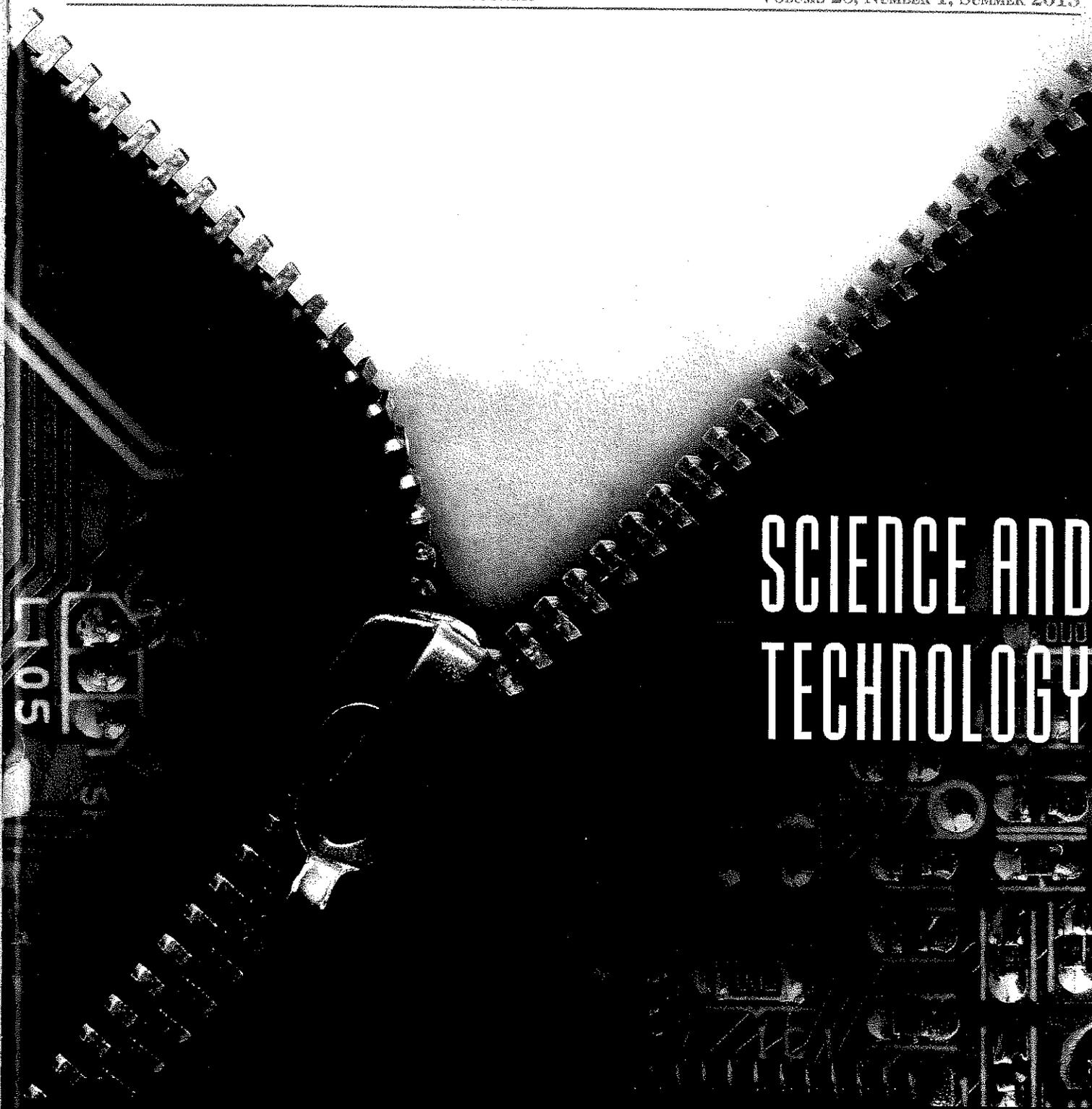


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SCIENCE AND
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Adversarial Collaboration: Court-Mandated Collaboration Between Opposing Scientific Experts in Colorado's Water Courts

Stephen E. Snyder, Daniel Luecke, and John E. Thorson

Justice Stephen Breyer, in his *Introduction to the Reference Manual on Scientific Evidence* (3d ed. 2011), reminded the legal community that “the importance of scientific accuracy in the decision of [a case in which disputed scientific issues are outcome-determinative] reach[es] well beyond the case itself.” Natural resource and environmental litigation is a prime example of the type of case to which Justice Breyer refers. Natural resource and environmental litigation almost universally involves conflicting scientific claims. How the conflicting science is resolved in those cases may determine what natural resources are developed, how they are developed, and what environmental policies are pursued.

