Supporting Document E-1

Candidate Alternatives

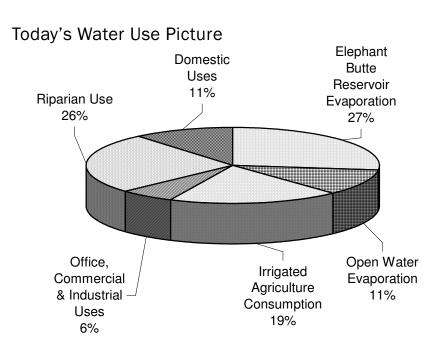
MIDDLE RIO GRANDE WATER ASSEMBLY

www.WaterAssembly.org

DRAFT

August, 2002

Candidate Alternative Action Descriptions for the Regional Water Plan



What will Tomorrow's Water Use Picture Be?

Current usage results in a 55,000 acre feet average deficit per year

Source: Middle Rio Grande Water Budget — Averages for 1972-1997, October 1999

Page 2 WATER BUDGET BALANCING ALTERNATIVES

Overview

Water. We can't live without it, and, according to recent polls, water is a top priority of the citizens of New Mexico. For good reason: we are using water faster than it can be replenished, compounding a debt that we have been accruing since the 1960's. Our projected population growth alone will create additional demands on an already over-appropriated water supply, causing further competition and conflicts among municipal, agricultural, and environmental water uses.

As we look to our water future, we must also acknowledge another fact. We in New Mexico are probably returning to a drier climate than we have experienced in the last 25 years. Each year that we fail to live within

How can we have sufficient affordable water to meet human and environmental needs while maintaining all of our desired New Mexican life-styles?

our renewable water supply, we limit the options available to future generations, as well as to

our own. Additionally, the chance of more Federal intervention in our water affairs increases.

How can we have sufficient affordable water to meet human and environmental needs while maintaining all of our desired New Mexican life-

styles? The Water Assembly, partnered with the Mid-Region Council of Governments, is looking ahead and trying to elicit a wise solution to our mutual problem.

The Water Assembly is committed to an open, inclusive and participatory process to develop a long-term water plan for the entire Middle Rio Grande region - Sandoval, Bernalillo, and Valencia Counties. Our plan, together with those from the other regions of New Mexico, will be incorporated into a state-wide water plan. The target date for completing our plan is June, 2003.

To date, the Water Assembly has held four series of Community Conversations throughout the region, put on five Assemblies, and obtained a survey of Attitudes and Preferences regarding water issues. From this process, a mission for the regional water plan was created. Recognizing our consistent overuse of this limited resource, the mission is to balance water use with renewable supply. We collected suggestions to accomplish the mission.

What to do? Voice your vision. How? We are seeking your help -now, while we still have choices left to us.

For more information on regional water planning, refer to the appendix of this document.

◆ The Problem

We are already using more water than is available to us, and yet we face additional stresses: endangered species, growing population, thirsty neighbors, water quality issues, land subsidence, and drought. The finite groundwater resource is a vital part of our regular overuse. Tree ring studies tell us the past 25 years have been the wettest period in New Mexico over the last 1000 years.

The Constraints

Various constraints limit the possible solutions to our problem. Water laws and treaties affect our ability to change our ways. The Rio Grande Compact divides river flows among Texas, New Mexico, and Colorado. Besides variable flows measured Otowi gauge and Elephant Butte, the Compact requires storage at Elephant Butte for delivery further south. Pressure is mounting to update the Compact, which could result in less water for New Mexico. In our state, water allocation is based on seniority, yet the Endangered Species Act has created new demands not anticipated under the traditional water rights system. Federal statutes also control water quality which may affect use, and Congressional acts establish how water may be stored in many of our reservoirs.

For more information on the Rio Grande Compact refer to the appendix at the end of this document.

♦ The Planning Strategy

Over the next several months, we will

be seeking the public's initial preferences regarding the 44 alternative actions contained in this booklet to help us build and present scenarios, or collections of actions, for further review. Then, through an ongoing public process, one of the scenarios will be selected as the basis for our regional water plan.

