

## Forensic Geomorphology

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According to Tank (1983, p. 12), geologists have testified as expert witnesses in litigation involving landslides, subsidence, erosion, ground and surface water problems, mineral discovery, mine safety, oil and gas discovery and ownership, environmental disputes, soil conditions, and criminal cases. Engineers are also involved in geomorphic-type forensic activity, especially with regard to the causes and effects of mass movement, river hydraulics, and flooding (Shuirman and Slosson, 1992; Rens, 1997). During the past 35 years, I have been involved as an expert witness in hearings, depositions, and trials that were related to channel incision, river boundaries, bank erosion, island ownership, water rights, and river navigability. This type of activity is considered to be part of the work of forensic geomorphology.

The term *forensic* brings to mind experts testifying during a criminal trial. This is understandable because of the popular mystery novels by Sarah Andrews that involve a criminal forensic geologist and books describing how forensic geologists use mineralogy and sedimentology to locate the sites of criminal activity (Murray, 2004). However, these limit the meaning of forensic, which is much broader. Forensic pertains to legal proceedings or argumentation (Morris, 1981). Black (1979) states that forensic medicine involves the “application of every branch of medical knowledge to the purpose of the law.” If we substitute geomorphic knowledge for medical knowledge, we have a definition of forensic geomorphology that applies to both criminal and civil litigation.

The purpose of this commentary is to encourage my friends and colleagues to become involved as experts in geomorphic litigation (Coates, 1976). In several instances, I have found highly qualified geomorphologists reluctant to be involved in cases in which they clearly could contribute to an appropriate outcome. For example, boundary disputes, where a river forms the boundary, require geomorphic input. Perhaps my fellow geomorphologists are deterred by examples of television program cross-examinations. In reality, a judge would never allow the speechifying that occurs during television trials, and in my experience, cross-examination has always been professional and reasonably civil.

An individual can be qualified as an expert “by knowledge, skill, experience, or education.” The expert may testify in the form of an opinion if “(1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case” (Federal Rules of Evidence, 2004).

There are three phases of litigation that involve expert witnesses. The first is the pretrial deposition, during which opposing counsel questions the expert witness in order to determine what was done and what the expert’s conclusions are. The purpose is to allow the opposition to learn as much as possible about the expert’s activities and opinions and what he or she will testify to in court. In this procedure, the questions are designed to elicit information, and the situation can be informal. Next is direct testimony, during the trial, when the expert’s opinions are expressed during questioning by the expert’s attorney. This is straightforward and professional. The final phase is cross-examination, when opposing counsel attempts to weaken the previous testimony and perhaps to show conflict between testimony in the deposition and testimony during direct examination, which is often referred to somewhat dauntingly as impeachment. This, of course, is the most stressful part of the expert’s involvement. However, if the expert is convinced that his or her testimony is accurate, the response to cross-examination will essentially be a repeat of the deposition and direct testimony.

The following is some helpful advice provided to me by attorneys with whom I have worked:

1. Be truthful—If you lie or are less than straightforward with an answer to a question, you will appear to be biased, and you will lose credibility. If your reputation is damaged, not only will you be damaged, but so will your client.
2. Listen carefully—Answer only the questions asked, and do not guess or speculate. “I do not know” is an appropriate answer. Remember, you can only be questioned in your area of expertise.
3. Provide short answers—Answer as briefly as possible, and do not volunteer information that was not requested.
4. Short but not too short—Do not answer yes or no to a complex question. You can always explain your answer.
5. You can always request a time-out if you are tired or require a break.
6. An appropriate response to an “isn’t it possible” question is “yes, but it is improbable.”
7. Do not joke or be flippant or sarcastic, and do not lose your temper.
8. Avoid jargon and keep explanations simple, especially before a jury.

The reason people hesitate to act as expert witnesses is that they feel that they will be made to appear incompetent or even foolish under cross-examination. That is, they are afraid that some fast-talking, know-it-all lawyer is going to make fools of them. However, most trial lawyers are afraid that some fast-talking, know-it-all witness is going to make

fools of them—or worse, is going to destroy their cases. A seasoned trial lawyer may not appear nervous—but most live with butterflies in their stomachs (Baker, 1983).

Remember, you are on better ground than the questioner. He or she can only ask questions; if you know the answers, you are in control. Often, if the expert has done a thorough and professional job, the opposition will accept defeat, and the case is settled before trial.

Examples of litigation related to river boundary disputes, causes of bank erosion, and the effect of diversions on channel morphology are provided by Bowman (1923), Womack (2001), Schumm, (1994), and Gordon (1995).

A well-trained geoscientist who understands the argument advanced by the opponent and who has done all of the field work, literature review, and data analysis necessary has nothing to fear from cross-examination. Of course, if the expert's investigations reveal that the case is weak or, if in fact, the position of the expert's employer is incorrect, it is the expert's obligation to so inform his employer and his attorney so that a trial can be avoided. Finally, a major obligation of the expert is to educate the attorney regarding the technical aspects of the case and to assist in developing a plan for the presentation of evidence and cross-examination.

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