Because of the impact on the public welfare of a natural resources or environmental cases, judges in such cases are particularly concerned that their decisions be predicated on sound science. Judges understand how lawyers try cases. They know that lawyers select expert witnesses who support their client's legal position. They know that good lawyers prepare (or coach) their experts before they testify. They know that cross-examination may be used not just to reveal prejudice and inconsistencies, but also to obscure inconvenient facts and exaggerate meaningless differences in the opposing expert's opinion. In their reflective moments, judges may wonder whether they are up to the task of understanding the complexities of the scientific issues they are being asked to decide. They may wish that they could engage the experts who so forcefully opine about the complexities of the issues before them in a dialogue about how those issues should be resolved. In short, in their reflective moments, judges might wonder whether the adversary process is the best process for helping them understand the science upon which their legal decisions will be based.

A survey of judges, special masters, and administrative law judges who are affiliated with Dividing the Waters—a network of judges and quasi-judicial officers who decide water-management disputes—revealed that judges have substantial concerns about advocacy science in the courtroom and the difficulties they encounter whenever they are asked to decide a case abounding with scientific uncertainty. The survey was one of

several seemingly serendipitous events leading to what many would regard as a radical revision of the rules governing the presentation of scientific testimony in Colorado's water court. In cases pending in those courts, experts must now meet, with out the attorneys or the parties present, on two occasions to identify disputed and undisputed issues surrounding their respective opinions and attempt to resolve the disputed issue. In addition, before testifying, each expert must sign a declaration acknowledging his or her duty to the court and attesting that the report does not include anything suggested by someone else (e.g., the lawyer or the client) not reflecting the expert's independent judgment.

Scientific Evidence in Water Cases

The so-called gatekeeping rules governing the admission of expert testimony are one of the principal ways in which the law has attempted to ensure that the trier of fact considers only sound scientific evidence. The *Frye v. United States* test, requiring the scientific technique to be “generally accepted,” served as the predominant threshold test for seventy years (1923–93). 293 F. 1031 (D.C. Cir. 1923). With the U.S. Supreme Court's *Daubert v. Merrell Dow Pharmaceuticals* decision, the criteria became more rigorous, requiring the judge to ascertain whether the technique is grounded in the methods and principles of the relevant scientific field. 509 U.S. 57 (1993).

The *Daubert* rules are often of limited use to judges who decide water-management disputes. One author concludes, “Empirical assessment of judges' background and ability to apply basic scientific and statistical principles suggests they are not well-equipped for this task.” Andrew W. Jurs, *Balancing Legal Process With Scientific Expertise: Expert Witness Methodology in Five Nations and Suggestions for Reform of Post-Daubert U.S. Reliability Determinations*, 95 MARQ. L. REV. 1329, 1350 (2012). Also, judges, not juries, frequently are the fact-finder in water-management cases, and decisions about whether to admit opinion testimony concerning the impact of a proposed water-management action are inevitably predicated on a key piece of evidence: a hydrologic model, the quality and reliability of which might not be amenable to assessment under *Daubert*.

A hydrologic model is a simplified mathematical representation of a stream system or aquifer. It attempts to predict how future events (be they natural or the result of human intervention) will impact the system. The building of such models, by its very nature, is experimental. Streams and aquifers are

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open systems and thus vulnerable to uncontrolled inputs; data are rarely available to define and describe the systems fully; conceptual models necessarily simplify the system; and uncertainties abound.

