

Chemical, Biological or Natural Control of Eurasian Watermilfoil: A study in Biopolitics

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Introduction

This is not going to be a discussion of the relative merits or drawbacks of the chemical, 2,4-D ([2,4-dichlorophenoxy] acetic acid), the white amur (*Ctenopharyngodon idella* Val.; Cyprinidae), or naturally occurring insects for the control of Eurasian watermilfoil (*Myriophyllum spicatum* L.; Haloragaceae) in the Okanagan Valley lakes in British Columbia.

It is going to be about the roles played by scientists, administrators and the public in regard to the infestation and to pest control conflict situations in general.

The Conflict

I shall begin with a brief overview about what happened locally.

Eurasian watermilfoil began spreading rapidly through lakes in the Okanagan basin in the early 1970s. The provincial government, through its Ministry of Environment, established the Aquatic Plant Management Program (APMP) to investigate the situation. Two advisory committees to the program, one composed of various federal and provincial government employees and the other of three University of British Columbia professors, were also established to provide technical advice on aquatic plant management.

By 1977, a number of courses of action had been considered by these bodies. At one end of the spectrum was a minimum program, including general acceptance of the infestation and mechanical control to be done when the weed impeded navigation or presented a severe threat to public safety. At the other was a vigorous control program to reduce the extent of the weed and possibly eradicate it through extensive mechanical and herbicide use.

The first was seen as not acceptable by these planners. The APMP's proposals for 1978 reflected the second — 'an effective and large scale program to attempt to eradicate and to achieve control ... research done has confirmed the effectiveness and safety of 2,4-D and indicated the value of a number of mechanical methods'.

Permits to treat with 2,4-D 500 of the 600+ ha infested were requested. A mechanical control program, research into the ecology of the weed, a quarantine program, use of barriers, elaborate monitoring and safety precautions were also planned.

Use of biological control agents, particularly the white amur and some foreign insects the USDA was investigating, were considered but none were thought to be feasible and efforts in this area henceforth consisted of monitoring U.S. research through the literature.

There was an awareness of the declines that had occurred in other areas, but never any serious consideration given to waiting to see if that might happen here.

Meanwhile, back in the Okanagan Valley, there was considerable concern from various segments of the public about the proposed control program. While most people would rather not have had the weed, degree of reaction varied greatly. Some people felt it threatened their livelihood and others thought it wasn't really all that bad. There was concern about the scale and cost of the proposed program and a feeling in some areas that causes rather than just effect should be dealt with. The city of Kelowna had issued a report saying

'we feel ... any action should deal with the habitat or the factors affecting it rather than solely with the offending plants. Cosmetology for the benefit of a few citizens becomes an obligation. It establishes a precedent and requires repetition of the action. Cost in the long term would no doubt be excessive.'

Some members of the Okanagan Water Basin Board also opposed use of public monies for cleaning up private beaches. Local medical health personnel accredited the milfoil with eliminating what had been a severe algae problem in a number of areas and urged that efforts be directed towards dealing with the sewage disposal problems that were causing eutrofication of the lake. The U.B.C. Advisory Committee, after visiting the Valley, acknowledged that there was a definite body of opinion that the control methods must not produce more problems than the weeds themselves.

However, most of the debate focussed on whether the biggest problem was the weed or the 2,4-D that the government planned to use against it. The anti-weed lobby, whose main spokesmen were APMP personnel, painted scenarios of tourists avoiding the Valley, of people drowning in shore-to-shore milfoil, and of property values plummeting. The anti-2,4-D people said none of these dire things would come to pass and that the real danger lay with the 2,4-D which they thought was a possible carcinogen, teratogen, and mutagen. A coalition of local environmental groups led the fray against use of the herbicide, but a wide range of other organizations, including most of the local health people and agricultural groups also went on record opposing it.

The chemical control part of the program was not fully implemented that year or in any of the three years that followed. Twelve, not five hundred, ha were actually treated with 2,4-D in 1978, and only a total of 70 ha were treated over the course of the whole program.