In parallel with the current process of obtaining public preferences, we are contracting with expert consultants for a more thorough analysis. This technical analysis will help us in better determining which alternative actions have what consequences. A report will be presented in November at a regional forum where you will be asked to further refine your initial preferences. The results, in turn, will lead to the development of scenarios as we proceed toward building a water plan.

♦ The Alternatives

The candidate alternative actions presented in this booklet are the result of more than 2 years of public participation at Community Conversations, in the Water Assembly Constituency Groups, and in the Water Assembly Working Teams. Two hundred and seventy-one ideas originally proposed by citizens, technical experts, and water managers, have been consolidated into these forty-four candidate alternative actions. These actions are potential strategies to balance our water budget.

Water Assembly volunteer experts completed preliminary analyses of

the technical, hydrological, environmental, political, economic, legal, and socio-cultural implications of each alternative action. Those preliminary analyses formed the basis of

The mission for the regional water plan is to "Balance water use with renewable supply".

the summaries that appear here.
Actions

were deferred if they were too general, were already included in other actions, or because they received a very low rating in the initial technical feasibility evaluation.

The Water Assembly is making every effort to identify the actual water impacts of each alternative and associated costs and benefits. As better

numbers become available, the information will be made known. Clearly, this is a work-in-progress.

.html. See New Mexico's Obligation and Compliance under the Rio Grande Compact by Norman Gaume.

YOUR ROLE

Which alternatives would you prefer for balancing the budget? Please review the alternative actions and bring your ratings to one of the Community Conversations during the first three weeks of September. During the community conversations, you will be asked to indicate your preferences.

Please bring this booklet and the enclosed card with you.

If it were up to you, which alternatives would you favor or avoid to balance the water budget?

Rate Your Top 4 Picks	Rate Your Bottom 4 Picks
1.	1.
2.	2.
3.	3.
4.	4.
Comments	

candidate alternatives, not recommendations

THE FORTY-FOUR ALTERNATIVES

The alternatives have been grouped into seven categories:

- 1. Change Water Use
- Decrease or Regulate Waterl Demand
- 3. Water Funding
- 4. Implementation of Water Plan
- 5. Increase Water Supply
- 6. Water Quality Protection
- 7. Water Rights

1. Change Water Use

 A-11 Develop markets for locally-grown produce, and low-water alternative crops.

Increasing production of low-water alternative crops would reduce overall dependence on water. Research is required to identify the crops and the markets, and plan for the transition. Investigate the associated costs, labor, and time requirements.

 A-28 Increase building densities (as compared to typical suburban density) and infill development through adoption of local government land use policies and regulations

This would be accomplished through local government land use policies, regulations, and incentives. Implementing this would require regulatory changes at the local level, for example, making house lots smaller or building multi-story dwellings.

Higher-density development would reduce the relative footage of landscaping and associated water use

 A-30 Adopt policies to integrate land use planning and water resource management in all government jurisdictions in the Middle Rio Grande water planning region.

Take water supply limitations into account when making land use development decisions. Develop mechanisms for local governments to adopt policies that coordinate water impact considerations with all land development and other uses of water.

2. Decrease or Regulate Water Demand

 A-56 Establish region-wide educational programs, including public and private school curricula, to encourage voluntary conservation of water.

Over the long-term this will raise consciousness and change lifestyle use of water.

 A-18 Adopt and implement local water conservation plans and programs in all municipal and county jurisdictions, including drought contingency plans.

Many programs are possible, for ex-

ample, publicity campaigns, pricing schemes, or installation of low-flow devices.

Encourage xeriscaping and drip irrigation. For example, bluegrass requires three times as much water as does native gramma or buffalo grass.

The finite groundwater resource is a vital part of our regular overuse.

In urban areas, where half or more of total water use is for landscaping, the substitution of lowwater-use plants

for high-water use varieties will save significant amounts of water.

Note that groundwater pumping supplements river flow when it is returned as waste water. Therefore, reducing pumping will result in less return flow to the river, with its consequences, both to the environment and to the State's ability to meet its Compact obligations.

 A-21 Examine a variety of water pricing mechanisms and adopt those that are most effective at conserving water.

The mechanisms to be examined include, but are not limited to

- 1. pricing water to reflect the true value;
- 2. instituting a moderately increasing block price schedule;
- instituting a steeply increasing block price schedule.

In order to implement and enforce several of these mechanisms, metering and recording are necessary.