The *Daubert* test asks whether a model has been peer reviewed and published, but a hydrologic model's reliability depends on its calibration (i.e., how well, had the model previously been in existence, it would have predicted past events). Under *Daubert*, the admissibility of a hydrologic model may depend on known error rates, but the field data necessary to assess important components of a hydrologic model, such as flow-depletion estimates, might not exist.

Outside the courtroom, a hydrologic model is continually subjected to hypothesis testing and is reworked as new data are acquired. In the outside world (as opposed to the world of the courtroom), models are often developed collaboratively, even when competing interests are at stake. In short, no hydrologic model is "scientifically correct." Models evolve as the hydrologic system is monitored, data are collected, assumptions about the system's behavior are changed, and the mathematical expression of those assumptions is revised.

Opinion testimony concerning the impact of a water-management action can rarely be rendered in the absence of a hydrologic model, but all models are suspect because of their complexity, the paucity of data, and their lack of complete transparency to all but those who build them.

Concerns about the Adversary System as a Process for Seeking Scientific Truth

In any water case in which scientific evidence predominates, three types of participants, whose roles are central to the case's outcome, may be found: the lawyers for the parties, the testifying experts, and the judge as fact-finder. As observed in the National Research Council's report *The Age of Expert Testimony: Science in the Courtroom*, p. 16 (2002) (NCR Report), the "members of each group are unfamiliar with the culture and 'professional myths' of the other." The members of each group when performing their courtroom assignments act out these professional myths imbedded in their respective cultures.

The lawyers for the parties are partisans. Their goal in the courtroom is not scientific truth. Their goal is a definitive decision in favor of their client. Even when general consensus around a proposition exists in the scientific community, this consensus is unlikely to appear in the courtroom. Instead, opposing attorneys "search out experts from the tails of the bell-shaped curve so as to strengthen their particular arguments." NCR Report at 16. For the lawyer, the adversarial process—not scientific consensus—is the threshold to the truth of the matter; and cross-examination that diminishes an opposing expert's opinion is the surgical instrument of choice, regardless of the scientific merits of the opinion.

Contrast the role of the lawyers with the role of testifying scientists. When testifying, a scientist is imbued with the methodological norms of the scientific community. Scientific "truth" is consensus among the members of the scientific community—a consensus predicated on iterative hypothesis testing and the rejection and modification of opinions as new insights are gained into the nature of the underlying phenomenon. Although embedded in the scientific culture of consensus, the testifying expert is uncomfortably aware that he or she is expected to act as an advocate and that both the party for

whom he or she is testifying and the party's lawyer expect the expert to testify in a partisan way. Which of these conflicting roles—the consensus-seeking truth-seeker or the partisan—will the expert play when testifying? The law assumes that a scientist's testimony will reflect the norms of the scientific community and not the expectations of the sponsoring clients. Is this assumption justified?

The judge's objective in the adversarial process is to render a decision based on the applicable law, but when the judge is arbiter of the facts, another objective emerges: to ensure that the legal decision is predicated on sound science. A judge is acculturated in the norms of the legal profession. The judge is fully aware of the lawyers' partisan role and anticipates that the testifying experts will advocate their clients' cases. The *Dividing the Waters* survey provides insight into the depth of judges' concerns about advocacy science in the courtroom.

The survey was conducted by Mariam Masid, as part of her doctoral dissertation leading to a PhD in Earth Sciences. Mariam J. Masid, *Reforming the Culture of Partiality: Diffusing the Battle of the Experts in Western Water Wars* (Oct. 30, 2007) (PhD dissertation, Colorado State University). Seventy-four judges, special masters, and administrative law judges from numerous jurisdictions responded to the survey. Among the survey's findings:

59% of the respondents reported encountering adversarial bias frequently in an experts testimony;

69% of the respondents reported fundamental irreconcilability of views in the opposing experts opinions;

and 35.8% of the respondents believed that expert reports had been edited for content; another 31.3% were uncertain whether editing for content had occurred.

The concluding chapter of the Masid dissertation reports that a majority of the responding *Dividing the Waters* judges were receptive to major expert-witness reforms.

