supply and land use integration.

Conspicuously absent in the land use element are requirements to include consideration of water supply and water quality issues created by new

development. In fairness, many of the other required elements refer back to and must be consistent with the land use element, thereby imputing the other elements' water management planning requirements back to the land use elements. Yet, it is the approved pattern of land use that will dictate the demands on an area's water resources. The almost complete absence of water management requirements in the land use element is an initial indication of the disconnect between the land use and water planning functions (Waterman, 2004, 136).

To remedy this omission, the California Governor's Office of Planning and Research recommended, in its 2003 General Plan Guidelines, that a new water element be included in general plans. At least one county in California has adopted such an element (Waterman, 2004). However, the state has not adopted this recommendation. In addition to the general plan's lack of specific guidance concerning water planning, California provides no statutory mandate for plan updating nor provides guidance regarding how far into the future to plan. Therefore, even if planning gave more attention to water issues, the plans might not be updated frequently enough to keep pace with new development or be projected far enough into the future to have any real impact.

b. Water Plans

California attempted to address this relative lack of water planning with passage of the 1983 Urban Water Management Planning Act, amended by SB 610 and AB 901 (Cal. Wat. Code §§ 10610-10657). All water suppliers with three thousand or more connections (or providing more than three thousand acre-feet of water per year) must prepare an Urban Water Management Plan (UWMP) or risk losing state funding. The plans must incorporate a twenty-year time horizon and be updated every five years. Based on population, climate, and other demographic factors, these forecasts ignore economic trends such as fiscal growth within the jurisdiction that could determine future land use (Waterman, 2004). Unlike general plans, UWMPs are not

subject to CEQA (Cal. Wat. Code § 10652). Therefore, water suppliers do not prepare environmental impact analyses of water projects.

c. Coordination of Land Use Plans and Water Plans

The California legislature advocates close coordination between water supply agencies and land use approval agencies, stating “it is vital...to ensure that proper water supply planning occurs in order to accommodate projects that will result in increased demands on water supplies” (Cal. Gov. Code § 65352.5(a)). The Urban Water Management Planning Act mandates that water suppliers consult others, including their resident jurisdictions, in the preparation of UWMPs. However, the phrase, “to the extent practicable,” limits this mandated coordination (Cal. Wat. Code § 10620(d)(2)).

Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, *to the extent practicable* (Cal. Wat. Code § 10620(d)(2), emphasis added).

Moreover, these consultation orders merely require a notification to jurisdictions within their service area that they are preparing the UWMP, one public meeting, and forwarded copies of the completed UWMP to the relevant jurisdictions.

Additionally, water suppliers need not use the general plans of the jurisdictions they serve as a source document for preparing the UWMP. At the least, water districts should obtain from the land use planning agency a list of potential projects that may trigger CEQA so their potential impact on the water supply can be forecast (Waterman, 2004). Some analysts even suggest that perhaps water suppliers should redefine their functions to assume the role of planners since they have the technological knowledge to predict future water availability (O’Brien and Markham, 1996). However, this suggestion may serve only to further reinforce the divide between land use

planning and water supply planning as planning responsibilities would be split between two separate agencies.

While the requirements that water districts incorporate general plans into their own planning have thus far lacked real impact, requirements that land use planners utilize UWMPs have as of yet resulted in an even slighter contribution to integration. Land use planning agencies utilize UWMPs as source documents for their general plans but only if the water supplier submitted the UWMP. After a land use agency completes the general plan and before ratifying it, it must submit the draft to the water supplier, which has forty-five days to comment. However, the land use agency faces no reprisal for failure to submit a draft to the water agency. Additionally, even if the planning agency submits a draft and the water agency responds, the collaboration occurs at the end of the planning process and potentially results in a single exchange of a large quantity of paper (Waterman, 2004). Therefore, any coordination “relies heavily on the good faith of the parties involved” (Waterman, 2004, 140-41).

d. Ensuring Adequate Water Supply for Specific Projects

The California legislature attempted to correct this disconnect between planning for water supply and development with the passage of several pieces of legislation aimed at integrating water supply into land use decision making at the specific project level. First, in 1995, the state passed SB 901, requiring land use approval agencies to obtain water supply assessments from suppliers for large projects. SB 901 was the legislature’s first step towards achieving a linkage between UWMPs and land use decision-making (O’Brien and Markham, 1996; Waterman, 2004). However, jurisdictions found its requirements easy to avoid and did so to escape the somewhat burdensome regulation (Torgan, 2004; Waterman, 2004).

SB 901 requires water suppliers to assess potential water supply for new developments. An available twenty-year supply, tested under different climatic conditions, satisfies SB 901's standards for each project evaluated. The land use agency includes the assessment in its environmental impact report for the development, utilized in the CEQA review. However, the bill provides little guidance concerning how the assessment should be incorporated into the review (Torgan, 2004). If the assessment reveals an inadequate water supply, the local government must impose "feasible" mitigation measures or develop some alternative so as not to encounter the shortage. However, even if the problem cannot be mitigated or avoided, the development may still be approved. A "statement of overriding considerations" overcomes the lack of water to meet the state's planning requirement. This statement, which must be supported by substantial evidence, basically claims that the benefits of the project outweigh its adverse environmental effects.

Even though the Act fails to prohibit outright developments that do not demonstrate an adequate water supply, it encompasses at least some integration by requiring that local governments consider water supply issues before approving new development (O'Brien and Markham, 1996).

The assumption underlying SB 901 is that, by requiring full disclosure of water supply problems, elected officials will be discouraged from approving general plan amendments on specific plans that would exacerbate such problems (O'Brien and Markham, 1996, 5).

However, the Act only applies to a "public water system", defined as three thousand or more connections. The Act also only applies to residential developments of five hundred or more units and commercial developments of more than one thousand persons or more than 250,000 square feet while at the same time exempting certain large-scale projects.

To address some of the perceived shortcomings of SB 901, the California legislature adopted Senate Bills 221 and 610 in 2001. SB 221 prohibits approval of tentative subdivision maps, parcel maps, or development agreements for residential subdivisions with more than 500 units unless a “sufficient water supply” exists. This water verification from the public water agency must come before the city or county can approve a tentative subdivision map.

Commenting on SB 221, Waterman (2004) states that it

breaks entirely new ground by requiring land use agencies to condition approval of some types of residential development on a showing that a sufficient water supply is in place to serve both the proposed project, as well as other existing and planned future uses (152-53).

SB 221 provided more teeth than SB 901 has.

However, in addition to applying only to residential developments, SB 221 presents the same large loophole of a minimum development size requirement. Developers need only to plan developments with 499 units or build piecemeal in order to avoid falling within the law’s scope.¹ The planning and environmental community has voiced its concerns about the threshold requirement of 500 units for development (Torgan, 2004). Many believe that the threshold should be decreased to as low as 200 units, an opinion universally opposed by developers (Torgan, 2004).

Developers trying to avoid the regulation by building in a piecemeal fashion, in other words dividing larger developments into smaller developments, could find themselves in litigation. For example, they may disagree with local planning agencies over whether two seemingly separate developments, each less than 500 units, constitutes a single development subject to SB 221. Legal disputes may also arise over whether sufficient evidence exists to

¹ For smaller public water systems with less than 5,000 connections, a subdivision means any development increasing the number of connections by ten percent or more (Cal. Gov. Code § 66473.7(a)(1)).

support a finding of adequate water supply (Epstein and Kibel, 2002). For example, neither SB 221 or SB 610 defines “sufficiency” or “planned future uses” which must be taken into account when making any assessment (Waterman, 2004).

