STREAM NOTES

To Aid In Securing Favorable Conditions of Water Flows

Rocky Mountain Research Station **October 2001**

Successful Water Allocation Negotiation: What Does it Take?

by Ayeisha A. Brinson

Increasingly, negotiation and mitigation are mandated or are a desirable route to resolve various natural resource issues including water allocation issues. Negotiation has become an important and increasingly common process in today's world as a pre-emptive move to avoid litigation, develop long-term partnerships, and get early implementation of agreed upon measures. The negotiation process can involve hydropower companies, large corporations, government agencies, private landowners, special interest groups, and others.

Researchers at the Social, Economic and Institutional Analysis Section of the Midcontinent Ecological Science Center, U.S. Geological Survey, studied six hydroelectric power license or relicensing cases in an effort to determine the causes of success or failure and the role of competing issues in each negotiation process**:** These cases were multi-organization negotiations associated with the Federal Energy Regulatory Commission (FERC) licensing process. Legislation allowed the various organizations to participate in these negotiations. The cases were located in the Pacific Northwest and Northeastern part of the United States and involved both successful and unsuccessful negotiations.

Based upon these case studies, criteria for success were developed. The purpose of this paper is to describe these criteria for successful negotiations which include:

- understanding technical issues,
- maintaining a balance of power,
- having a desire to bargain, and
- individual qualities of negotiators.

The criteria can be applied to any negotiation that involves multiple stakeholders (i.e., persons or organizations who have a vested interest in the outcome of the process).

Clear Technical Issues

Defining and clarifying technical issues are both critical steps in resolving conflicts in a negotiation process. Technical issues and problems must be defined explicitly early in the process in order to increase the opportunity for success.

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CONTRIBUTIONS *are voluntary and will be accepted at any time. They should be typewritten, single-spaced, and limited to two pages. Graphics and tables are encouraged.*
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"Once the values and technical facts are agreed upon, it is important to design studies that will answer the technical questions and positively contribute to the negotiation."

Defining technical issues includes establishing **clear goals**, objectives, methodologies, and purposes. Clear goals and objectives must be defined to frame the decision criteria for pre-licensing and post-licensing aspects of the project and these goals and objectives must be determined early in the process. Negotiators must understand the benefits of answering the technical questions before proceeding. To define the actual technical issues, values about the questions involved and technical facts from different groups must be clear and understood. If value issues are unclear, the differences should be resolved through negotiation. Values will differ substantially from situation to situation and party to party. Although, people will not hold the same values, all parties may ease these differences through clarification of what values are present. The negotiation process goes more smoothly when technical issues are straightforward.

For technical clarity to be achieved, **precise definitions** are necessary early in the process. Obviously, each stakeholder has different areas of expertise. If one group uses jargon that is commonly understood in its field, this may confuse other participants, who are not familiar with these terms. Clarity is achieved when problems and issues are defined; technical issues are accepted; and the appropriate studies or methodologies are agreed upon. In the negotiation case studies, technical clarity was more easily achieved when 1) the engineering designs were not too complex; 2) there were moderate environmental impacts; and 3) all of the participants agreed upon the need to address these issues. Defining technical issues not only applies to complex components of the study (i.e., instream flow or structural components of a dam), but also to basic information about licensing (i.e., FERC regulations).

Problems may arise from a variety of areas. Disagreements may occur over which discipline to use to discuss or solve a problem. At times, there can be a lack of consensus on the application of the results, but having technical clarity helps to solve this problem. Clarity is affected by an individual participant's values; for example, in one of the case studies, two stakeholders disagreed on the scope of the project, one of the important first steps in defining technical issues. Negotiations would have been more successful if the stakeholders had first agreed upon the actual issues involved and then clarified these issues by collectively approving studies that would best describe these interactions. These agreed upon studies can be designed, implemented, and completed by an independent cadre of recognized experts. These experts can assist in meetings and discuss possible results of the study in an effort to resolve any disagreements over study results. For further discussion of these issues, see Lamb et al. (2001) and Burkardt et al. (1998).

Balance of Power

Power, the ability to influence others and to prevent other parties from acting unilaterally, is central to any negotiation and natural resource negotiation is no exception. The balance of power shifts throughout the entire negotiation process but is related to certain sources of power for each stakeholder. Negotiation participants gain power from their individual areas of expertise; for example, a natural resource agency representative has knowledge about fish and wildlife management that many other negotiators would not have. This works both ways; a utility company negotiator may gain power from his or her expertise in engineering or project design. Certain stakeholders also may gain power from legislation, such as the

"A balance of power is important to maintain the fairness and legitimacy of the negotiation process."

"A desire to bargain is necessary to increase negotiation success."

Endangered Species Act or the National Environmental Policy Act. Other opposing stakeholders may be able to counteract some of this power by applying monetary resources to the process.