 A-22 Provide local programs that offer incentives for adoption of water efficient technologies and utilization of water saving devices.

Promote the transition to watersaving devices and water-efficient technologies through incentives sponsored at the local level. (This could apply to both municipal and industrial customers.)

 A-8 Meter all water supply wells, including domestic wells, throughout the waterplanning region.

Under the current system, domestic wells owners are allowed up to 3 acre-feet per year. Metering is not required so there is no way to monitor actual water use. Once the amount of water being used is known, there may be an incentive to use less of it.

 A-61 Reduce the allowed pumping from domestic wells and restrict drilling of domestic wells where surface waters or the aquifer could be impaired.

This alternative requires that well metering be in place.

A-60 Fund irrigation organizations to develop and implement water conservation programs.

There are two common types of irrigation organizations: traditional acequias and Conservancy District ditches. The approach to conserving

may differ whether one considers traditional community acequias or conservancy district acequias. Conservancy district acequias tend to be much larger and might require federal funding to implement the changes. Note: The Conservancy District of the MRG was created in 1924 to manage water delivery along the Rio Grande between Cochiti lake to Elephant Butte. The district taxes property owners to fund management of the ditches and dams.

 A-7 Meter and manage surface water distribution flows through all irrigation systems to conserve water.

Allows the accurate measurement of permitted water use and associated losses. Metering by itself may encourage conservation.

 A-10 Develop and employ alternatives to maximize irrigation efficiency on all irrigated land in the region.

This is a follow-up to alternative A-7. Mechanisms include, but are not limited to:

- Install drip, sprinkler, surge, or furrow irrigation where feasible. Note that this doesn't work for many farm crops, like alfalfa.
- 2. Laser-level fields to remove depressions where [excess] irrigation water settles.
- 3. Aggregate the small, strip farm plots so that alternatives become cost-effective.

 A-9 Develop conveyance alternatives for water transportation in agricultural irrigation systems.

Most Irrigation systems in the MRG planning region deliver water and carry some return drainage flow through unlined ditches (canals). Off-farm irrigation water losses exist as riparian evapotranspiration, seepage, illegal diversion, and canal breaches, resulting in substantial amounts of water not being delivered to users.

This alternative action calls for the study of the off-farm conveyance issues and proposed solutions such as various types and combinations of canal lining systems, pipes, and improved diversion and regulatory structures, to reduce losses preferably without impacting aesthetics. Such changes will improve irrigation efficiency and conservation, resulting in diverted water savings.

3. Water Funding

A-58 Water Funding - Establish dedicated and continuing funding for Regional Water Planning as an ongoing process and as a basis for water management at local, regional and state levels.

The Regional Water Plan (RWP), once submitted and approved, will require periodic revision.

 A-59 Establish a State-based water severance tax for wa-

ter projects, planning and conservation.

The proposal is to tax the net with-drawal of water from the water system, especially ground water which is being depleted at a higher rate than it is being recharged. Establishing a severance tax or other taxing mechanism would implicitly recognize water as a State resource. The income could be used to fund other water management implementations.

4. Implementation of Water Plan

 A-53 Through open and inclusive processes, ensure public involvement in water planning by continuing regular public information/ dissemination programs and public relations campaigns, and citizen planning committees. Keep the public engaged in this process.

The theory is that as the public becomes better informed of the scale and complexity of the problems, there will be more pressure for change. People who understand the problem will be motivated to conserve water. Public participation ensures that a broad array of interests is represented.

 A-52 Develop a sustainable and coordinated growth management plan for adoption and implementation by local governments in the middle Rio Grande region. Manage growth in order to reduce increases in water consumption, minimize impact on water resources, and encourage conservation-oriented economic development.

A number of political issues affect this alternative, including:

- 1. Water authority is at the State level; land use authority is vested at the local level. Coordination would require one oversight agency.
- 2. There is both strong support and strong opposition to this alternative.

Growth policies need to recognize economic impacts and the limits of sustainability imposed by the amount of water available.

 A-73 Establish and integrate a regional Geographical Information System (GIS) database of publicly accessible information on water resources and photo imagery covering the water planning region.

This would be a helpful tool for planning and modeling, provided the data is accurate.

 A-15 Preserve, but continue to draw, deep-well water for drinking purposes only.