California lawmakers also passed Senate Bill 610, signed into law in 2001. This bill, a follow up to SB 901, requires cities and counties to review detailed “water supply assessment reports” prepared by potential water suppliers for various types of large development projects, or if the water suppliers cannot be identified, to create their own for consideration in the environmental review process. SB 610 applies to residential and commercial developments of a certain size, like the requirements found in SB 221. Therefore, developers may attempt to avoid SB 610 through piecemeal development. Litigation may be necessary to determine the adequacy of the assessments and the relationship between the assessments and the findings in the CEQA environmental review documents (Epstein and Kibel, 2002). Development opponents already use the two statutes to halt construction by invoking them to cause delay and thereby increase developer costs (Torgan, 2004).

Additionally, neither law calls for any real collaboration between land use and water agencies (Waterman, 2004). SB 610 only requires one exchange of information when the water agency delivers its assessment of available water supply to the land use agency. SB 221, meanwhile, includes a provision that allows for a collaborative process between the subdivision applicant, the land use agency, and the water planning agency. However, the statute did not mandate coordination of plans.

Epstein and Kibel (2002) present a pessimistic view of California’s integration efforts to date. Reviewing the state’s recent legislative and administrative attempts to increase integration, they state that the “changes have to date proved largely ineffectual in addressing water supply

availability for development projects” (Epstein and Kibel, 2002, 1). However, while the efficacy of California’s recent legislation remains to be determined, the legislation has created a strong focus on the issue that was not present before (Torgan, 2004).

B. Florida

Florida has sought for twenty-five years to integrate land use and water supply planning (O’Brien and Markham, 1996). The state attempts to link water supply to land use decision-making at the state, regional and local levels. Using minimal enforceable planning requirements for local governments and a water-permitting program, Florida has sought to take water concerns into account early in the development process (O’Brien and Markham, 1996). But despite numerous legislative acts and policy initiatives aimed at improving integration, Florida still lacks a formal link between land planning and water planning (Angelo, 2001).

B.1 State Management

a. State Plans

At the state level, Florida employs a state comprehensive plan as well as two subordinate plans, the State Land Development Plan and the Florida Water Plan (O’Brien and Markham, 1996). The Florida Department of Community Affairs, the state’s land use planning agency, prepares the State Land Development Plan, while the Department of Environmental Protection prepares the Florida Water Plan. The Florida State Comprehensive Plan seeks to ensure that “new development is compatible with existing local and regional water supplies” (Fla. Stat. section 187.201(8)(b)(5)(1995)).

Florida formally recognizes the importance of considering water supply when making land use decisions. In fact, Florida created a Land Use and Water Task Force in 1994 to address this issue (Angelo, 2001). The Task Force’s recommendations included strengthening data

collection and disseminating that information, requiring local governments to use it, and improving the linkages between the regional planning councils' policy plans, the regional Water Management Districts' plans, and local governments' comprehensive plans.

The state also considers land use in its water policy, utilizing state and regional land-buying programs for water supply and management purposes, giving tax breaks for water recharge areas, advocating water conservation, and requiring use of the lowest water quality when possible (O'Brien and Markham, 1996). The first two strategies guide development to appropriate areas while the latter two allocate water to its most beneficial uses. Most states employing state plans lack Florida's proactive approach towards integrating water supply planning with land use planning. This approach is not exclusive to the state's water plan but also can be found in its comprehensive plan. As of 1997, only two states, Florida and Pennsylvania, included water supply or recharge measures into their planning statutes (Otto et al., 2002). Cohen (2004) also comments that of the four states he studied—Oregon, Florida, New Jersey, and Maryland—Florida employed the most extensive water supply planning system. Florida reinforces this commitment to integration at the regional and local levels through the creation of regional planning bodies that support local planning efforts.

b. Regional Management

At the regional level, Florida has created two sets of planning bodies, eleven regional planning councils and five water management districts (WMDs). The state tasked the planning councils to “develop strategic regional policy plans which include provisions concerning land use and water supply” (O'Brien and Markham, 1996, 6). These policy plans must be consistent with the state comprehensive plan (Fla. Stat. § 186.508 (1995)). The five WMDs play a more technical role in assessing water resources than do the councils. The state requires WMDs “to

develop regional water supply plans which assess current and projected water demand for all sectors of the economy and the environment and compare the demand with available water resources” (Fla. Stat. § 373.0391 (1995)). In addition, WMDs implement the state’s water permitting program (Fla. Stat. ch. 373 (1995)). They also assist local governments in developing alternative water supplies.

More generally, the state charges the WMDs with the important job of supplying local governments with the technical resources needed to make sound planning decisions. In fact, the Land Use and Water Task Force recommended that WMDs be required to provide detailed water supply reports to local governments. However, the state legislature failed to adopt this recommendation. Some local government officials have contended that these reports would burden rather than help them and potentially reduce their control over land use decisions (O’Brien and Markham, 1996). These concerns notwithstanding, the fact remains that most local governments simply lack the expertise, staff, or financial resources necessary to develop this type of technical information. Therefore, the WMDs’ main value lies in their ability to provide technical assistance (Angelo, 2001).

B.2 Local Management

a. Land Use Plans

Florida also seeks to integrate water supply and land use planning at the local level. Local comprehensive plans must include a “drainage, potable water, and natural groundwater aquifer recharge element correlated to principles and guidelines for future land use, indicating ways to provide for future potable water, drainage...and aquifer recharge protection requirements for the area” (Fla. Stat. §§163.3177(6)(c) (1995)). Local comprehensive plans must also assess current and projected water needs for ten-year periods (Fla. Stat. §§ 163.3177(6)(d)). The State

Department of Community Affairs reviews all local plans before approving them and hears objections from the regional planning councils, the WMDs, or any other concerned citizen.

b. Coordination of Local Land Use Plans with Regional Water Plans

Florida Senate Bill 1906 requires the coordination of local comprehensive plans with the WMDs' Regional Water Supply Plans [RWSP], addressing the following issues: sanitary sewer, solid waste, drainage, potable water, and natural groundwater recharge. Additionally, the bill requires the development of a potable water work plan for building water supply facilities to be completed by 2005. The bill also addresses conservation, asking local governments to project needs and sources for at least a ten-year period, considering the WMDs' RWSP or Water Management Plan. Finally, the bill emphasizes intergovernmental coordination.

Florida has taken great steps to ensure coordination between water supply planning and land use planning. Even so, despite Florida's twenty-five years of coordination experience, legislation passed in 2002 mandating coordination indicates that earlier coordination attempts may have been overstated or that earlier efforts lacked effectiveness. Limited litigation over plan amendments and consumptive use permits due to water supply concerns may indicate that Florida's current integration approach works (O'Brien and Markham, 1996). However, observers of Florida's coordination of water and land planning believe that it exists more on paper than in reality. Cohen (2004) argues that in all four states he examined, "the level of coordination actually occurring is usually much lower than the level required by state law" (20). Regarding Florida, Cohen quotes a Florida land use attorney observing,

[t]he land use/water management district linkage expressed in the [local comprehensive] plans is lip service. To date, water has little, if any, effect on land use decisions. Everyone expects that to change in the future but the same discussion occurred twelve years ago and nothing happened. It would have the effect of giving water districts—with an appointed, not elected board—the ability

to stop growth in a sixteen-county area. This is unacceptable to most county governments and developers (2004, 5).

To remedy this, Florida needs to plan for water in conjunction with, if not antecedent to, land use planning, “[a]nything else is unacceptable” (O’Brien and Markham, 1996, 8).

C. Maryland

Spurred first by water quality issues regarding the Chesapeake Bay and most recently by several severe droughts, Maryland has begun to pay serious attention to water issues. As a state actively pursuing growth management policies, Maryland should be a model for successful water supply and land use planning integration. Unfortunately, Maryland’s current practices fail to set such a shining example (Cohen, 2004).