Logistical issues, such as controlling the agenda, the pace of the process, precedent, and personality are important but less tangible factors in the balance of power. Personality is important, because participants with strong personalities may assume leadership roles. Unpleasant personalities may hinder or slow the negotiation process. A balance of these different power sources leads to a successful negotiation. For further discussion of these issues see Burkardt et al. (1997).

Desire to Bargain

A need or a desire to bargain and negotiate occurs when people feel an urgency to formally participate in negotiations. A desire to bargain is necessary for negotiation success but does not automatically ensure success. There are several factors related to this need or desire to bargain including the importance of the issue (environmentally, politically, or socially); the efficacy of individual stakeholders; outside forces, such as community importance; and an organization's role in encouraging negotiation.

Participants increase their need to negotiate if they are unsure of a regulatory organization's stance, (i.e., if they think they will be ruled against); but on the other hand, parties who feel that a regulatory organization may side with them have a decreased need to negotiate. Participants have an increased need to negotiate if they feel that the issue at hand is especially important, for example, if the issue at hand is close to an organization's central mission, or if the resources at stake are unique or important.

An individual participant's organization plays a vital role in the negotiation process. Every organization has developed distinctive styles that do not change much over time, thus current negotiations are generally not too different from past negotiations. The desire to bargain can be diminished because many organizations will not negotiate when they feel they are the experts for that issue. The ability to overlook the history (i.e., when participants previously met to negotiate on other projects) among negotiators is a by-product of personality (see below).

A participant's personal feeling of efficacy is important in the process. Stakeholders are more likely to participate actively if they believe that their actions can make a difference. People who are more powerful in their individual organization feel more effective and are instilled with this need to negotiate. Outside and uncontrollable factors can also influence the need to bargain. For example, in the Eastman Falls case, the dam washed out during a spring flood, creating a stretch of free-flowing river with excellent fishing. There was sudden public support of the resource agency's position, thus increasing the organization's need to negotiate because this event increased sense of efficacy and saliency of the issue. In this case, the exogenous event positively affected the need to negotiate. However, exogenous factors can negatively affect participants' need to negotiate as well. For further discussion of desire to bargain, see Burkardt et al. (1998).

Proper Negotiator Qualities

Based upon the six case studies, negotiators must possess five characteristics for negotiation success: **consistency, authority, continuity, personality** and **preparedness**. Consistent and continuous participation is vital in most negotiation processes.

"All participants must show good faith throughout the process so that a level of trust is maintained."

Negotiations tend to drag on when participants miss meetings or participants frequently change. Participation by multiple agencies also slows the process; for example, confusion may occur when different offices of the same organization with different areas of expertise (e.g., water resource specialists and biologists from a single state natural resource agency) are involved in an uncoordinated study.

A negotiator's authority plays a part in negotiation success. The process is slowed if negotiators do not have the authority to commit to a resolution because they need a supervisor's approval. If this lack of authority is known in advance, it can be accommodated. But, if a person without decision authority does not inform the other participants, this can become a source of distrust and hamper success.

In general, negotiation participants must remember certain personal rules. An individual's personality plays an important, if not the most important, role in the negotiation process. For example, in one negotiation case, a participant noted "representative Z felt he had to…handle every question with a D-9 bulldozer." Negotiators should be personable and friendly but firm in representing their group or organization. Negotiators should be experienced and not completely new to the process. However, they should be open to suggestions about how the process should proceed and they must be prepared for each meeting. Participants should be open to inventive solutions. All participants must show good faith throughout the process so that a level of trust is maintained. A general cooperative atmosphere enhances all participants' desire to finalize agreements and thus increases the likelihood that disagreements can and will be resolved and an acceptable solution or decision reached. For further discussion of negotiator qualities, see Taylor et al. (unpublished).

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Criteria for Successful Negotiations:

- ***Clear Technical Issues***
- ***Balance of Power***
- ***Desire to Bargain***
- ***Proper Negotiator Qualities***

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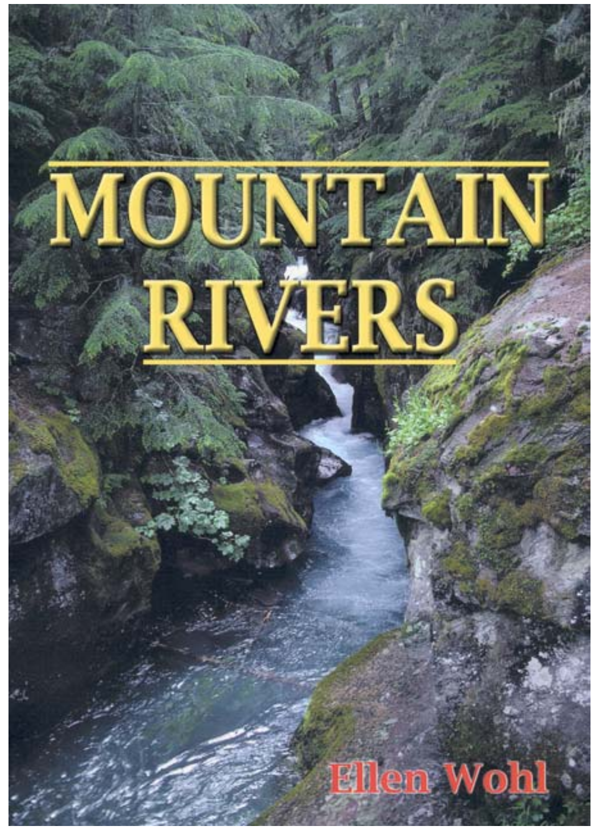
Mountain Rivers