Each year the environmental group would launch appeals against the permits issued. They would produce experts and expert testimony about the dangers of 2,4-D to humans and the environment. The government would counter with other experts and evidence that it was safe. The appeal board which operated under the same government auspices as APMP, always accepted the arguments of the APMP and upheld the permits. However, the delays resulting from these appeals often carried past the time when the chemicals could be effectively applied. As well, the issue of uncertainty of safety and disagreement among experts contributed to public opposition to use of the herbicide. More and more municipal bodies rejected use in areas under their jurisdiction.

The APMP undertook an extensive public relations program to sell the effectiveness, necessity and safety of the program: public information meetings, production of a film about Eurasian watermilfoil called 'The Alien Invader', production and dissemination of pamphlets — but the controversy and polarization, if anything, only increased.

In 1982, the government, using financial restraint as the reason, discontinued the use of 2,4-D for the control of milfoil. The previously unacceptable option had come to pass and milfoil had gone from being a nuisance to a threat and back to a nuisance again. Controls consisted mainly of harvesting. There was still a lot of milfoil in the

lakes. However, the infestation had peaked at 674 ha in 1978, and was actually declining since that time in some untreated areas.

The APMP was able to carry on research from 1980 to 1983 into the cause of these declines and clearly established that attack by a variety of indigenous insects, followed by pathogen damage was responsible. This research has now been discontinued. It was not seen as a priority in a time of financial restraint.

To summarize, most of the actual control programs against Eurasian watermilfoil in B.C. have been of a mechanical nature. The large-scale 2,4-D program did not occur, and use of exotic biological control agents was never tested in the area. Natural decline, due primarily to insect attack, is occurring, but whether or not this will significantly reduce the infestation of milfoil in B.C. remains to be seen.

What had also occurred was a tremendous investment of time and energy and money by government and local environmentalists in opposing each other as to how milfoil control would be carried out. This is certainly not a unique situation. Public opposition to programs developed to deal with issues ranging from pest control — milfoil, spruce budworm, gypsy moth — to nuclear plants and the disposal of toxic wastes, has become a familiar pattern in this country, and in many other places in the world.

Discussion

While in the pest control area, chemical control programs have drawn the most fire. This may be at least in part because they are what is most often used. I suggest that the increasing frequency with which we find ourselves at odds with the very people we are supposedly trying to assist is not just an anti-chemical basis; remember, opposition to white amur in many places has been as strong as the opposition to the use of 2,4-D was here. There are a number of situations involving use of biological control agents that resulted in conflicts very similar to this one.

I will predict that as the use of biological control agents becomes more common and higher profile, so will conflicts with the public regarding their use. The agendas of symposiums about biological control, as so many of their agricultural and forestry counterparts already do, will increasingly include discussion about how to deal with what we perceive to be a hostile media, how to outwit 'irrational' environmentalists, and how to reach the silent majority who we hope (but are not sure) support what we are doing. All this and more, unless we can learn why this is happening and make some changes.

The conflict that occurred was not due to malicious contentiousness, incompetence, or anything else of that nature on anyone's part. Indeed, if less capable, less honestly motivated people, had been involved on either side of the conflict, I feel it would not have persisted as long or as intensely as it did.

Nor do I feel that the controversy was without some benefit. Safety measures were perhaps more carefully observed, and alternatives more rigorously sought. Many residents of the area became more environmentally aware because of the issue, and continue to be active in other such situations. However, such gains could surely have been less painfully made, and a program more acceptable to a greater number of people developed and carried out.

With the best intentions we invest a lot of time, energy and money developing programs that we feel sure are the best possible — and they may well be — only to see them rejected, stalled or defeated by the very public they were created to serve. Too often excellent overall programs are put into peril because of one small but controversial part.

Similarly, citizens who oppose these programs truly believe in the truth, beauty, and wisdom of what they are doing, and make similar investments, only to often see unsatisfactory ultimate results.

How can this dilemma be resolved? There are many issues, but I would like to address two that I feel are central to such conflicts. One relates to disagreement among scientists, and the other to decision making.

We need a new theory and method of decision making — one which can accommodate the fact that experts can be expected to disagree — indeed judge such disagreement to be a healthy, inescapable feature of decision making, and that the absence of such disagreement indicates inadequate scrutiny of the situation. In this case, and often in other cases, scientists for the government are pitted against scientists for the opposition, in search of an absolute right and wrong. This seems to spring from some simple theory of science; i.e. that data are collected for which there is one interpretation. In fact, of course, every set of data has a number of often conflicting interpretations. This is something we accept easily enough in discussion among ourselves, but have a great deal of difficulty dealing with publicly.