Removing vast quantities of water from the aquifer is lowering the water table and creating various surface water problems. Proposal is to limit consumption of aquifer waters for drinking purposes only and obtain water A-67 Establish a regional water management authority to provide professional water resource management and to administer or assist in a water banking program.

A regional authority can provide coordination and consistent implementation of the regional water plan. Currently, water management is under the authority of various federal, tribal, state, and local departments. Water banking is a term used for several different concepts. It may be used to allow the authorized agency to make decisions about water transfers quickly. Water banking is also used to denote a system of leasing out unused water to avoid losing water rights.

However, water banking may be detrimental to the acequia systems.

 A-143 Encourage active water resource management by the State Engineer (OSE/ ISC).

Currently the Office of the State Engineer (OSE/ISC) administers water rights and associated data. The role of

the OSE/ISC should be expanded to be proactive in managing our overall water resource.

 A-144 Address groundwater/ surface water interactions in the statutes for administering water rights.

There is a connection between surface water and shallow ground water. That is, by extracting groundwater, surface water will percolate down to the shallow groundwater and "fill in" the volume of water that has been pumped. This interaction has a time

lag and will not be immediately observable. For groundwater wells near the river, the effect may take days or weeks depending on the separation distance. For groundwater

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wells further away, the effect could take weeks or years. One example of the need for this accounting of the interaction of surface water and groundwater is that a junior water rights holder who has pumped groundwater, could later "infringe" on the water supply to senior surface rights holders, particularly during a time of drought.

- 5. Increase Water Supply
- A-69 Acquire additional water rights without condemna-

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tion from various sources from within or outside the water-planning region, and import water from other basins where possible.

Under NM law, water rights are a property right and can therefore be condemned if it is in the public interest to appropriate the water for another use.

It is becoming increasingly difficult to find willing sellers and the cost to purchase and transfer water from place to place is quite high.

A-39 Utilize technological advances for treating deep saline and brackish water for potable or non-potable use in the region.

Desalination is used in various parts of the world to obtain fresh water. These techniques could be applied to brackish water in several of the NM basins, or even to ocean water. Possible sources: Tularosa basin (near Alamogordo); an unnamed basin West of Albuquerque; Gulf of California or other ocean. Brackish water may be available at the bottom of Rio Grande basin.

There are significant technical, economic, and environmental issues associated with this, including the cost of desalination, disposal of brine waste, and the cost of deep water pumping.

 A-38 Increase monitoring and modeling of surface water system to improve water management at the watershed level, and retain excess water flow from Elephant Butte Reservoir during wet cycles.

Under the Rio Grande Compact, NM accrues credits for excess water flow and debits for deficits. A spillover of the Elephant Butte dam wipes out all accumulated debits. Proposal is to improve monitoring of the snow pack so that NM is able to predict how much water to let flow down to Elephant Butte and thereby manage the wet year water excess to NM's best interest.

 A-46 Inject water treated to drinking water standards for aquifer storage and recovery (ASR) in appropriate locations throughout the water planning region.

Use the aquifer as interim storage for surplus water. It may be possible to pump surplus water back into the aquifer. Technical issues exist regarding quality of the water to be injected. It is not known how much of the water would be retrievable. Further research is needed.

 A-45 Reduce open water evaporation in storage reservoirs, e.g. by retaining water at higher elevations or latitudes, or by reducing surface areas

Under the provisions of the Rio Grande Compact, NM must reserve a certain amount of water in the Elephant Butte reservoir for use by Texas. Both the shape of the reservoir, which has been

compared to a champagne glass, and the location, which is in a hot area of the state, contribute to a high percentage of evaporation. Water lost to evaporation is not counted toward the deliverable to Texas. Proposal is to reduce the amount of water lost to evaporation by any of various means, including,

- Cover Elephant Butte Lake with surfactants, a thin layer of goop that would reduce evaporation. SNL is working to develop a non-hazardous product that would do this.
- 2. Store some or all of the water in a cooler region. With a better management plan, it might be possible to minimize the water sent to Elephant Butte and keep it in a cooler region of the state. Or, it may be possible to negotiate new agreements with Texas and Colorado within the Compact.
- Aquifer storage and recovery may solve some of the legal obstacles to alternate storage.