C.1 State Management

a. State Land Use Plans

Maryland first sought to integrate land use planning and water planning with the 1984 Critical Area Act, a response to water quality concerns in the Chesapeake Bay. The Act imposes new land use requirements on any land within 1,000 feet of the Bay. However, this integration of land use planning and water planning aims to preserve water quality not water supply.

In 1992, Maryland passed the Economic Growth, Resource Protection and Planning Act. This was followed in 1997 by the Smart Growth Initiatives. These two pieces of legislation attempted to steer new development into “suitable areas,” known as Priority Funding Areas, and to discourage development on resource lands, in order to protect the state’s resources, including water (1992 Economic Growth, Resource Protection and Planning Act). The Smart Growth Initiatives restricted funding for development outside these areas.

Attention to water supply in Maryland intensified following a severe drought in the summer of 1999. As a result of the drought, then governor Paris Glendening issued an executive

order establishing two committees to investigate water conservation and drought management. Despite the committees' efforts, parts of the state were not prepared for another severe drought in 2002. In early 2002, for example, Frederick, Maryland, faced a severe water shortage, forcing the implementation of a temporary construction moratorium (Snyder, "Frederick Rushes," 2002). Also, by late 2002, the three reservoirs serving the city of Baltimore contained only forty-two percent of their capacity (Cohen, 2004).

b. State Water Management

Maryland has no statewide water supply plan (Cohen, 2004). At the state level, the Maryland Department of Environment [MDE] holds responsibility for water supply issues. MDE issues water permits for surface and groundwater, develops the state's groundwater protection program, responds to local water supply emergencies, and reviews local water and sewerage plans (Cohen, 2004). MDE undertakes water supply forecasting on a permit-by-permit basis. The agency rarely denies a permit for ground or surface water withdrawals. However, it may attach conditions limiting the withdrawals that may have the effect of stopping a project. This implicit permit denial occurs more often with groundwater than surface water appropriations (Cohen, 2004). Interestingly, developers may extend water lines to new developments serviced by an already permitted water supplier without a permit (Cohen, 2004).

c. Regional Management

Regionally, three commissions, the Susquehanna River Basin Commission, the Interstate Commission on the Potomac River Basin, and the Patuxent River Commission, conduct some water supply planning and also exercise some authority over growth in order to protect water supply. The Susquehanna River Basin Commission holds the most authority, with the power of

review and approval over applications for large water withdrawals (Cohen, 2004). However, this commission has jurisdiction over only a small area within Maryland.

The Interstate Commission on the Potomac River Basin serves mainly as an information provider and liaison among agencies with very limited authority over water supply regulation (Cohen, 2004). However, this Commission plays a much larger role in water supply forecasting and planning. Finally, the Patuxent River Commission pays virtually no attention to water supply concerns focusing its attention instead on issues of water quality (Cohen, 2004). In sum, at both the state and regional levels, Maryland conducts little or no comprehensive water supply planning.

C.2 Local Management

a. *Land Use Plans*

Any real water supply and land use integration in Maryland must then occur at the local level. However, state legislation does not demand a specific water sufficiency analysis element for local comprehensive plans (Cohen, 2004). State requirements leave coordination of land and water resources to local water and sewer plans. While water and sewer plans must be based on local land use plans, they fail to impact land use decision-making in the same way as local land use plans. Therefore, water plans are drafted to meet the water demands outlined by local comprehensive plans rather than local comprehensive planners adapting their land use decision-making to water constraints.

b. *Water Plans*

Maryland county governments must prepare ten-year water and sewer plans, updated every three years, under *Environment Article*, Title 9, Subtitle 5 of the state annotated code. The plans must incorporate “all relevant planning, zoning, population, engineering and economic

information and all State, regional, municipal and local plans” in order to anticipate “with all practical precision” the parts of the county which will require water, sewage, or waste disposal systems over the next ten years (Md. Env't. Code Ann. § 9-505). While MDE regulations require that these plans “contain a discussion of ground and surface water resources within the county including the quality and potential quantity of these sources” (COMAR § 26.03.01.04E), Maryland law does not require that counties base their plans on actual water supply availability. Instead, water facility availability serves as the basis for assessing if water needs will be met (Cohen, 2004). Moreover, counties drafted many of these plans prior to the 1997 Smart Growth Initiatives. As a result, the plans failed to take Priority Funding Areas into account when they determined where and when water and sewer lines would extend to undeveloped areas (Cohen, 2004). Therefore, municipalities do not direct water and waste services towards these areas, causing a disconnect between the state’s growth management policies and the state’s actual growth. With no state funding for plan updates, counties are unlikely to correct this disconnect soon.

Additionally, Maryland law fails to mandate a specific methodology for localities to use when predicting water use to plan for facilities (Cohen, 2004). Even so, a mandated methodology poorly undertaken would produce incorrect results. Public works engineers tend to utilize a standard procedure to forecast water demand and supply. Frederick, Maryland had a comprehensive plan and a procedure for modeling future water supply and still faced a severe water shortage in 2002. The city imposed a temporary construction moratorium as a result of the lack of water. Therefore, the requirements that counties write water and sewer plans and that MDE review the plans lack the efficacy to ensure adequate water supply for communities (Cohen, 2004).

c. Ensuring Adequate Water Supply for Specific Projects

In a final attempt at integration, Maryland law requires that local governments prove they have sufficient water for all new development. Subdivision plat recordation and building permits hinge upon a finding that the water supply system adequately serves the proposed construction (Md. Env't. Code Ann. §§ 9-512(b) and (d)).

These measures fail to achieve integration. In 2003, Governor Ehrlich signed an executive order creating a Water Resource Management Advisory Committee to produce a report with recommendations on the state's water supply and its relationship to the state's smart growth policies. Even in this most recent attempt to integrate land and water policies, the executive order's list of research needs overlooked two major areas: 1) an explicit request for an analysis of the degree to which the state's water resources can support both short-term and long-term growth based upon projected demographic and economic forecasts and permitted densities in the state's designated growth areas, and 2) an analysis of the extent to which land has developed inconsistently with Smart Growth policies, and the water quantity and quality implications of these non-Smart Growth development patterns (Cohen, 2004, 9). Maryland has thus far failed to connect its smart growth policies to its water supply issues successfully. In a state whose smart growth tools could dictate a high level of land use and water supply planning integration, the state instead so far has attained a relatively low level of such integration (Cohen, 2004).

D. New Jersey

New Jersey employs a statewide water supply plan and a state growth management plan. However, strong home rule powers for municipalities in the state and reliance on local property taxes for revenue dilutes the strength of New Jersey's state plans. Strong home rule powers allow municipalities to ignore state growth policies. Property taxes make up seventy-five percent of all

local revenue in the state, compared to a national average of fifty percent (Cohen, 2004). Reliance on property taxes for revenue keeps municipalities from implementing state growth policies since, for example, developing land designated for open space preservation may generate needed property tax revenue. As a result, the state unsuccessfully protects its water supply from land use problems such as pollution from industrial and wastewater discharges and development-induced disruption of surface and groundwater recharge (Cohen, 2004).