What exactly is a mountain river? While most of us can recognize one when we see one, a precise definition is lacking. In ***Mountain Rivers***, Dr. Ellen Wohl, geomorphologist in the Department of Earth Resources at Colorado State University, simply notes that "the most obvious definition for a mountain river is that it is a river located within a mountainous region."

Although the study of rivers is well established, the geomorphology of mountain rivers is distinct from rivers located in lowlands and a great majority of past river research has focused on lowland rivers. Characteristics that differentiate mountain rivers from rivers as a whole include:

- Steep average channel gradient;
- High channel-boundary resistance and roughness from the bedrock and coarse clasts more likely to be present along these channels than along low gradient channels;
- High turbulent flow and stochastic sediment movement resulting from steep gradient, rough channel boundaries, and limited sediment supply;
- A strong seasonal discharge regime with high spatial and temporal discharge variability resulting from the effects of changes in precipitation with elevation and basin orientation;
- Channel morphology that has high spatial variability because of the external control of geology, but low temporal variability because only infrequent floods or debris flows are able to exceed channel-boundary resistance;
- The potential for extraordinarily high sediment yields over a period of a few years following watershed-scale disturbance; and
- A longitudinal zonation of aquatic and riparian biota that is influenced both by river characteristics and by elevation.

Mountain Rivers is first and foremost an integration and synthesis of existing knowledge of mountain rivers. The book begins with an overview of the development of fluvial geomorphology followed by discussions of mountain drainage basins, channel processes (hydrology, hydraulics, and sediment transport), channel morphology, mountain channel biota, and the direct and indirect impacts humans have on mountain rivers.



Ellen Wohl (2000), Mountain Rivers, 320 pages, copyright © 2000 by the American Geophysical Union.

Mountain Rivers is designed as a specialist reference for those already familiar with the basics of river processes and forms. The organization is such that readers can read the book straight through, or use the book as a spot reference to provide a synthesis of current knowledge on specific topics, such as bedload equations or equal mobility concepts. The book is an ideal refresher for anyone who has been unable to keep up with the latest literature about gravel-bed rivers.

Mountain Rivers may be purchased from the American Geophysical Union On-line Bookstore: http://www.agu.org/pubs/order.html.
The cost is $27.50 for AGU members and $39.00 for non-members. Annual AGU membership dues are $20 so it may be advantageous to join the organization and participate in all of their scientific endeavors.

Some Basics About Cottonwood Establishment and Survival

by Larry Larson and Michael Borman

A number of factors influence the establishment and survival of plants within riparian corridors. The periodic occurrence of flooding, erosion, deposition, and drought directly influences plant composition. Knowledge of plant adaptations is important to interpret the site potential of a riparian corridor. The purpose of this article is to illustrate environments that favor black cottonwood establishment and survival within the riparian corridor. Information of this type is necessary for establishing appropriate instream flow regimes to restore these riparian ecosystems.

Establishment

Cottonwood flowering and pollination generally coincides in the spring with rising high water in riparian systems and is followed by seed development and dispersal which occurs as water levels recede. The timing of these events is critical to cottonwood seedling establishment. Individual cottonwood seeds are quite small and have a life expectancy of 1-2 weeks which is further reduced to 2-3 days upon wetting. As a result, seed germination and establishment has a narrow window of opportunity and requires a specific environment.

Typical cottonwood establishment is associated with moderate to slowly receding waters that expose freshly deposited mineral substrate (fine sand or a fine sand/gravel mix). This yields an environment free of competition, a mineral soil in which root penetration can maintain contact with a zone of moist substrate as waters recede, and an environment that is not subject to additional erosion, deposition, or prolonged flooding during the first growing season. From a stream classification (Rosgen) perspective we are, in general, describing a "C" channel which provides colonization opportunities through point bar formation and the deposition of substrate in remnant channels that also carry flood water. The stream gradient in this scenario will likely be less than 2 percent allowing fine sands or a sand/gravel mix to form the surface layer of the exposed point bar with layers of mixed and coarse material beneath. The mixed and coarse materials are typically deposited during periods of higher stream velocity. The stream gradient also suggests that floodwaters will tend to pond within this reach of the stream and then recede at a slower rate than would occur on steeper gradient streams.