As well as different interpretations of facts, there are problems of saying what constitutes a significant effect and what is an adequate amount of data.

But basic to all of the above, and most important of all, are the different values and value systems at the root of these disagreements. This is seldom discussed, and when such disagreements occur, too often one's opponent is labelled as biased (which has become synonymous with words like 'irrational' and 'unscientific') and dismissed from further serious consideration.

Actually bias is just a mental tendency or preference — a value system — all things that scientists aren't supposed to have!

'Biased' was the word used by environmentalists and scientists alike about each other in the milfoil conflict. They were both right. There were definitely two kinds of biases or value systems operating in opposition to each other. One was that benefits from use of 2,4-D far outweighed any risks involved: the other was that that was not so. There was also disagreement about the magnitude and urgency of the problem.

Both sides had lots of facts to support their beliefs. However, whether the risks outweighed the benefits, or how urgent it was, was a matter of human judgement, and values and beliefs — an area in which scientists are no more qualified to make decisions than the average layperson, and particularly the average layperson who might be directly affected by the results of any such decision.

Hard facts — ppm, LD₅₀, x number of infested ha — are few and only go so far. Human judgement is needed to interpret facts and findings and determine their relevance to each particular situation.

Also, pest control has been considered to be mainly a technical problem. The APMP personnel certainly tried to deal with it that way. They felt that 2,4-D was (if all technical problems could be overcome) a highly effective control. As is so common in these situations, a decision about how to handle the problem technically was reached first and then an attempt was made to incorporate it with social and economic concerns. The latter are areas like judgement about risks in which biologists have no more wisdom and expertise than the average layperson.

Another thing we are aware of but seldom talk about or deal with constructively is how often where you work, when and where you obtained your education, makes it easy to predict what your priorities, values, biases if you will — will be. In situations like this all possible alternatives are usually acknowledged, but this doesn't mean they are equal or even given serious consideration in daily practice. We always have at least a favourite type of solution which receives more of our attention than other alternatives.

In an attempt to have a wide variety of input and presumably avoid some of the pitfalls I'm discussing, the advisory committees mentioned earlier were established. There were a variety of different specialists involved in the B.C. Aquatic Weed Advisory Committee. However, they shared one definite bias — all were government employees, either federal or provincial, and all had to have at least been aware of, if not in agreement with, the sort of solutions and method of handling public pest control situations that political situations seem to demand; i.e. technological fixes — the application of science in a definite way to get quick and hopefully permanent results. Eradication of milfoil, which was still being talked about as late as 1980 in government reports, is such a solution. The three university scientists had worked on government commissions, indeed were selected partly because of this, and would have also shared this predilection. It is interesting that when disagreement with the proposed program did arise from within the ranks — some medical health officers, fish and wildlife people, Environment Canada — those in charge of the program dismissed their criticisms as irrational, prejudiced and something to be got around rather than considered.

With scientists and environmentalists alike, initial impressions, once formed, tend to structure the way subsequent evidence is interpreted. New evidence is seen as being reliable if it is consistent with our initial beliefs and not if it isn't. In the milfoil controversy, this was certainly the case. Also depending on their predisposition, people saw efforts to reduce the hazard represented by 2,4-D as either responsiveness to public concern or as an indication that the risks were very great indeed, probably more so than was being publicly admitted.

Differing values or biases among scientists and between scientist and the community at large are inevitable. I don't feel there is anything wrong with scientists functioning as advocates of different points of view or for different segments of the population. It is a problem only if it is not handled openly and evenhandedly.

Which takes me to my second point about who makes the decisions in these conflicts. There is a temptation to say the politicians do, but usually it is not that simple. I would suggest they often prescribe the type of solutions they want — permanent, effective, rapid results — but that the details as to how it will be done — indeed what can be done — are left to the researchers and administrators far more often than we might wish to admit or desire. The charges sometimes made about powerful but invisible elites being behind government actions certainly have some basis in fact. Policy making is not decision making but the former often evolves directly into the latter.