D.1 State Management

a. State Land Use Plan

Municipalities exercise land use decision-making authority in New Jersey, with counties playing a small role (Cohen, 2004). However, the state provides planning guidance, under the New Jersey State Planning Act, in the form of the State Development and Redevelopment Plan (SDRP). A growth management plan, the SDRP directs growth to suitable areas. However, unlike Maryland's smart growth plan, New Jersey's SDRP provides no financial incentives to induce localities to follow it. Additionally, the state affords municipalities strong home rule powers, effectively making compliance with the SDRP voluntary.

b. State Water Plan

The New Jersey Department of Environmental Protection (DEP) manages the state's water supply (Water Supply Management Act of 1981, N.J.S.A. 58:1 A-1 et seq.). DEP's responsibilities include water permitting for appropriations exceeding 100,000 gallons per day, developing standards and procedures to maintain minimum flow levels, managing water supply shortages through allocation plans and use restrictions, regulating wells, and preparing a state water supply plan to be updated every five years. DEP prepared the last state plan in 1996. New Jersey expects to release its next state plan in 2004. The plan projects water deficits by 2040 for

nine of the state's twenty-three watersheds, with a total deficit of almost thirty million gallons per day. Critics believe that these shortfall estimates are overstated.

The New Jersey Water Supply Authority manages existing state-owned water facilities and constructs new facilities when needed (Cohen, 2004). The DEP Commissioner is a member of the Water Supply Authority. As in California, two separate agencies control water supply management and water supply facilities. In New Jersey, the dual role of the DEP Commissioner may allow for more coordination between the two agencies.

c. Coordination of Land Use Plan and Water Plan

Currently, little coordination between New Jersey's state land use and water plans exists (Cohen, 2004). In 2000, the DEP issued and then retracted a rule that would have created this missing connection. The retracted rule would have "(a) restricted development to areas that the SDRP identified as suitable for development; (b) established criteria for determining maximum daily pollution loads for water bodies; and (c) modified water quality management plans and strengthened restrictions on development using septic systems" (Cohen, 2004, 65). Local government opposition compelled the DEP to withdraw the rule (Cohen, 2004).

D.2 Local Management

a. Land Use Plans

Municipalities must prepare local comprehensive plans, but the state's Municipal Land Use Law requires only three elements—a statement of objectives, principles and policies underlying the plan; a land use element; and a policy statement relating the coordination of the plan to neighboring areas, the county, and the SDRP (N.J.S.A. 40:55D-28). A 2000 study by the non-profit organization New Jersey Future surveyed forty-four townships to determine how well the townships protected their natural resources (Cohen, 2004). The study found all the privately

owned, environmentally important land in the state zoned for development, usually with minimum lot sizes of between one and three acres. Also, the townships land use actions proved inconsistent with the state's environmental goals. The study's authors attributed this dissonance largely to the townships' reliance on property taxes for revenue, creating a conflict between natural resource preservation and fiscal needs.

b. Ensuring Adequate Water Supply for Specific Projects

While water planning remains optional in local plans, municipalities must ensure adequate water supply for all new developments (N.J.S.A. 40:55-D-38). However, the law fails to define "adequacy" or specify for how long the supply must be secured. Therefore, local governments possess large discretion to determine just what an "adequate supply" means in practice (Cohen, 2004).

Coordination between land use and water supply planning is poor in New Jersey despite the state's attempts (outlined above) to secure a different result (Cohen, 2004). The state's water supply plan symbolizes this problem as it states that the SDRP may actually conflict with the water supply plan and recommends that future updates of the SDRP take these potential conflicts into account. Addressing this conflict at the state level may prove easier for New Jersey than finding a solution to the disconnect that exists at the local level that would require massive political change.

E. New Mexico

According to Lucero, integrating growth and water supply in New Mexico will "require another important connection though (one often overlooked)—the connection between planning, regulations and decision-making" (2003, 1). She emphasizes the proliferation of plans in New

Mexico but the lack of their effective implementation. Successful integration requires that plans not sit on a shelf but actually form the basis for action (Lucero, 2003).

E.1 State Management

At the state level, the Office of the State Engineer and the Interstate Stream Commission, separate but jurisdictionally-related agencies, manage New Mexico's water resources. These agencies hold authority over the supervision, measurement, appropriation and distribution of almost all surface and ground water in New Mexico. The State Engineer also serves as secretary to the Interstate Stream Commission and oversees the staff of both agencies (<http://www.ose.state.nm.us/>).

a. *State Water Plan*

New Mexico has conducted water supply planning at the regional level for the past ten years (Lucero, 2003). Divided into sixteen regional water-planning districts, the state has directed more than five million dollars towards regional planning efforts in the past decade. The state has sought to create a comprehensive water plan that would “recognize and encourage the connections between water availability and land use decisions” and provide for a “fair distribution and allocation of the scarce resource to all users consistent with approved regional water plans or the state water plan” (Lucero, 2003, 3). New Mexico adopted its first state water plan in late 2003.²

One of the goals of the plan was to “recognize the relationship between water availability and land-use decisions” (New Mexico 2003 State Water Plan, 34). Senate Bill 195, calling for the creation of the state's first water plan, asked that the plan “recognize and *encourage* the connections between water availability and land use decisions” (emphasis added). In order to

² The 2003 State Water Plan is available at: <http://www.ose.state.nm.us/water-info/NMWaterPlanning/2003StateWaterPlan.pdf>.

accomplish this goal, the state plan outlined four policy statements: 1) “the State shall seek to ensure that land use decisions are consistent with available water supplies”; 2) “the State shall seek to ensure that land use decisions do not adversely impact the State’s water resources”; 3) “the State shall promote the efficient use of water and the protection of water quality in all new development”; and 4) “the State shall continue to respect, preserve, and support existing local zoning, planning and subdivision authority” (2003 State Water Plan, 34). Various implementation strategies follow the policy statements. However, none of these strategies appear enforceable because they contain such words as “encourage” and “promote,” words not generally used to require action (2003 State Water Plan, 34-35).

E.2 Local Management

Regarding the bill that would result in the 2003 State Water Plan, Lucero stated, “[a]lthough the bill is laudable and represents a very important step for New Mexico, it is also, unfortunately, an example of the serious blind spot we have in this state—a failure to see beyond the plan, to future issues of implementation” (2003, 3). Currently, New Mexico has no express requirement that adopted comprehensive plans and zoning or other local land use regulations be consistent with state plans.³ The state also fails to require local governments to conform their decisions and actions to the new water plan. Even prior to the plan, state control over local regulation of water availability for new development was limited.

When a new subdivision is proposed, the OSE [Office of the State Engineer] assists the local government in its evaluation of the proposal by analyzing physical availability of a water supply for the proposed development. The OSE subdivision review determines whether water supply is sufficient to sustain the proposed development for 40 years. A 40-year planning horizon may be inadequate for many uses. Some local governments require that water be sufficient for periods of up to 100 years. In these instances, the OSE will assess water availability to the longer period. The OSE opinion regarding the availability

³ States that expressly require consistency include Arizona, California, Delaware, Kentucky, Maine, Nebraska, Oregon, Rhode Island, Washington, and Wisconsin (Lucero, 2003).

of water is not binding, however, and the local government may choose to ignore a finding that the water supply for the development is insufficient (2003 State Water Plan, 36).

That is, local governments face no sanctions or penalties for any actions they take that are inconsistent with the plan. Moreover, local governments can create land use plans in conflict with the state water plan (Lucero, 2003).

F. Oregon

Oregon integrates water supply planning with land use planning through the coordination of local water and comprehensive plans. A state land use plan provides guidance to local governments for achieving state growth management policies. Lacking a state water plan, Oregon provides a weak example of the value of land and water resource coordination to its municipalities.

F.1 State Management

a. State Planning

At the state level, Oregon utilizes a state growth management plan, predicated on the use of Urban Growth Boundaries (Cohen, 2004). These boundaries direct development and protect critical environmental areas. Water permitting substitutes for state water planning. Water appropriators must obtain a permit from the Water Resources Department [WRD]. The state must consider water availability when approving permits. WRD limits its consideration to the adequacy of supplies to accommodate the applying party rather than comprehensively assessing water supply needs to accommodate multiple prospective users.

