

Advocacy, Critical Thinking, and the Classroom

Science teachers at all levels spend too little time providing exercises that teach students to think critically, in favor of providing content to memorize (AAAS 1989, 1993; Nelson 2000). That's true of fisheries science as well. I've created a number of class exercises to encourage students to think critically about controversial natural resource management issues for use in my capstone course at Virginia Tech (Berkson and Harrison 2001, 2002). In this essay I provide an example regarding advocacy, a frequent topic in this and other natural resource management journals in recent years. I show that this exercise helped students critically evaluate the professional implications of advocacy and the range of advocacy options they will face as natural resource scientists.

Advocacy in the Classroom

There have been a wide variety of viewpoints written on advocacy in general, on the role of advocacy by the individual (Wolok 1995; Lackey 1997; Meffe 1998), and the role of advocacy by our professional societies (Brussard et al. 1994; ICAFS 1995; Noss 1994), among other topics. By advocacy, I explicitly mean the promotion of specific environmental policy alternatives over others. For example, in this context, one is not advocating when he presents the results of a scientific study on dam removal, but one is advocating when he specifically promotes the policy of dam removal. Students entering careers in fisheries will not be able to avoid or escape dilemmas involving advocacy. Given the certainty that our students will face this important issue, how do we address the issue of advocacy in our classrooms? There are three main ways.

The first and easiest way to deal with advocacy in the classroom is to ignore it. Many faculty believe that the topic is not pure science, and therefore doesn't belong in the fisheries science curriculum (Berkson and Harrison 2001). Topics involving values, whether societal or personal, don't play a role in their classrooms. While easy to administer, this philosophy does not properly prepare students for the world they will be facing when they leave the university (Berkson and Harrison 2001, 2002).

The second way we commonly deal with advocacy in the classroom is to tell students how to think about the issue. We all have strongly held opinions on whether scientists should be advocates. If we look at the literature, we often find papers where authors argue one extreme or the other. Some argue that natural resource scientists must be

advocates for nature, because nature has no other advocates (Noss 1994; Meffe 1998). Others argue that if we become advocates for specific policies, we hurt our scientific credibility and our effectiveness as scientists (Brussard et al. 1994; Lackey 1997). If we agree with one side or the other and present only one point of view in the classroom, we, in effect, strongly encourage all of our students to adopt our point of view. As faculty and mentors we should not encourage students to accept our values, we should encourage them to identify their own (Berkson and Harrison 2001).

The third and least common way to deal with advocacy in the classroom is to encourage students to think for themselves. It is true that many of our students are not used to thinking critically about much of anything. University students, and science students in particular, are used to memorizing and regurgitating. Students are commonly taught to memorize the right answer, that science is objective, and that personal values don't play a role in our work. Development of personal values should be a curricular thread (Newcomb et al. 2002) that appears throughout the undergraduate curriculum.

Alternate Points of View

What do we know about advocacy and the individual? While we can find literature saying we all should be advocates and literature saying none of us should be advocates, it's very tough to find an article stating that there's room for both points of view. In fact, there are jobs for scientists who want to advocate for specific policies and jobs for scientists that want to avoid advocacy. Scientists who feel a strong need to advocate can find jobs with one of many environmental groups likely to encourage advocacy. Scientists who want to avoid advocacy can find jobs with a national laboratory or a federal agency where advocacy is likely to be discouraged. The bottom line is that we do not all have to be advocates nor do we all have to avoid advocacy. It's up to each individual to decide what role he or she wants advocacy to play in his or her career.

As faculty and mentors, one of our goals should be to encourage students to think about what careers will make them most happy and effective (Reed 1989). Many students will enter careers that are not consistent with their values. Individuals that want to avoid advocacy may be extremely uncomfortable and unhappy in a job where advocacy is encouraged or expected. Similarly, would-be advocates may find it difficult to work in an environment where advocacy is not tolerated. If students haven't thought about advocacy, how can

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they consider it when picking a career? By encouraging students to think about issues like this before they make key career decisions, we increase the likelihood that they will be happy with their careers. In addition, recent graduates who are happy and excited about their work are likely to be more productive than those who aren't (Berkson and Harrison 2002).