Much of the thinking in the United States about sound science in the courtroom has focused on the need for a rigorous threshold or gateway test for admitting expert testimony. Although questions exist about whether a rigorous test is the most appropriate method for protecting juries from fringe science, a rigorous threshold test is not of much use when judges are the fact-finders. The *Dividing the Waters* survey revealed what type of help judges need when—as in most water-law cases—they act as arbiters of the scientific facts. Judges need assurance that the experts are acting independently of the constraints imposed on them by their clients and the lawyers. Judges need assistance in understanding the complexities of scientific testimony. In short, judges need access to experts who will act in an independent capacity as scientific advisers, teachers, and consultants.

Colorado's Attempt to Deal with Expert Bias in Its Water Courts

In 2006, a long-festering water shortage on Colorado's South Platte River came to a head. Drought in the early 2000s became increasingly severe, and in 2006 water-rights priorities on the South Platte were enforced in favor of senior surface rights by forcing the shutdown of hundreds of high-capacity

wells. The shutdown dried up thousands of acres of prime cropland and caused severe economic and social disruption in several local communities. The political fallout from the crisis included loud public complaints about Colorado's water courts. These courts, water-rights owners complained, were much too slow in making decisions, and participation in a water-court proceeding was much too expensive.

Colorado's Supreme Court responded proactively to the public criticism. On December 4, 2007, the chief justice established a Water Court Committee of the Supreme Court and charged the committee with the task of reviewing the water-court process and making recommendations on how to improve the efficiency of the process without adversely affecting the quality of the proceedings. A state supreme court justice chaired the Water Court Committee. The committee's members included another supreme court justice, two water judges, state water managers, consulting hydrologists and water engineers, and, of course, water-law attorneys. The committee chair appointed several subcommittees.

One of these—the Role of Experts Subcommittee (Experts Subcommittee)—was assigned the task of evaluating the expert-witness process in water-court litigation and making recommendations for improving the process. Shortly after it was formed, the subcommittee became aware of the Masid dissertation. The chair of the Water Court Committee had sat on Ms. Masid's dissertation committee and had suggested to her that members of the Dividing the Waters network might participate in her contemplated survey. The minutes of an early meeting of the Water Court Committee reported that the Experts Subcommittee was “focusing particularly on the recommendations and conclusions regarding experts in water cases found in * * * the dissertation of Mariam Masid.” The Water Court Committee's minutes and reports, public comments on the committee's reports, and related information can be found at www.courts.state.co.us/Courts/Supreme_Court/Committees/Committee.cfm?Committee_ID=27.

The testifying expert is uncomfortably aware that she is expected to act as an advocate and that both the party for whom she is testifying and the party's lawyer expect the expert to testify in a partisan way.

The Masid dissertation includes a discussion of expert-witness practices in the courts of England, Wales, and Australia. It reports that judges in those countries have expressed concerns about expert-witness practices similar to the concerns revealed by the Dividing the Waters survey. The dissertation also reports on expert-witness reform proposals in those

countries. When interviewing members of the Experts Subcommittee, we learned that many members were particularly intrigued by these reforms.

The expert-witness reforms in England and Wales are predicated on the so-called Lord Woolf Report. Lord Woolf, the Master of the Rolls (the second most senior judge in England and Wales), was commissioned by the Lord Chancellor in the 1990s to study and recommend changes for the rules of civil procedure for English and Welsh courts in a number of areas, including expert witnesses.

Lord Woolf's proposed expert-witness reforms are predicated on two principles: (1) normally only one expert should testify about the science relevant to the resolution of a legal question; and (2) an expert's duty, when called as a witness, is to act as an adviser to the court and not as an advocate for the parties. In his report, Lord Woolf recommended the following seven guidelines:

- (1) As a general principle, single experts should be used wherever the case (or the issue) is concerned with a substantially established area of knowledge and where it is not necessary for the court directly to sample a range of opinions.
- (2) Parties and procedural judges should always consider whether a single expert could be appointed in a particular case (or to deal with a particular issue); and, if this is not considered appropriate, indicate why not.
- (3) Where opposing experts are appointed they should adopt a cooperative approach. Wherever possible this should include a joint investigation and a single report, indicating areas of disagreement which cannot be resolved.
- (4) Expert evidence should not be admissible unless all written instructions (including letters subsequent upon the original instructions) and a note of any oral instructions are included as an annex to the expert's report.
- (5) The court should have a wide power, which could be exercised before the start of proceedings, to order that an examination or tests should be carried out in relation to any matter in issue, and a report submitted to the court.
- (6) Experts' meetings should normally be held in private. When the court directs a meeting, the parties should be able to apply for any special arrangements such as attendance by the parties' legal advisers.
- (7) Training courses and published material should provide expert witnesses with a basic understanding of the legal system and their role within it, focusing on the expert's duty to the court, and enable them to present written and oral evidence effectively. Training should not be compulsory.