F.2 Local Management

a. *Land Use Plans*

Oregon requires local governments to prepare comprehensive plans addressing and complying with Oregon's nineteen growth management goals (Cohen, 2004). Four of those goals address water resources. The "Open Space, Scenic and Historic Areas, and Natural Resources" goal requires that local governments consider the carrying capacity of water resources as a major determinant of the plan. The "Air, Water and Land Resources Quality" goal protects water quality. The "Public Facilities and Services" goal requires that local governments create public facilities plans as a supporting document to the comprehensive plan. Public facilities plans must describe the water supply systems available to service designated land uses. The "Urbanization" goal establishes urban growth boundaries, determining how far public facilities must extend their services and potentially protecting critical lands outside the boundaries. While several of the goals implicate water supply planning, the integration of water supply issues into the land use plans exists more in theory than in practice (Cohen, 2004).

b. *Water Plans*

In 2002, WRD issued regulations requiring large water suppliers (those supplying more than one thousand people) to prepare water management and conservation plans (OAR 690-315). WRD uses these plans as a basis for permitting decisions. Water suppliers must use reported land uses and population projections found in local comprehensive plans as a basis for determining future water estimates in their plans (OAR 690-086).

Few water suppliers have submitted plans to WRD since 2002 (Cohen, 2004). Additionally, WRD still have characterized many of the submitted plans as not "being particularly good" (Cohen, 2004, 27). The WRD staff member responsible for reviewing the

plans, explaining their inadequacy, commented that “[i]t is difficult for any community to really view water as a finite resource and to look at alternatives to what they are doing now” (Cohen, 2004, 27).

The 2001-2003 Strategic Plan issued by the WRD comments that,

each year the state’s water supply falls far short of the demands placed on it. Across Oregon, many streams are dry in the summer and fall months. Adequate natural flow reserves for new and expanded uses do not exist. In many places, sufficient flows for existing users do not exist—and haven’t for decades. In more and more areas, we are facing uncertainties about ground water reserves...Put very simply, there is not enough water where it is needed, when it is needed, to satisfy both existing and future water uses” (Oregon Water Resources Department Strategic Plan: 2001-2003).

While the state’s growth management policies are strong, the state’s water shortage suggests that water supply planning lacks high priority. Cohen (2004) gives Oregon’s attempts to integrate land use and water supply planning a mixed review. Like in New Jersey, he finds that Oregon’s growth management strategies and water supply planning may even conflict as some water supply policies endanger agricultural lands, open space protection, and scenic and recreational uses of waterways.

G. Washington

Both Washington’s Water Resources Act and Growth Management Act bring attention to the important role water supply plays in land use planning. However, neither act explicitly states that water must physically and legally exist before new growth will be permitted (McDonald, 1998). Moreover, the state allows local governments to draft local comprehensive plans without an assessment of available water resources.

G.1 State Management

a. State Land Use Plan

The planning requirements of the Growth Management Act address water concerns in its environment and public facilities goals (RCW 36.70.020). The environment goal seeks to protect both water quality and quantity. The public facilities goal requires that local governments' plans include water facilities for new development. Compliance with neither goal requires local governments to ensure that water rights exist for all planned growth. However, the public facilities goal and its legal interpretations require local governments to plan for needed water infrastructure (McDonald, 1998).

Taking the logic one step farther, McDonald (1998) argues that providing water infrastructure cannot meet the public facilities goal of providing adequate service without adequate water supply. Therefore, the public facilities goal in addition to planning for adequate water infrastructure should also plan for adequate water supply for future development. In practice, plans may be written without consideration of adequate water supply. Since a state agency controls water permitting, local governments face uncertainty when comprehensively planning for water supply since they do not know if the state will issue water permits for various uses.

b. State Water Plan

The Water Resources Act requires the state to plan for water supply and use comprehensively so that the state and local governments can best manage their supplies (Ch. 90.54 RCW). Local governments must ensure that their actions comply with the Act (RCW 90.54.090). Additionally, the Department of Ecology may recommend that local governments adopt certain land use policies that protect water resources (RCW 90.54.130).

In Washington, water appropriations cannot be made until the Department of Ecology issues a permit (RCW 90.03.290). The Department of Ecology enjoys broad discretion over whether to issue a permit (*Schuh v. Dept. of Ecology*, 100 Wn.2d 180, 667 P.2d 64 (1983); *Peterson v. Dept. of Ecology*, 92 Wn.2d 306, 596 P.2d 285 (1979)). The department will not issue a permit unless the proposed use is a beneficial use of water, water is available, the use will not injure other existing uses, and the use will be in the public interest (RCW 90.03.290).

Small withdrawals for single and group domestic use not exceeding 5,000 gallons per day fall outside the permit requirement and constitute a “domestic use exemption”. Developers use this exemption to avoid obtaining a permit since the exempted quantity accommodates up to six single-family homes (McDonald, 1998). However, a 1997 Attorney General opinion ruled that developments seeking to utilize several wells, each pumping less than 5,000 gallons per day but together exceeding 5,000 gallons per day, will be counted as a single project and not be exempt from the permit requirements (McDonald 1998; Washington AGO 1997 No.6). Therefore, the project as a whole, not its individual wells, forms the basis for meeting the permit requirements.

Washington’s building industry criticized the AG opinion and sent letters to local governments refuting the Attorney General’s interpretation of the statute (McDonald 1998). They argue that under the exemption each well should be considered a separate entity and not lumped together. Although local governments do not issue water permits, they do make land use decisions, and the permit exemption issue could play a role in their decisions.

G.2 Local Management

a. *Land Use Plans*

Washington requires local governments to draft and adopt comprehensive plans. The state also requires local governments to consider water resources in some aspects of their local

plans, as detailed in the section, *State Land Use Plan*, above. However, state law fails to require local governments to include water supply as an explicit element in local comprehensive plans.

b. Ensuring Adequate Water Supply for Specific Projects

The state of Washington's Growth Management Act prohibits local governments from approving any subdivisions unless potable water supplies exist (McDonald, 1998, citing RCW 58.17.110). Additionally, local governments may not issue building permits "unless and until they find there is adequate water supply extending for a reasonable period of time necessary for the intended use of the building"(McDonald, 1998, citing RCW 19.27.097 and AGO 1992 No. 17). If the project falls outside the domestic use exemption, then the burden of determining adequate supply shifts to the Department of Ecology.

However, if the project falls within the domestic use exemption, the local government alone must determine if an adequate water supply exists. Local governments lack the resources to assess water supply that the state possesses and may not make thorough determinations. Additionally, the assessment results in a different outcome if only a portion of the development is taken into consideration rather than the larger project. Therefore, local governments may approve developments not requiring state permits even without a sufficient water supply.

McDonald, the Assistant Attorney General for the Ecology Division of the Washington Attorney General's Office, believes that the Growth Management Act and Water Resources Act together provide the best scheme for managing growth and water under Washington's current law (McDonald, 1998). However, he advocates that, in addition, local governments analyze water supply when drafting local plans even though this now is not required. Local governments assessment of water supply at this early stage makes future coordination of water supply with development easier.

IV. RECOMMENDATIONS FOR GREATER INTEGRATION OF LAND USE AND WATER SUPPLY PLANNING

Since the integration of land use planning with water supply planning is not widespread, the relevant literature is often more prescriptive than descriptive. This section synthesizes the “best practices” identified by the studies of state practices as well as the general planning literature on the topic. However, since many of these practices have yet to be thoroughly adopted by any state or local government, a determination of their “worth” must await future analysts.

