ESSENTIAL DECISIONS FOR AN INSTREAM FLOW POLICY

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Abstract. Georgia has the opportunity to develop a comprehensive water management policy that meets the current and future water needs of the state and its neighbors. Incumbent upon this process is the obligation to protect the environment while at the same time maximizing the productive worth of this finite natural resource. This paper presents a set of minimum requirements for developing an instream flow policy, which is a key component of environmental protection. The policy is integrally tied to the safe yield and its inherent water allocation system. Key attributes of safe yield and water allocation related to instream flow policies are addressed.

INTRODUCTION

Georgia has embarked on an ambitious process to produce a plan for managing her water resources well into this century. One of the central challenges of this process will be to craft instream flow standards that protect aquatic environments while providing water for a diversity of human needs. Our purpose in this paper is to draw attention to a number of key components of an instream flow policy:

- Instream flows must be consistent with a workable definition of safe yield. This is because the development of a water management policy requires the specification of a quantifiable water allocation metric.
- While safe yield is a rigorous concept, it does not have an unambiguous scientific or technical definition.
- The instream flow policy must include temporal variations, and not a simple minimum. This implies that safe yield can be met by a variety of instream standards.
- Instream flow policies cannot be implemented and enforced in isolation, but must be explicitly linked to the state's water allocation process.
- A successful instream flow policy must take account of changes in hydrology, scientific knowledge, and sociodemographic changes in the state.
- Instream flow policies should be linked with explicit water quality objectives as well as with specific flow quantities.
- Instream flow policies are inextricably linked with decisions about water storage.

Such considerations introduce complexity into instream flow protection. This is unavoidable - instream flows are just one aspect of an interconnected set of decisions about water that will be central in the state's environmental and economic future.

DEFINING SAFE YIELD

We endorse the American Society of Civil Engineers' definition of safe yield [1]:

> The *safe yield* of a water resource is the amount of water available for withdrawal without impairing the long-term social utility of the water source, including the maintenance of the protected biological, chemical, and physical integrity of the source.

We wish to make two important points that are relevant to this definition. First, the relationship of hydrology and ecology is the essential and central - but not the exclusive - criterion for determining safe yield. In a world of random events and scientific uncertainty, there is no single level of withdrawal limitations that absolutely guarantees any given environmental outcome. The need to balance the value of consumptive uses of water against the protection of biological, chemical, and physical integrity will remain a part of determining safe yield and instream flow standards.

Second, safe yield is an explicitly dynamic concept, not a snapshot of water use at any given point in time. The goal of instream flow policy must be to define and revise a path over time, not to set a single final criterion for minimum flows.

IMPLEMENTING INSTREAM FLOW POLICIES

Implementing an instream flow cannot be done in isolation of the state's water allocation system. Achieving specified streamflows requires the ability to define and modify withdrawals. This, in turn, requires the ability to specify who has the right to use how much water, for what purpose, in which watersheds and aquifers, under what hydrological conditions. The amount of water that is permitted for withdrawal within a watershed and within aquifers should not exceed the safe yield of the resource for that geographical area. This should be modified to consider net increases or decreases in the quantity of water stored for future use.

One of the biggest - and certainly the most difficult - of all tasks in implementing an instream flow policy is to make permitted water use consistent with safe yield. This is a challenging task (politically, technically, and legally) because it means changing the nature of water rights and placing additional limits on water use.

An instream flow policy should consider the relationship between water quality and a permitting and regulation system aimed primarily at water quantity. Policies that govern instream flows should consider how water quality is affected by permit terms, conservation incentives, and other elements of specifying water use. In doing so, the policy should recognize the significant body of law, regulation, and government and non-government efforts that are primarily aimed at improving the quality of the state's waters.

Linking instream flow policies with the water allocation system raises the issue of whether and how the allocation of water should be linked with the quantity of water returned, i.e., the amount of consumptive vs. non-consumptive use. Currently, water-use permits are based on the quantity withdrawn without regard to the quantity, quality, timing, and location of return flows to surface waters. These return flows affect both the instream uses of water and the quantity available to other users. A good policy should determine whether and how the terms of a water permit are contingent on the quantity and characteristics of return flows.

Of particular importance and difficulty is the question of determining how should seasonal variability in water needs be built into a water allocation system. There are likely to be circumstances where the water available for permitted offstream use may follow a seasonal cycle. Protecting instream flows requires defining whether and how the maximum permitted usage of water varies throughout the year for each permitted user, and should devise ways of clearly specifying any such variations in permits in a legal and reasonable way.

WATER USE MANAGEMENT

Implementing policies to protect instream flow is directly related to the state's interest in water conservation. One way of advancing this interest is to set specific efficiency standards for particular uses. For example, golf courses could be limited to a maximum amount or irrigation, or car washes could have a maximum amount of water use per vehicle washed.

The terms of a water use permit could be based on these specific benchmarks, or fees and incentives could be set in reference to these benchmarks. Such a system has the advantage of sending a clear signal of the amount of conservation effort the state expects. It could also be equitable in that it treats users in the same category the same way in terms of their water use.

Such a system has the potential disadvantage of requiring substantial resources on the part of state agencies. It also risks the development of standards that are too inflexible to allow some users to carry on their economic activities. Flexibility to accommodate unpredictable individual needs while maintaining overall limits on water use is a major virtue in an efficient water allocation system.