Lord Woolf, *Access to Justice—Final Report* (1996).

Most of these recommendations were incorporated in Part 35, “Experts and Assessors,” of the United Kingdom's Civil Procedure Rules (1998).

In Australia, courts have ordered that expert testimony be

presented through a process known as “hot-tubbing,” which is the concurrent presentation of expert-witness testimony to the court. While judges can modify the hot-tubbing process to fit the circumstances, generally speaking the process has two parts. Before trial, the experts meet without lawyers to discuss their individual written reports and prepare a joint report that sets forth areas of agreement and disagreement. At trial, the lawyers present their lay witnesses in traditional fashion; however, the expert witnesses are called to sit together as a panel (the hot tub). Each expert summarizes what the expert sees as the major issues. The experts can comment on the other experts’ presentations and ask questions of the other experts. The lawyers then identify topics upon which they seek to cross-examine; but before they do, in an apparent effort to save time, the experts have an opportunity to address those topics. The judges of the Federal Court of Australia have used the hot-tub approach to the presentation of expert testimony since the mideighties and the approach is also used in the Land and Environmental Court of the state of New South Wales.

Hot-tubbing, its proponents claim, results in a much more illuminating presentation of the science to the court than the traditional expert-witness approach. In hot-tubbing, all the experts on the topic are testifying at one time, answering the same questions on the same basis. “Because each expert knows his or her colleague can expose any inappropriate answer immediately, and also can reinforce an appropriate one, the evidence generally proceeds directly to the critical, and genuinely held, points of difference.” Justice Steven Rares, *Expert Evidence in Copyright Cases—Current Expert Evidence and the ‘Hot Tub,’* FEDERAL JUDICIAL SCHOLARSHIP ¶ 22 (2009).

Apart from those discussed in the Masid dissertation, other approaches have been used to improve the capacity of tribunals to understand and apply scientific evidence. In his concurrence to *General Electric Co. v. Joiner*, 522 U.S. 136 (1997), one of the *Daubert* progeny, Justice Breyer suggested methods to assist trial judges in making determinations about the admissibility of complex scientific information: court-appointed experts, narrowing scientific issues at pretrial conferences, examining proposed experts at pretrial hearings, and appointing special masters and specially trained law clerks. The use of special subject-matter courts or tribunals (where the judges themselves have the relevant technical or scientific background) may also facilitate the reliable assessment of scientific evidence, regardless of the applicable gateway rule. Japan has created a registry of certified experts. A trial court can select an expert from this registry, although litigants can also retain their own expert from this list or otherwise.

Our interviews with selected members of Colorado’s Experts Subcommittee revealed broad support for reforms predicated on Lord Woolf’s philosophy that the expert’s primary duty is to the court. Subcommittee members broadly supported reforms clarifying and illuminating the disputed issues. The subcommittee considered and rejected as possible reforms hot-tubbing and a rule allowing only one expert, selected by the parties or appointed by the court, to testify about a particular issue.

Ultimately the subcommittee recommended that Water Court Rule 11 be amended in ways transforming expert witnesses’ practice from primarily an advocacy practice to a practice with two overriding objectives: (1) to assure the judge of each expert’s independence; and (2) to provide testimony assisting the judge in understanding the science in dispute.

Water Court Rule 11, together with other water-court rules, was adopted by the Colorado Supreme Court on February 18, 2009.