A. Statewide Management

State legislation determines the level at which land use and water supply planning will be integrated. Historically, local governments control land use planning and zoning. Therefore, in theory at least, the local level appears best suited to oversee such integration. In addition, having one entity undertake both functions makes eminent sense. However, localities face information shortages, as they lack the necessary technical knowledge for modeling water supply. Additionally, local control over water supply fragments as watersheds traverse political boundaries, and supervision of the resource may require a more regional approach. Lastly, the states may not give localities the legal authority to integrate water supply planning into land use decisions effectively. Still, some states, such as California, chose to leave water supply planning to municipalities. Other states, such as Florida, acknowledge a role for municipalities but support them with regional and statewide planning efforts.

A state water plan and a state land use plan at a minimum provide local governments with a model. When the state clearly links the two plans, then the state sends an important message to local governments to do the same. However, existing practices show that statewide planning fails to ensure good local-level planning or local coordination of water and land planning (Cohen,

2004). States place false hope in trickle-down planning, especially when local planning is discretionary because communities may not reflect state-level planning goals.

State governments should encourage integrated water supply and land use planning at the local level. Even in states with strong home rule powers for local governments, such as New Jersey, states can define minimum standards for integration, leaving discretion in their implementation to local governments, and create incentives for increased integration. State legislatures should consider including a requirement in their statutes governing local planning that communities include a plainly articulated and comprehensive water element. States may also choose to follow the lead of states like Arizona, California, and Maryland that require a demonstration of adequate water supply for all new growth. States should also monitor local governments to ensure that the integration required by law actually occurs. As Cohen's study (2004) of Florida, Maryland, New Jersey, and Oregon highlights, local integration often fails to meet state standards.

B. Local Management

A local government can achieve water supply and land use integration through two methods that exist in different time frames. First, every local government can include in its comprehensive plan a water element that addresses water supply issues, from ensuring enough water for planned growth to protecting critical areas necessary for water recharge or a clean supply. If included, local governments should prepare these plans in anticipation of development. Second, local governments can require a showing of an adequate water supply before approving any projects. This requirement should not replace long-term planning but supplement it as development occurs. If local governments address water supply issues only at this phase, then water planning become piecemeal, and water may not be directed to its most beneficial uses.

Overall, local planning needs to incorporate longer planning horizons, holistically analyze development, and pay sharp attention to land uses' effects on water supply.

B.1 Planning

As of 1997, only two states, Florida and Pennsylvania, required water supply discussions or recharge measures in local plans (Cobb, 1998). Local planning should use a systems perspective that broadly considers the interplay between land uses and water resources (Dunne and Leopold, 1978). Local plans should reflect this thinking. Rather than creating separate plans for land and water, local governments should draft integrated plans that present a complete strategy to grow while at the same time protecting water resources.

a. Water Component of Local Comprehensive Plan

As localities plan for the future uses of land within their borders during the drafting of comprehensive plans, they should determine if an adequate water supply exists to meet those land uses. Just as the amount and type of available land determines where new growth will occur, the amount and type of available water should act as a similar constraint. When local governments consolidate the many facets of water issues, including supply, into local comprehensive plans, they reduce the risk that they will overlook a water concern. Localities cannot make the right decisions regarding how to develop when they lack the critical information necessary to make these choices.

Although municipalities may address water resources in their comprehensive plans, the plans often place water in the background, hidden in sections on the environment, land use, or public facilities (O'Brien and Markham, 1996; Waterman, 2004; Cohen, 2004). For example, as Table 1 on the following page shows, Wisconsin identifies groundwater issues relevant to each section found in the state's requirements for local comprehensive plans. When local governments

disperse water resource issues among the many elements of comprehensive plans, the dispersal dilutes the strength of comprehensive water supply planning.

Table 1: Groundwater issues in local comprehensive plans

Comprehensive planning element	Relationship to groundwater
Issues and Opportunities	Important issues may include • the amount of water needed for future homes, farms and businesses • whether the needed water is available, how it will be provided and at what cost • how growth will affect the future quality and quantity of available groundwater • the need for community wellhead protection planning
Housing	• Additional houses increase the demand for clean water and other services. • Paved areas may reduce the amount of groundwater recharge. • More homes may mean more fertilizer and pesticide use. • The potential for household chemicals or used oil to be dumped on the ground or into septic systems increases. • Decisions must be made on whether new houses will have public sewers or private on-site wastewater disposal systems. (See Fact Sheet 3).
Transportation	New roads needed to serve growing areas may mean: • more runoff of water off impervious surfaces that might have recharged groundwater. • more salt to keep the new streets safe in winter, which may seep into groundwater. • more chemicals leaking from automobiles and entering storm sewers or seeping into the ground.
Utilities and community facilities	• Communities must assess future water needs and the ability of existing systems to meet future needs, including the infrastructure and any environmental limitations to the siting of new wells or reservoirs. See also Economic development below.
Agricultural, natural and cultural resources	• Groundwater provides the majority of the water in many Wisconsin lakes, streams and wetlands. • Pumping municipal, industrial, agricultural or other high-capacity wells may reduce flow to surface water bodies. • Agricultural land use may increase potential for groundwater contamination from fertilizers and pesticides. • Groundwater information is important in assessing the ability of the resource to sustain growth over the long term.
Economic development	• Water demand may increase from new residences and businesses. • Water costs may increase due to pumping from deeper aquifers or adding new wells to the system to meet demand. • New high capacity wells could affect groundwater quantity and sensitive surface water resources. • New businesses may have facilities, operations or land use practices that could cause accidental spills or other groundwater contamination.
Intergovernmental cooperation	• Because groundwater impacts go beyond political boundaries, a coordinated effort is important to avoid potential problems down the road. Working together can maximize the use and protection of the available water resources.
Land use	• Many land uses (agricultural, urban, residential, commercial, industrial) have the potential to impact groundwater quality. • Impermeable areas such as buildings, roads, houses and parking lots prevent precipitation from infiltrating into the subsurface, increasing runoff and potential flooding. • Water and sewer service plans, subdivision plans, and wellhead or source water protection plans are all forms of land use planning that can mitigate groundwater impacts.
Implementation	•As communities develop a schedule to implement the comprehensive plan, communities need to make sure that protection of the groundwater resource is considered. Developing a wellhead protection plan is one way to accomplish this important step. It is important to have information on groundwater resources to make sound planning decisions.

Source: Comprehensive Planning And Groundwater Fact Sheet 1: Wisconsin Groundwater Coordinating Council, available at <http://www.dnr.state.wi.us/org/water/dwg/gw/pubs/SmartGrowth1.pdf>

While one may argue that the inclusion of water issues throughout the plan highlights water's centrality to comprehensive plans, one can also argue that it portrays water as of secondary importance to all other issues receiving more focused attention. Moreover, as of 1997, only eleven states required internal consistency within local comprehensive plans (Cobb, 1998). As a result, individual sections of local plans may conflict with each other. For example, the land use element of Wisconsin's plan may dictate one outcome for water supply while the economic development element dictates another.

To remedy the lack of focused attention, comprehensive plans can contain a separate water element consistent with the other elements. Local governments should be careful not to substitute an assessment of adequate water services, i.e., water works and delivery systems, for an assessment of available water supply as the two are not equivalent (Angelo, 2001; Cohen, 2004). Water infrastructure cannot function without water supply. Communities should view water as a vital resource as necessary to their development as land, roads, or schools. Including water as a separate element in comprehensive plans reflects this perspective.