But how can we accomplish this? Students are not used to inserting themselves into course material and identifying personal values and opinions. As a result, students asked to come up with their own opinions look for an easy way out and often adopt either the first or the last opinion they encounter. Many of the smarter students will actually wait in hopes of learning their professor's opinion, assuming that it will be the correct answer on their next test. Adopting someone else's opinion is easier than being introspective, particularly if one doesn't know how.

Encouraging Critical Thinking

One way to encourage students to think critically is to expose students to a sampling of articles published on the subject with a range of opinions (Berkson and Harrison 2001, 2002). Once exposed to various points of view, some students will begin to think about their own opinions on the subject.

Reading other people's opinions, even a range of opinions, is usually not sufficient to encourage critical thinking in the majority of students. To do this, students must become immersed in these issues. They need to relate the issues to their own lives. They need to think and talk the issues in the first person. A good way to do this is through the use of an in-class exercise to promote critical thinking with active learning techniques (Ebert-May et al. 1997).

An Example Class Exercise

In the example below, students are asked to insert themselves into a fictional case study, forcing them to think critically about advocacy. I use this exercise in a single 50-minute class session. I start by providing students with the basic fictional story below.

"You live in the state of Virginia where the yellow-finned hog-nosed darter is endangered. Many people find it to be a very cute species given the combination of its flat nose and its unique coloration. The darter lives in a small section of stream habitat, currently desired by town planners and home builders. The basic science is clear to all who care to see. The population decline of the darter is due to habitat destruction. Stopping the decline and restoring the population is dependent on preserving the remaining habitat. A new business park is being proposed on prime darter habitat."

The students are informed that there are four basic interest groups of concern:

- **Local universities**, and in particular, their new assistant professors, are becoming actively involved in darter research, jumping at every opportunity to acquire additional funding from the federal government.
- The **federal agency** responsible for darter management is busy trying to stay out of the controversy because this is an extremely important region politically.
- **Town residents** have been trying desperately to get out of the recession of the last 10 years and see the building boom as their best chance.
- **Environmental groups** are beginning to rally around the darter, using it in national fundraising appeal letters.

Students are told to review Table 1, which lists four possible occupations and four opportunities to advocate policy. Their assignment is to consider each possible pairing and answer the following: If this was my occupation, would I be willing to take advantage of this opportunity to advocate a specific policy regarding the darter? In each case listed in Table 1, the students are to assume that they enjoy their work and want to continue doing it. They are to carefully think of the pluses and minuses of each action. The students begin working through the table individually, then move to groups to discuss their answers.

Advocating for policy as a scientist often has implications and may cause unintended consequences for one's job. There are a number of subtle and not-so-subtle considerations that the students will hopefully consider. Working in groups is beneficial as one group member may think of consequences that others may miss.

For instance, consider a federal agency employee who speaks at an environmental rally against the business development. Word might get out that he is an employee of the agency. Fellow agency employees, including supervisors, would likely learn of his involvement. How would his employers feel about his advocacy, considering the agency's objective to stay out of the controversy?

Consider the case of an elementary school teacher who writes a letter to the editor against the business development. It's likely that the students' parents, most being supporters of the development, would read the letter. How would they feel about their children being taught by an anti-development person?

Many of these opportunities to advocate may seem to be unrelated to an individual's work, when in fact there are connections and consequences. Being an advocate often involves risk and it is up to each individual to decide how much risk they are willing to take. The exercise forces students to think about this. Usually groups can work through the table within the 50-minute session.

Evaluation of the Exercise

A survey was developed to test the effectiveness of the exercise. Students were questioned regarding their opinions about advocacy and how their opinions changed as a result of the exercise. The survey contained 22 questions: 12 designed to target the students' opinions about advocacy in general, and 10 designed to ask students about their own futures and the role advocacy is likely to play. For each question, students were asked to circle one of five responses: 1—Strongly Disagree, 2—Disagree, 3—Neutral, 4—Agree, 5—Strongly Agree.