While the state has a clear interest in helping all users conserve water, it is just as clear that the state's resources are limited. A policy should determine what level of resources would be devoted to education and technical assistance in helping users achieve conservation goals. It should also give guidance on whether more emphasis will be given on general conservation education or on specific technical assistance provided on a one-on-one basis. A key issue is whether all users in a category (for example, all farmers) are entitled to expert technical assistance without payment, or whether some system of priorities of more general technical assistance will be used.

A contentious issue will be to determine how existing water permits will be modified to meet the goals of instream flow policy. It is a necessary but difficult challenge to find a legal and equitable way

of making these modifications. If there are users who are currently using less water than their permits, then implementation policy should determine whether and how to take this into account in modifying the permit. Such a determination should take care to avoid penalizing those who are using less water by virtue of their water conservation efforts

The challenge is particularly great for the holders of agricultural water permits, which are not quantified except by the maximum capacity of the pump. If it is necessary for agriculture to use less water to meet the state's goals, then this must be reflected in permit terms. This means deciding how to change the maximum quantities on agricultural water permits.

Implementing limits on agricultural use raises a number of additional issues. Some agricultural products (sod, for example) require significantly more water than others. A policy must take into account the marginal value of the water applied. In some cases, such a policy might encourage farmers to grow water-intensive crops. A policy should also determine whether to change permit terms annually depending on what crop a farmer chooses to grow. If the choice of crop changes allowable water use, it makes it more difficult to achieve overall water withdrawal goals with certainty.

The amount of water that can be used in agriculture may depend on where in the state the permit is located. However, this may mean treating users in the same category (for example, peanut growers) differently depending on where they are located, which may be seen as inequitable.

The amount of water that can be used while protecting safe yield may depend on whether the water is taken from surface water or groundwater sources, even when the users are located within the same watershed. Implementation policy must decide whether quantitative permit terms for users in similar circumstances when the source of their water differs.

The implementation policy should restrict the number of users who are allowed to continue to withdraw water without a permit. Users that are allowed to continue to withdraw water without a permit may be required to report characteristics of that water use, including quantitative measurements of withdrawal and return flows - both the quantity and quality. Policies to protect instream flow should specify these duties and obligations, as well as the circumstances (for example, increased use) that would cause these users to be required to apply for a permit in the future.

PLANNING FOR UNCERTAINTY

Policies to implement safe yield should explicitly account for unpredictable changes in the demand for offstream water use. The quantity of water used in offstream uses may have to change in response to hydrological or ecological conditions.

Even if the amount of available water were to stay constant, the uses to which that water would be put are constantly changing. Georgia continues to experience population growth, particularly in urban and suburban areas, and new residents require water. New golf courses and other large areas of irrigated turf continue to be established. Agriculture is a dynamic and frequently changing industry. Water is used by an enormous variety of commercial enterprizes in the state, and the nature and processes of these businesses are constantly changing.

All of these dynamic forces have one inescapable consequence - any specific allocation of water among a group of users cannot continue to serve the state's interests as all of these changes take place over time. This means that successful policies must determine how to provide for new uses when the state's goal of protecting safe yield does not allow additional withdrawals. This is the core of the reallocation issue. If there are new beneficial uses for offstream water use - or if existing uses require additional water - then such uses can only be allowed when existing users reduce their consumptive use of water.

Policies should determine if there are overriding interests that allow the state or regional water entities to require less water use in order to provide water for new uses. One circumstance where this might be possible is where permitted users are using less than their total allocation - although this creates incentives to always use the total allocation. This raises the issue of whether the state will pay - or will be required to pay - compensation to users whose water uses are affected involuntarily, including the level of compensation and the source of funds.

Voluntary transfers between water users have obvious advantages over involuntary transfers. Such transfers are most likely to take place when there is compensation paid to the permit holder that voluntarily uses less or no water. Alternatives include fees paid by the new users, through a water bank or through fees paid to the state for new permits. Another alternative is direct payment from the new user to the old user.

In all of these cases, there is the issue of who sets the level of compensation - the state or voluntary agreements between old and new users. Another issue which should be addressed is whether such trans-

fers are permanent transfers of water use or can be contracted for a specific period of time (for example, one growing season) and then revert to the original permit holder.

CONCLUSIONS

Planning for the future in Georgia is an integral component of developing a water resources management plan. While current water uses must be considered, it is paramount that future water demands be anticipated. Not only will there be continuing uncertainty in the types of water uses, but also in the availability of water supplies due to climatic variability and legal restrictions.

Consumptive and non-consumptive uses of water, whether from surface or subsurface sources, and the quality of onsite and offsite water quality impacts, are all issues that must be addressed. The cumulative impacts of water resource allocation on the environment are an important - but not exclusive - consideration when developing an allocation system.

Once an initial allocation of water resources is made, a system that allows for reallocation over space and time must also be considered. Reallocating water from one use to another may change the amount of consumptive use, the point at which return flows enter surface waters, the timing of returns, the quality of returns, and other characteristics of the water use that affects instream uses of water and other third party interests. A successful policy must create a consistent and defensible process to assess these affects to decide whether any proposed reallocation of water protects the public's interest in safe yield.

This paper does not claim to solve the major water resource issues facing the state. Instead, it provides an outline of the key issues and decisions that confront the water resources community, and those who wish to establish water management policies. Clearly, difficult decisions lie ahead. Our goal is to make these decisions less burdensome by placing them in their proper context and framework.

REFERENCES

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