◆ A-44 Encourage on-site rainwater harvesting.

The vast majority of rainfall is lost to evaporation. If a percentage of this rain could be collected, it would provide a significant additional source of water. There are legal issues concerning impoundment of storm water and impairment of water rights as well as issues bearing on the quality of harvested water.

◆ A-24 Promote, through in-

centives, on-site residential and commercial greywater reuse and recycling.

Provide incentives to implement greywater reuse systems in residential and commercial properties. Greywater reuse systems would require

separate on-site plumbing which makes them more expensive to implement. Considerations

Which alternatives would you prefer for balancing the budget?

also include defining standards for the level of treatment for greywater so that it is healthy enough for nonpotable uses. For example, how to mitigate the presence of household chemicals and biological hazards in greywater.

A-27 Reuse treated wastewater for non-potable uses.

The cost to bring wastewater to a state where it can be used for watering lawns, etc., is much lower than cleaning the water to a drinkable level. Find a way to distribute the treated wastewater for any or all non-drinking needs. The treated wastewater can be reused once or several times before it is returned to the river or lost to evaporation. Several implementation approaches are possible. One approach is to retrofit homes and businesses with a second set of water pipes. Another approach is to apply this to new construction only.

 A-1 Restore Bosque habitat and manage vegetation in the Bosque to reduce Page 11

evapotranspiration by selectively removing vegetation and promoting native plants.

For example, the Russian olive and salt cedar trees are high water consumers and inhibit the growth of other low-water plants. Return the Bosque either to cottonwood or a mosaic of grasses, trees and shrubs . Research is underway to determine how much water would be saved.

A-33 Establish erosion prevention measures and use soil and vegetation management techniques to reduce runoff and increase infiltration throughout the watershed, including forested mountains and uplands.

Expand watershed management programs. These programs are intended to slow runoff and reduce erosion through various means, for example, installing better groundcover, restoring grasslands and canopy environment, and controlling watercourse drainage.

Establish vegetation management programs. Regional forests, including the Bosque, are currently full of small diameter trees and brush. This not only presents a fire hazard, but it also consumes water and prevents natural infiltration of rainwater and snowmelt.

 A-2 Develop the economic potential of non-native species removal, harvesting, and output of products by

local industries.

The objective is to develop products that use the plants being removed by vegetation management programs. If implemented successfully, this could become an income source rather than a cost.

 A-34 Enhance and expand local government storm water plans and programs to control runoff using swales, terraces, and retention structures to minimize erosion, enhance infiltration and recharge, and prevent pollution of surface and ground water.

The majority of local governments in the region do not have programs of this nature because the cost is relatively high and the benefits are either long-term or indirect.

 A-40 Continue evapotranspiration studies and apply findings to vegetation management programs in the water planning region.

Evapotranspiration is the water given off by plants. More research is needed to understand how much water comes from which types of plants and under what conditions. Use this information to minimize riparian water loss.

 A-36 Create constructed wetlands for groundwater recharge, water harvesting, and habitat improvement, and hydrological manage-

ment of the Rio Grande.

Use constructed wetlands as an alternative method for treatment of sewage and other forms of greywater. Technical considerations include the difficulty of protecting the wetland plants from destruction by heavy downpour and floods. In addition, a significant amount of water is lost to evaporation and evapotranspiration.

 A-66 Implement local and regional watershed management plans through all land and water agencies in the planning area.

Once a water plan is agreed upon, coordinate the implementation among the numerous agencies at local, state, tribal, and federal level, which have some jurisdiction in the matter.

 A-42 Conduct research on innovative water supply enhancement techniques such as weather modification.

If a way is found to do this effectively in this region, it could create additional water supply. This is a highly experimental field.

6. Water Quality Protection

 A-26 Expand use of centralized wastewater collection and treatment systems into all areas of urban and suburban development within the water planning region.

Certain areas of the region rely on septic tank systems which do not adequately purify the water before it returns to the groundwater. Technical limits such as distance and pipeline size make implementation costly.

 A-50 Enforce wellhead protection programs on all public water supply wells within local government jurisdictions.

Federal and State regulations stipulate that public water supply well-heads must be protected to prevent contamination of groundwater. These regulations are not enforced. Most communities lack wellhead protection programs.