First, Rule 11 affirmatively states that an expert has a duty to the court and that the expert’s opinion is provided to the court under the standards of conduct applicable to the expert’s profession. The rule expressly prohibits the parties and their attorneys from instructing their experts to alter their reports or opinions. The rule also prohibits an expert from altering his or her opinion or report at the suggestion of another person unless the expert has formed an “independent judgment about the correctness, accuracy, and validity of the suggested matter.” To ensure that the expert fully understands the weight of the obligations assumed when agreeing to appear in court, each expert must sign a declaration attesting that he or she has acted in accordance with the foregoing mandates.

Hot-tubbing results in a much more illuminating presentation of the science to the court than the traditional expert-witness approach.

Second, Rule 11 requires that the opposing experts meet *without the parties or their attorneys present* on two occasions: (1) after the party seeking relief from the court has made its disclosures; and (2) after the opposing parties have made their disclosures. The purposes of the meetings are to “identify undisputed matters” and to “refine and attempt to resolve disputed issues.” Within twenty-one days after the second meeting, the parties’ experts must prepare a joint report setting forth the “matters of fact and expert opinion” that they dispute and do not dispute.

Statements made and notes taken during the meetings of experts are deemed by Rule 11 to be “statements made during compromise negotiations” and are not discoverable or admissible. The committee comment to the rule suggests that the expert for the party seeking relief chair the experts’ meetings. The comment also contains sample agendas for the meetings and various tips for conducting them.

The written comments submitted to the Colorado Supreme Court during the public comment period before the Water Court Rules were adopted reveal that the expert-witness reforms were not greeted with universal acclaim. The Water Law Section of the Colorado Water Bar, in its written submission, stated that the section “is not able to present a consensus, or even a majority, position with respect to substantive provisions of the proposed rules” but also urged the Colorado Supreme Court to consider carefully the written comments submitted by several water-law firms. Written comments submitted by some highly regarded firms criticized the expert-witness reforms, particularly those requiring experts to sign declarations acknowledging a primary duty to the court and requiring experts to meet without the lawyers and clients present.

The expert-witness reforms in Colorado are analogous to a form of scientific research known as “adversary collaboration.”

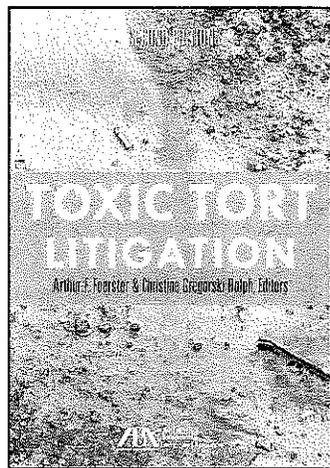
The impact of Colorado’s expert-witness reforms on trial practice in Colorado’s water court cannot be assessed at this point. The rules apply to water cases filed on or after July 1, 2009. In our interviews we have not been able to identify a case that has actually gone to trial under the new rules. Our interviews with hydrologists and water engineers suggest that in pretrial proceedings, the mandatory meeting of experts is clarifying and illuminating the disputed issues and sometimes is the catalyst for settlement. One interviewee hypothesized that the extent to which issues are clarified could depend on the chair’s willingness and ability to lead collegial discussions.

Another interviewee expressed concern that while the rules might simplify trial practice, pretrial practice is more complex (and more expensive) because more is required of experts during the pretrial phase.

The expert-witness reforms in Colorado are analogous to a form of scientific research known as “adversary collaboration.” Adversary collaboration, as described by Nobel Prize-winning psychologist Daniel Kahneman, is a process whereby “scholars who disagree on the science agree to write a jointly authored paper on their differences, and sometimes conduct research together. In especially tense situations, the research is moderated by an arbiter.” THINKING, FAST AND SLOW 234 (2011).

Adversary collaboration does not always resolve scientific disagreements, but it can enlighten. Kahneman describes an adversary collaboration that he undertook with a psychologist holding different views. Kahneman deems this adversary collaboration his “most satisfying and productive.” He reports that at the conclusion of their joint research, the other psychologist “and I disagreed less than we had expected and accepted joint solutions of almost all the substantive issues that were raised. However, we also found that our early differences were more than an intellectual disagreement.” *Id.* at 244. If adversary collaboration works as well in Colorado’s water courts as it did for Kahneman, Colorado will have achieved much. 🌱

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