This sequence of events may occur only once in ten years or longer on many streams in eastern Oregon. This gives cottonwood stands an even-aged appearance (similar height and size) because a large number of seedlings tend to become established at the same time and then thin as the colony matures. In addition, cottonwood populations associated with point bars may give the appearance of being formed in a series of lines or arcs of even-aged trees, reflecting the periodic establishment of seedlings along a receding water line.

All of these factors are encompassed in the "Recruitment Box" model proposed by Canadian scientists Stewart Rood and John Mahoney. An application of the model is shown in Figure 1.

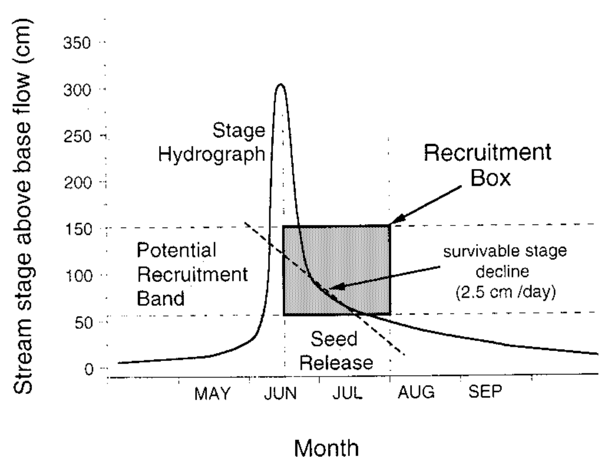


Figure 1. Parameters of the cottonwood seedling recruitment box model applied to the Bow River, Alberta (Mahoney and Rood, 1998; Wetlands (18): 634-645).

In addition to seedling establishment, cottonwoods can also become established through the burial of broken or detached branches and through the development of suckers that sprout from shallow roots. Black cottonwoods shed branches (cladoptosis) throughout the winter and early spring as part of a natural pruning process. Winter winds and snows can also break branches from parent plants, which fall at the water edge. These tree parts represent potential sources for new tree establishment. In this case, high waters may transport and bury or simply bury the branch in place on point bars or other sites of substrate deposition. Then, as the high water recedes, the branches sprout forming new plants. Reproduction via root suckers is also common in black cottonwood. Suckering tends to increase when the parent tree has crown and/or shallow root damage.

Survival

Cottonwoods are susceptible to both extended drought and flooding conditions. Young plants are especially susceptible to drought when moisture from the water table drops below their rooting zone. This is a major cause of seedling death on over-steepened point bars and on steeper stream gradients where water levels can drop at a faster rate than root growth. Juvenile and mature trees, while less susceptible to drought, can show signs of pruning, leaf-drop, and yellowing due to cavitation (air bubble formation in water transporting tissue). Extended periods of drought will result in stunted growth and/or death in juvenile and mature trees.

Cottonwood has several adaptations that allow it to survive flooding events, but it is not as well adapted to prolonged flooding as a number of other riparian species. Cottonwood trees that occur in these areas are often associated with soils that contain a layer of coarse substrate. These soils drain more quickly than fine textured soils and thereby effectively reduce the length of time that a root system must survive in a flooded environment (little or no available oxygen). Cottonwoods typically show signs of stress when flood conditions extend beyond a few weeks. The roots on mature trees tend to survive flooded conditions by utilizing anaerobic respiration (respiration without oxygen) to continue essential metabolic functions. However anaerobic respiration can not be continued indefinitely. It is roughly 20% as efficient as oxygen-based respiration and the by-products from these chemical reactions accumulate within the plant tissue where they become toxic. Reliance upon this adaptation requires a slowdown or stoppage of plant growth and will be limited by the amount of carbohydrate reserves stored within the roots and the subsequent accumulation of toxic compounds. A second way that cottonwoods overcome the lack of oxygen in flooded soils is through the presence of lenticels along the stem and root crown area of the tree. Lenticels are small cracks or pores that develop in the bark. Oxygen entering the tree through these pores will migrate toward areas of low oxygen concentration. In most cases, this oxygen is supplied to adventitious roots. Both of these adaptations can occur within the plant at the same time but in different portions of the root system.

Concluding Remarks

The riparian corridor is a complex mosaic of moisture and disturbance patterns. Plants that form communities within those corridors survive on sites where their basic requirements for establishment, growth, and reproduction are being satisfied. It is obvious that restoration efforts in riparian areas require an understanding of both the environmental mosaic and the life history/adaptations of riparian species. Species-specific knowledge of this type is extremely useful to determine instream flow regimes designed to restore riparian vegetation ecosystems.

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