Planners should not limit their analysis of available water supply to an assessment of how much water their community consumes. Unfortunately, the most commonly used technique for water supply planning involves multiplying projected population by a per capita water use coefficient that also takes into account nonresidential water uses (Kaiser et al., 1995). Proper analysis of available supply needs to incorporate consumption *and* land use effects on potable supply. For example, Florida requires a "conservation and aquifer recharge" element in local plans. The state reminds local communities to pay close attention to water resources. The City of Tampa's comprehensive plan visibly tackles the effects of development on water resources (Cohen, 2004). The plan directs development away from both wetlands and one hundred year

floodplains. Moreover, the plans calls for the establishment of “scientifically-defensible land use regulations and performance standards for development activities in areas of high recharge/contamination potential” in order to protect both groundwater quality and quantity (Tampa Comprehensive Plan, 1998, 22). The plan seeks to accomplish these objectives by “restricting development or land alteration activities which breach the confining layers of the Floridan aquifer;” “protect[ing] water quality by restricting activities and land uses which would adversely affect the quality and quantity of identified water sources . . .;” and “through the land planning and development review processes, consider the requirement of aquifer recharge easements where such mitigation is appropriate” (Cohen, 2004, 54-55).

The inclusion of a water element in local comprehensive plans accomplishes several aims of successful land use and water supply integration. First, a water element provides better information to the public since the element consolidates all relevant water issues into one location (Waterman, 2004). This integration also fosters increased interaction between land use and water planners since they must work together to achieve this coordination. In California, current administrative rules reduce collaboration between land planning and water planning agencies to a one-time massive document exchange between agencies. An integrated document of water and land plans would force the two sets of planners to collaborate more closely (Waterman, 2004). Second, a water element that includes a thorough water supply assessment may reduce the need for further reassessments as dictated by specific project approval requirements (Waterman, 2004). Planning right the first time can save localities time and money. Third, localities periodically review or update their comprehensive plans. Therefore, if local plans include a water element, local governments will be far more likely to update their knowledge of water issues (Waterman, 2004).

However, the inclusion of a separate water element could have some negative effects. First, if states mandate its inclusion but fail to provide local governments with the financial or technical resources needed to create it, local governments may view the element as a burden rather than as an opportunity for better planning (Waterman, 2004). State and regional agencies need to support local efforts to integrate water supply into land use plans. These agencies can lend support through the provision of knowledge and technology, as Florida's Water Management Districts do. Florida law mandates that Water Management Districts assist local governments to develop and revise the water resource components of their comprehensive plans (Fl. Stat. § 373.0391).

Second, as with most environmental policies, state or local governments may find it difficult to determine if the benefits of a water element outweigh its costs (Waterman, 2004). Currently, many jurisdictions act as if water is an infinite resource (Cohen, 2004). Most governments fail to see a need or have ignored the need for improved water resource management. For jurisdictions where the current system fails to manage water resources properly and apparent shortages exist, governments perhaps can better justify the adoption of a new method of management.

Third, local governments could use a water element as an exclusionary tool, allocating water to preferred uses and excluding certain industry, businesses or socioeconomic groups from the community (Waterman, 2004). Whether this concern becomes a reality depends on many factors including the relevant legal system governing water rights and how much control localities have over designating future land uses. Even in Oregon, where urban growth boundaries give local governments great control over future development, state law forbids local governments from freezing these boundaries or imposing annual growth caps (Cohen, 2004). If

active growth management states cannot use land planning to halt growth, then a small likelihood exists that localities will use water planning to do the same. However, policy analysts should consider this issue further.

Overall, including a water element into local comprehensive plans is likely to encourage planners to develop and to present a clearer picture of the community's resources. It reduces the redundancy of separate land use and water plans and can thereby save local governments time and money. Finally, the inclusion of a water element produces a source document that land use planners can utilize when making specific project approval decisions. Thorough integration of a water element into the comprehensive plan requires that at least the following factors be discussed: the protection of critical lands and an understanding of the water supply impacts of development.

b. Protect Critical Lands

A highly valuable and needed method to protect water supply involves the regulation of areas of land critical to a sustainable water supply. To ensure that water properly cycles through the environment, local governments should steer development away from these critical areas, including aquifer recharge zones and drainage basins located upstream from water-intake facilities (Page, 2001). Local governments can protect these sensitive lands in several ways (Meyland, 1993). First, construction moratoria can prohibit any new development within these areas. Second, acquisition of critical lands through purchases, the establishment of conservation easements or through zoning in order to set aside these areas as parks, open space, and agricultural lands can limit their development. Last and implicitly, localities can refuse to extend water and sewer services into sensitive lands to prevent their development.

Regarding the first option, localities should use construction moratoria as a last resort (Lucero and Soule, 2002). Beyond creating a confusing environment for development, their use rests upon shaky legal foundations. In fact, many states prohibit construction moratoria while others may limit their duration by statute (*Tahoe-Sierra Preserv. V. Tahoe Reg. Planning*, 122 S.Ct. 1465, 1495, 535 U.S. 302, 354, 152 L.Ed.2d 517, _ (2002)). The legal concept of ultra vires prevents localities from legislating in areas outside the bounds of their recognized authority. One common area to raise ultra vires challenges is local designation of sensitive or critical lands (Tarlock, 2002). For example, courts in Vermont and New Jersey have not recognized local authority to issue construction moratoria on sensitive lands.⁴

Moratoria can cost local and state governments time and money clearing up the involved legal disputes. In 1988, New Jersey passed the Watershed Moratorium Act, temporarily preventing the sale of land within specified watersheds (Cohen, 2004). The state passed the moratorium as a stopgap measure in order to give the legislature time to develop legislation targeted at the protection and preservation of watershed lands critical to water supply protection. The state never established the watershed land protection legislation. Instead, the state has dealt with several lawsuits and paid municipalities annual payments to offset lost tax revenues from the halted development (Cohen, 2004).

⁴ See, *In re Kisiel*, 772 A.2d 135 (Vt. 2000) (town plan prohibition on development on “steep slopes” an insufficient basis for denial of permit); *City of Newark v. Township of Hardyston*, 667 A.2d 193 (N.J. Super. Ct. App. Div. 1995) (Reviewing a moratorium on land development within a municipal watershed, the court stated that “[t]he Legislature is still wrestling with the problem of watershed protection. The issue is politically sensitive because it is a matter of general concern (protection of watershed land and water sources) against both the property rights of watershed owners and the taxing interests of municipal entities...the fact that no easy resolution has occurred is neither a surprise nor a sign that the moratorium was meant to expire” (*City of Newark v. Township of Hardyston*, 667 A.2d 193, 198 (N.J. Super. Ct. App. Div. 1995)).

Legislation similar to the law envisioned, but never adopted, in New Jersey presents the best opportunity for the protection of critical lands. Other states have passed such measures. For example, in 1983, New York passed the “Incompatible Uses Law” (Meyland, 1993). The law directed the New York Department of Environmental Conservation to “promulgate rules and regulations which will restrict or prohibit incompatible uses over primary water supply aquifers, giving special attention where necessary to protect primary groundwater recharge areas” (N.Y. Env’tl. Conserv. Law § 15-0514.5). In states without comparable legislation, local governments can accomplish critical lands protection through land purchases, conservation easements, and zoning. State programs that provide funding to local programs provide much aid to these efforts.

Through its Save Our Rivers Program and the Preservation 2000 Program, Florida provides funds to its Water Management Districts to purchase land and/or conservation easements in order to protect water quality and supply (Cohen, 2004). The WMDs receive thirty-percent of the funds generated from those programs and may use them to acquire lands in imminent danger of subdivision (Cohen, 2004). In New Jersey, the governor in 2002 signed a bill that gave the highest priority in the state’s open space purchase program to lands protecting water quality and providing flood relief (Cohen, 2004).