 A-47 Identify, protect and monitor areas vulnerable to contamination (quality issue) and restrict groundwater supply wells in sensitive areas.

This is a particular issue where there is a high-density of shallow wells, septic systems, and leaking storage tanks. Development near many public wells is not monitored or controlled and could create sources of contami-

nation of the public water supply.

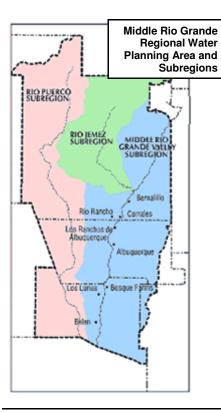
In addition, high concentrations of domestic wells in close A report will be presented in November at a regional forum where you will be asked to further refine your initial preferences.

proximity to septic systems represent a serious regional water contamination issue. Local governments do not keep records on the relative placement of wells and septic systems.

7. Water Rights

A-63 Change state water law to include in-stream flow as a beneficial use.

Under current law, to maintain a water right, you must put it to beneficial use. Water flowing in the river, known as "in-stream flow," has not been declared a beneficial use in New Mexico. However, the health of the river affects state parks and animals that live in the river environment. By determining beneficial use to include in-stream flow there would be some legal protection for riparian uses of water.



A-71 Identify, quantify, and adjudicate all water rights and the order of wet water utilization in the waterplanning region.

Adjudication is the legal process of reviewing all water rights claims in an area to determine which are actually defensible. The process results in a clear accounting of how much water may be used and by whom. Currently, on average, there are more claims than there is water, so this process would clarify who must stop using water during a water shortage.

A-51 Establish more equitable accounting for evaporative losses in Rio Grande Compact water.

Per the Rio Grande compact, NM is required to keep a certain amount of water in Elephant Butte reservoir A large amount of the water in the reservoir is lost to evaporation. The evaporative loss would normally be shared among all water users, both Texas and New Mexico. Change the Compact so that Texas is responsible for some of the evaporative loss, which would reduce the delivery amount that New Mexico owes Texas. Renegotiating the Compact is highly unlikely.

APPENDIX

♦ Regional Water Planning

Regional water plans for the sixteen regions within the state are currently under construction, and are due in 2003. Some have already been submitted and four have been accepted. The plans will describe how the available water is now being used and will identify priorities for managing water use in the next 40-50 years. The State of New Mexico mandated the creation of these plans during the 1980s in response to several lawsuits brought against New Mexico and between other states concerning water allocation.

The intent is to incorporate the regional water plans into overall New Mexico State Water Plan. At the present time a framework or guidance document for development of the State Water Plan is in progress. Besides helping to deal with water in accordance with New Mexicans' values and preferences, New Mexico needs water planning to be able to defend the State's need for its water allocations under various compacts.

The regional water plans and the state water plan are intended to identify the water values and to define the water-related public welfare of the people of New Mexico and to provide solutions to manage our water in accordance with those findings.

For more information on regional water planning, visit the State Engineer's web site at http://www.seo.state.nm.us/doing-business/water-plan/plan-menu.html.

The Rio Grande Compact of 1938

This Compact resulted from 40 years of dispute and discussion over allocation of the water of the Rio Grande among Colorado, New Mexico, Texas, and Mexico. The Compact provides for allocation of water among the States using a complicated formula that depends on each year's water conditions. Colorado's delivery to New Mexico is measured at the State line. New Mexico is obligated

to deliver a certain amount of water to Elephant Butte dam for use by southern

The target date for completing the Middle Rio Grande Regional Water Plan is June, 2003.

New Mexico, Texas and Mexico. The portion allotted to the Middle Rio Grande and Socorro/Sierra regions of New Mexico is the difference between what passes the Otowi gauge near Cochiti and what is owed to Texas.

For more information on the Rio Grande Compact visit http://wrri.nmsu.edu/ publish/watcon/proc/proc44/contents

Page 16 MIDDLE RIO GRANDE WATER ASSEMBLY

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THE WATER ASSEMBLY IS WORKING IN PARTNERSHIP WITH THE MID-REGION COUNCIL OF GOVERNMENTS TO DEVELOP A REGIONAL WATER PLAN.

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balance water use with renewable supply