The survey was given to students in the class, "The Role of Science in Natural Resource Management," in the spring of 2003 at Virginia Polytechnic Institute and State University. The survey was first given to the students on a Monday during the last 15 minutes of class and then collected. The exercise was then conducted during the first 40 minutes of the next class, on a Wednesday. Students were then given another copy of the same survey to fill out during the final 10 minutes of Wednesday's class. The students did not know they were going to be given the survey twice. The before and after surveys were completed by 31 students enrolled in the course, 27 seniors and 4 graduate students. Changes between the before and after surveys were tested with a Wilcoxon signed rank non-directional test that pairs before and after responses for each individual.

Because of the exercise, students better understood the wide range of opinions held about advocacy. Students' responses tended to move in the direction of "strongly disagree" ($W=45$, $N=12$, $P=0.08$) to the statement, "Resource scientists, in general, feel the same way about advocacy." Similarly, students' responses to the statement, "My classmates place a similar priority on advocacy as I do," changed ($W=81$, $N=18$, $P=0.08$) in the direction of "strongly disagree." The exercise is designed to make the point that some will take great risks to advocate and others will not.


Students, as a result of the exercise, better understood the subtle implications of being an advocate. Students' responses changed ($W=115$, $N=21$, $P=0.05$) in the direction of "strongly disagree" to the statement, "A person can be an advocate on their own time, regardless of their employer." Similarly, responses to the statement, "Some employers will not tolerate their employees advocating for environmental policies," changed ($W=-33$, $N=10$, $P=0.10$) in the direction of "strongly agree" after the exercise. The exercise is designed to demonstrate to students that advocacy can have great implications, depending on the career and employer you choose. Students need to have a realistic view on the consequences of advocacy.

Realizing the potential implications of advocating on employment, students' desire to advocate decreased. Students' responses changed in the direction of "strongly disagree" ($W=60$, $N=14$, $P=0.06$) to the statement, "Advocating for specific environmental policies is very important to me." Many students entering the course felt that advocacy was an activity they were expected to do. As a result of the exercise, advocacy was seen as more of a choice. Note that not all students moved away from advocacy. A small number actually moved in the direction of "strongly agree."

Finally, and most interestingly, the exercise seemed to increase the confidence the students had in their anticipated career choice. Students' responses changed ($W=-44$, $N=10$, $P=0.03$) in the direction of "strongly agree" to the statement, "I know with great certainty the kind of job and employer I will have in the future." This statement showed the greatest movement on the survey. In the course, I stress that students must identify their values on important issues like

Table 1. Sample Class Exercise: Consider yourself having each one of these occupations, one at a time. Would you take advantage of the following opportunities to advocate a specific policy regarding the darter?

OCCUPATION			
Assistant professor at a land grant university	Research scientist with a federal agency	Elementary school-teacher in the town	Policy analyst for an environmental group
OPPORTUNITY			
Testify, if asked, before Congress			
Write a letter to the editor in the local paper			
Speak to a rally of environmentalists			
Chain yourself to a bulldozer			

advocacy, and then find careers consistent with those values. This exercise helped students both identify their values on advocacy and identify careers consistent with their values. As a result, students became more confident of their choices. 

Summary

As educators, we need to encourage our students to think critically. In this essay, I described an exercise that focuses on the controversial issues of advocacy to accomplish this. As demonstrated by the evaluation, students gained a greater understanding of the complexities and subtleties of the issue. They also gained a greater understanding of the role they want advocacy to play in their lives. The students felt that this was an important and necessary component of their education. All 31 students surveyed after the exercise either agreed or strongly agreed with the statement, "Advocacy should be discussed in the natural resource management curriculum." This is one component of a unique capstone course at Virginia Polytechnic Institute and State University (Berkson and Harrison 2001, 2002; Berkson 2002).

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