There is also a strong tradition that decisions which will affect environmental quality or public interests are best made by supposedly apolitical, rational, unbiased scientists who will ensure these resources will be used responsibly for the benefit of man. This is a tradition that is being challenged more and more frequently. People are more concerned with the quality of life and see humans as part of the biosphere, not as master of it. They are quicker to resent impersonal, expertise-dominated policies. Many feel about scientists the way many scientists feel about a certain kind of auto-mechanic or physician. They agree there is a problem — possibly not what you thought it was — but don't bother to discuss the details of it with you because they know you wouldn't understand. Besides, it doesn't matter if you do, because they have already decided how to take care of everything, and yes, it's going to cost, and just sign here please. Protests are often less against what is being done than how it is done.

Too often, not knowing how to deal with, or simply not wanting to, we try to neutralize or avoid, public involvement. Most participatory mechanisms are reactive. Too often the pattern is to decide, inform and defend. We hold public information

meetings to tell people what we are going to do. Often they already know and, feeling that it is a *fait accompli*, don't bother to show up. Or we ask their opinion, reserving all the time the right to make the final decision.

When it became obvious that there was quite a bit of opposition from the public to the use of the herbicide, the scientists decided that this concern was due to a lack of proper information about the situation and the distortion of facts by the media and environmental groups. The cure was seen to be more information to the public and development of a better relationship with the media. While both are valid actions, they overlooked a desire and need for genuine involvement of people in solving their own problems. They also did not see or refused to accept as something they had to deal with, the fact that it was not that many of the local residents didn't understand the problem but rather that they were disagreeing with the government's interpretation of what it was and with how it planned to handle the problem.

When, then, do you involve citizens? I would suggest you do so from the beginning, before any major decisions have been made and before commitment to any particular type of solution, and on an ongoing basis before finalizing any subsequent steps.

Just what role is a scientist to play in this integrated approach? Lowerance's (1984) criteria from his book 'Of Acceptable Risk', provide a good basic guideline. He feels a scientist's role in any situation involving risk is to: (1) collect and organize information so it is accessible and understandable ... simple and jargon-free; (2) put sources of bias and potential conflicts of interest on the record ... to state previous public positions on the issue at hand; (3) identify what components of a decision are scientific facts and which ones are value judgements; (4) reveal degrees of certainty with which various parts of the decision are known ... to present worst as well as best scenarios and to tell people what we don't know as well as what we do know; (5) insist on the inclusion of critical, articulate laypersons who will be affected by the decision to be included as equal partners in the development of policy and decision making. These could be Turner's (1985) conflict resolution groups or van Zon's (1985) grass carp working group.

From whence are these articulate and critical laypersons to come? I would suggest they are already out there. That, in fact, is the cause of the increase in controversy. It is interesting that it is the more well educated and informed with whom we most often find ourselves at odds. There are more and more people who feel they have a right to know and to have a say in actions that affect them.

For those who feel such people are few and far between, I would like to quote Thomas Jefferson:

'if we think people are not enlightened enough to exercise their control with wholesome discretion, the remedy is not to take it from them but to inform their discretion.'

In the Netherlands there are courses which teach scientists how to popularize their research findings and for lay people to better understand and appreciate scientific theory and methods. The latter is very important. Some of our problems may be because we have oversold effectiveness and certainty and safety to the public and consequently have a credibility problem. The public must learn to appreciate that a profession's body of knowledge is only the best available truth for that time and that it is impossible to predict all effects of an action. We must avoid the White Knight Syndrome of saving the lakes, forests, or whatever, and the development of false expectations either by omission or commission.

This will not be easy. Scientist and laypersons alike, like certainty. Uncertainty breeds anxiety which leads to denial which leads to overconfidence in data, methods, and current scientific techniques. However, if we are to solve the problems we face in an

amicable and effective manner, we really have no choice but to begin to work in these directions.

It is a matter of reordering priorities. The political aspects of our work will continue to be much more difficult than the biological ones until we decide they are as much of a priority, right from the beginning — as the biological ones. Involving the public must become as important as being sure of the taxonomic identification of the pest or control agent in question.

And finally, I recommend that we look past all the obvious, immediate problems and apparent drawbacks of this new ordering of priorities to the positive aspects of being able to share responsibility in difficult situations, to a surer sense of being on the right track, and for greater support for at least some of the things we might want to do.

References

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