

INTERACTION OF COMPETING USES OF WATER

Wisely sharing the use of water resources is essential because there are so many demands for water.



Water is needed by cities and towns for water supply, by farmers for irrigation, by industries for navigation, by tourists for recreation, and by people everywhere for electricity.

"Good water years" - years when rainfall is plentiful - make accommodating everyone's needs and desires for water much easier. During periods of drought, however, just meeting minimal needs can be very difficult.



The thick white band ringing Lake Mead's shoreline shows the drop in water levels. The near-vertical walls of Boulder Canyon are just upstream of Hoover Dam. (Photograph courtesy National Park Service)

Because competing users want the water for their own purposes, finding ways to share the resource is becoming an ever-increasing challenge for managers.

It is critical that Federal, State, and local agencies, as well as other water user interest groups find ways to accommodate each user's needs, whenever possible, and still meet the needs of the users. This can be accomplished through various means.

- Educate the public on water conservation.
- Distribute water conservation literature.
- Develop a Drought Contingency Plan. It will need to be implemented and enforced.
- Get the stakeholders together to discuss the issue.
- Consider buying water from another source.
- Determine emergency sources of water and secure all the necessary agreements, rights-of-way, and easements, required to gain access to the source.
- Implement water reduction measures on all the users.
- Call for voluntary conservation.
- Ask home users to install household water conservation devices.
- Accelerate public education programs.
- Start saving rainwater.
- Develop water reuse and greywater recycling.
- Incorporate mandatory nonessential water use bans.
- Ration water.
- Increase the efficiency of the existing distribution system through leakage and loss reduction programs.
- Ask commercial and industrial customers to use their own emergency sources (if they have them).
- Prioritize the competing uses.
- The ski resort will need to reduce or eliminate the amount of snowmaking once the season changes.
- Switch to low water use crops.
- Limit irrigation.

IMPACTS OF COMPETING USES

Often, the aquatic ecosystem is changed because of competing uses. Sometimes to a series of negative impacts can occur because of the societal needs for water. One of the major things that could happen is hydrologic modification. This is where a stream or river is altered because of human activity. All hydrologic modifications, whether properly or improperly implemented, may result in water pollution, which will impact aquatic and riparian habitats.

Population growth and development may cause land use changes that result in hydrologic changes to watersheds. Channel modifications are sometimes needed to maintain navigable waterways and control flooding. Dam construction and operation is often necessary to store water for irrigation, recreation, and flood control and to provide a source of drinking water. Yet, these activities can be sources of pollution and adversely affect water quality and habitat if not properly managed.

One of the principal pollutants resulting from hydrologic modification is sediment. Excess nutrients and toxics may also be associated with sediment produced by hydrologic modification activities. These activities also may disturb riparian areas causing an increase in streambank erosion, and destruction of aquatic habitat.

Stream channels are often modified to straighten, relocate or change their depth and width. Once this is done, that will change:

- the instream water temperature
- the physical and chemical characteristics of the bottom sediment
- the rate of transport and sediment deposition, and
- more than likely there will be increased flooding downstream

Once the channel is changed, it needs to be maintained. This, will require dredging, which also impacts aquatic and riparian habitats for fish and wildlife. Some of these impacts may be temporary, but if there is the constant need for maintenance, then there will be long-term significant consequences.

Constructing dams and impoundments can result in significant changes in the ecology of streams. Naturally, there will be an increase of sediment and chemical contaminants. The dam operation itself will produce changes in the water temperature and chemistry (pH and dissolved oxygen). Dams and impoundments may also disrupt the natural transportation of sediment and can result in significant changes to instream flow.

The effects of flow alterations include blockage of fish migrations; alteration and loss of stream habitat; introduction of competing non-native fishes; degradation of water quality; alteration of nutrient cycles; disruption of food webs; destruction of fish eggs; decreased fish abundance, size, and condition; increased hybridization of closely related fishes competing for spawning sites; and decreased nutrient availability.

Unless streamflows are established, implemented, and protected, the following impacts can be expected to accelerate:

- Replacement of unique regional fauna by fishes adapted to more regulated stream environments. This would result in more listings of endangered species. Stream fishes currently considered as endangered would disappear in nature.
- Localized stream flooding will continue to degrade bottomlands, reduce stream productivity, and adversely affect stream fishes.
- Riparian habitat will continue to be degraded, adversely affecting stream quality.
- Reductions of streamflows will reduce and degrade stream habitat, increase summer water temperatures, reduce oxygen, and concentrate pollutants.
- Fluctuating flows associated with power generation will reduce stream resources by promoting unstable channels. Such flows will alternately scour, then promote downstream siltation of stream habitats.

What can you or a professional society do to mitigate the effects on fisheries populations?

1. Encourage States and Provinces to legally identify stream resources and water needs, and give formal recognition of instream fishery needs as a beneficial use in their water resource programs.
2. Encourage AFS members, at all levels, to become involved in legal and legislative processes related to obtaining protection of instream flows.
3. Support the identification, equal consideration, and implementation of enhanced instream fishery flows at both new and existing water storage projects.
4. Promote development of better habitat evaluation procedures, and support research efforts to obtain more comprehensive information about stream fish habitat requirements.
5. Support research to better understand the seasonal amounts, location, and timing of water needed for reproduction, recruitment, growth, and other stream fish life history needs.
6. Promote the formation of national and international programs to evaluate stream ecosystems, with emphasis on conservation of fisheries resources.
7. Encourage governments to adopt "no net loss" policies for conserving the remaining stream ecosystems in North America.

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