Without state support, localities must depend on their own financial resources to protect these areas. For example, Suffolk County, New York, spent \$118 million to purchase 3,440 hectares of open space in order to protect aquifer recharge zones (Page, 2002). Other localities without such financial clout may have to rely more on voluntary conservation easements that impose development restrictions in exchange for tax breaks or use their zoning powers to regulate development in those areas.

Lastly, localities can limit growth by not providing water supply infrastructure in these areas. The availability of public water promotes development (Page, 2002; Randolph, 2004). Therefore, without public water, development should decrease. Studies of localities in many areas of the United States have shown that development of lands without water and sewer lines is almost impossible (Page, 2001). Through all these various methods of control, local governments can limit land uses in areas critical to the protection of water supply.

c. Understand Water Supply Impacts of Development

When planners consider development impacts on water supply, they often limit their consideration to the direct effects—i.e., how much water the development uses and how much wastewater the development produces. While this analysis remains important, planners also need to consider the indirect effects, such as increases in stormwater volume, decreases in water recharge due to impervious surfaces, changes in quality due to maintenance activities like fertilizing and other chemical applications, and lowering of groundwater tables due to increased pumping (Delaware River Basin Water Resources Plan, 2004). For example, recent research shows that increased impervious cover can have a significant effect on water availability.⁵ Examining only the seemingly small effects of a development's water consumption on the area's water resources ignores the larger consequences of a development's physical impacts on water supply (Angelo, 2001).

⁵ “The predicted rate of change in stream runoff, base flow, and evapotranspiration increases substantially for watersheds with a projected increase of 15% or more in impervious surface cover with respect to 1995 conditions. Water-budget calculations indicate that runoff may increase 50% or more, and base flow may decrease 10% or more, in these watersheds. Watersheds with current and projected ground-water withdrawals greater than 20% of estimated ground-water recharge were identified as being most sensitive to increases in impervious cover and ground-water withdrawals and therefore are most at risk with respect to the sustainability of ground-water yields” (Zapezca, 2004, n/a).

More research should be directed towards understanding what types of development and development practices least negatively affect water supply (Berke et al., 2003; Otto et al., 2002). Cohen (2004) recommends three areas for further research: 1) case-by-case studies to determine the effects on groundwater recharge of stormwater runoff to streams; 2) study of the degree to which “smart” development patterns, such as infill development and higher density development, produce better water resource outcomes; and 3) construction experimentation, such as porous pavements and “green roofs,” to provide more environmentally-friendly development. This research should be made available to local governments so that it can be incorporated into land use decision-making.

B.2 Ensure Adequate Water Supply for Specific Projects

As a supplement to coordinated land use and water supply planning, local governments can require water assessments for all new development. If the land use planning agency cannot find that an adequate water supply exists, then the agency will not approve the development. Local regulations need to be clear. In other words, they should provide a clear definition of adequate supply and contain a definite time period during which the supply should be available. Such restrictions must also be based on solid scientific evidence of the existing water supply. Without such evidence, local governments may face costly and time-consuming litigation as developers seek to overturn agency decisions (Cohen, 2004).

Several states have already augmented water-planning efforts with development restrictions that require builders to demonstrate present and future water supply before construction begins. Again, while these regulations may supplement a state’s effort to manage water supply, they should not be mistaken for water planning. Ensuring that water exists for new developments on an ad hoc basis is not equivalent to long-range comprehensive planning, as it

simplifies water resource planning to a mere comparative analysis of consumption and supply. Simply estimating a development's likely water consumption fails to consider how the development itself may impact future water availability. With a comprehensive plan already in place, local planners can also assess whether the community as a whole can tolerate the development's water impacts.

Arizona was one of the first states to enact such regulation with its 1980 Growth Management Act (Tarlock and Lucero, 2002; McKinney, 2003). Developers in Arizona must demonstrate a 100-year water supply in order to build. The state so far has not used this requirement to limit growth (Tarlock and Lucero, 2002). However, the Act has steered municipalities away from overdrafting groundwater and towards using more renewable water supplies (McKinney, 2003).

California recently passed similar development restrictions with Senate Bills 221 and 610 (O'Brien and Markham, 1996; Epstein and Kibel, 2002; Torgan, 2004; Waterman, 2004). However, these bills only apply to large developments or projects. Even smaller developments can affect water resources and should be included in the analysis (Epstein and Kibel; Torgan, 2004).

Like the state-level development restrictions, some local governments also require developers to demonstrate water supply before beginning construction. Several communities along Colorado's Front Range, at least on an ad hoc basis, require developers to prove that they have adequate water supplies (McKinney, 2003). In Nevada, counties may deny subdivision requests due to inadequate water supply even if the State Engineer has previously approved the plan, as decided in *Serpa v. County of Washoe*, 901 P.2d 690 (Nev. 1995). The court held that “[t]here is no state law indicating that the ruling of the State Engineer preempts a county or other

governmental entity from enacting zoning laws that impose limitations on water use that are more restrictive than those of the State Engineer”(*Serpa v. County of Washoe*, 901 P.2d 690, 693 (Nev. 1995)). The court expanded the localities’ power of independent definition of “orderly physical growth and development” to include the ability to determine water availability for itself (N.R.S. 278.230, subd. 1). While local governments have this power in Nevada, at least for now, other states or their courts may not extend similar authority to local governments.

Windham, Maine is also considering limiting or restricting development where groundwater supplies are low (“Maine City,” 2002). A planning consultant for the town commented that “larger lot sizes would reduce the draw on an aquifer in a neighborhood, and bringing in public water would be another option.” Restricting development through the requirement of larger lot sizes may have adverse effects, however. Development will be pushed farther out and possibly into critical water recharge areas affecting future water supply. Bringing in public water may also encourage increased growth in recharge areas. However, with a comprehensive plan already in place, local governments can create development restrictions related to water supply that complement rather than conflict with the locality’s water management policies.

V. CONCLUSION

While understanding the connection between land and water supply makes a step in the right direction, action needs to accompany heightened awareness. At a minimum, water should play a more prominent role in both state and local comprehensive planning. The case studies presented in this paper demonstrate that the achievement of effective land use and water supply planning integration is a large task. While states may not be able to mandate integration that produces an effective result, they may have more success encouraging integration through state

incentive programs. State governments should explore some potential incentives. For example, states could provide funding for local comprehensive plan development if the plan includes a water element. Also, states can provide local governments with non-financial support, such as technical assistance and education. States may encounter an undesirable water future if they continue to leave protection of the water supply up to the courts or solely to the local governments.

Hopeful that communities will choose to undertake the task of integrated water and land planning, this paper presented two specific ways in which local governments can increase their integration. First, they can prepare comprehensive land use plans that include a water element. Second, they can require that developers demonstrate an adequate water supply before receiving approval for new developments. Mindful of the political and economic realities communities face, states may want to consider state statutes requiring a demonstration of adequate water supply before approving specific projects. Such a statewide statute may relieve some of the pressure from new growth that local governments face. In other words, local officials can point to the state statute when the developers question the requirement.

Ideally, a community's general plan should drive specific project plans rather than allowing specific projects to drive the general plan. States should then monitor local governments to ensure that they meet any state standards requiring the incorporation of water supply concerns into land use decision-making. Plans can have little impact without effective implementation.

While this paper provides recommendations for increased integration, it cannot answer what it will take for those recommendations to become reality. Planners need to give more attention to this issue. Some suggested areas for further research include: 1) assessing the

existence and validity of legal mechanisms that ensure greater concern for water supply, 2) examining the effects of different types of land uses on water supply, 3) exploring different modeling techniques that include climate change scenarios, and most importantly, 4) understanding in depth the roles politics and economics play in obstructing the integration of water supply and land use planning.

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